

Habitats and Endemic Species in Tourism Areas

Lebanon scale





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

Habitats and endemic species in tourism areas Lebanon scale



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OVERVIEW

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REVIEW

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List of abbreviations

CDR	Council for Development and Reconstruction
DFW	Department of Fisheries and wildlife, Ministry of Agriculture
MoE	Lebanese Ministry of Environment
NCMS	National Center for Marine Sciences

I. Introduction

The new fastest growing tourism trend today is mainly heading towards ‘nature-based’ tourism, which often involves excursions and journeys to either natural sites or wilderness in the developing countries where a large portion of the world’s biodiversity is of a high concentration (Olson, 2001). Yet, nature-based tourism activities may put pressure on the resources they usually rely on. In fact, they represent high risks to ecosystems and the ‘services’ they provide (e.g., freshwater supply, soil regeneration and pollination). At the same time, the current trend towards protecting most of the world’s preserved areas as well as their natural resources depends chiefly on Tourism prosperity that is unfortunately in its turn is threatening the natural resources (Kuenzi and McNeely, 2008).

Lebanon represents a typical example where nature-based tourism has a significant role in the development of the tourism industry. The natural setting of Lebanon is one of the best tourism attractions. In particular, the coastal zone of Lebanon, including marine and terrestrial habitats for a variety of both the flora and the fauna different species, is one of the main touristic destinations not only for local visitors but also for international tourism.

The Lebanese coast lies on a 225 km length extending from Aarida in the north to Ras El Naqoura in the south. It extends between the following geographic coordinates:

34° 37’ 58” N & 35° 58’ 35” E, at Al-Arida

33° 05’ 39” N & 35° 06’ 14” E, at Ras El Naqoura.

The continental shelf along the Lebanese coast is relatively narrow (~3 km) and it becomes wider in the northern and southern areas (~6 to 7 km).

The Coastal water encompasses wide ecosystems variety such as Coralligenous habitat, seagrass meadows, Vermetid reefs and others, as well as habitats associated with endangered fauna and flora (Bariche, 2010). These play the role of nursery and shelter habitats serving not only fisheries but also allowing other various ecosystem components to respond to human needs and services (Fernandez-Arcaya *et al.*, 2017). In fact, these marine habitats consist of a diversity of marine life, with thousands of various species, as well as new ones that are under research and discovery (MOE/UNDP/ECODIT, 2011).

Over 80% of the coastline (within a stretch of a few kilometers in-land) is invaded by economic and urban activities, while natural areas represent less than 20% of the total coast. The coastal zone is characterized mainly by its population density. In fact, almost a majority of 70% of the total population lives in the coastal zones, where they exert a variety of touristic activities (CDR, 2005).

Although the Lebanese coast is known for its natural beauty and attraction to tourists, it is suffering from several calamities such as urbanization, urban housing, infrastructure

development, recreational activities, waste discharge and pollutants emission (*i.e.*, solid, liquid and even air). According to the Global Convention on Biodiversity, the “Lebanon Biological Diversity” is regarded as the most comprehensive assessment of biological diversity in the region. Thus, the GEF/UNEP funded a project for both reviewing and compiling existing data on species nationwide. However, several studies became the source of contradictory debates among scientists concerning issues such as the outstanding species number and distribution as well as Lebanon’s flora and fauna trends (MoE/GEF/UNDP, 2015).

The existing discrepancies will persist as long as new surveys have not yet effectively replaced the previous datasets compilations. Updating species discovery remains a last long changing process as long as new species are being researched and discovered. The endangered species are either increasing or heading towards extinction. The lack of qualified taxonomists due to the absence of taxonomy programs specialty within university curriculum in Lebanon has contributed to hindering further effective research.

In this deliverable, the information and data on habitat and endemic species in the coastal areas in Lebanon is based on published reports and studies, including mainly field surveys and site investigation to identify Lebanon ecosystems, particularly in the coastal zone (SPA/RAC, IUCN, MoE, *etc.*).

The Lebanese coastal ecosystems will be evaluated in terms of biodiversity, mentioning the main endemic species inhabiting the coast, as well as presenting the most critical coastal habitats (*e.g.*, sea turtle nesting areas, monk seal sightings, marine birds nesting sites, *etc.*).

Furthermore, the current report is going to assess the touristic activities impact on both endemic biodiversity and habitats along the Lebanese coast by referring to previous reports and case studies.

II. Habitats and endemic species threats and their impacts on coastal ecosystems

II.1. Habitats and endemic species

II.1.1. Marine species

Marine species situation was assessed through a local study conducted by 1996 Biological Diversity of Lebanon. The coastal zone is considered as the richest and yet the most vulnerable zone of the entire country. Native marine flora and fauna are competing in terms of the increasing number of populations that are invading species originating from the Indo-Pacific and Atlantic oceans (MOE/UNDP/ECODIT, 2011).

Several habitat types were documented in the Lebanon coastal area along with their key associated communities and species. The Lebanon coast encompasses several surficial materials including sandy beaches (40%), rocky beaches (35%), cliffs (10.5%) and sand dunes (14.5%). On the other hand, marine coastal habitats range from shallow marine such as vermetid reefs, coralligenous habitats, rhodolith/maërl beds, seagrass meadows and beds (Badreddine, 2018), to deep-sea ones such as underwater canyons (Aguilar *et al.*, 2018). Six main habitat types (coralligenous habitats, rhodolith beds, sandy bottoms, rocky bottoms, sandy-muddy bottoms and bathyal muds) were thoroughly described and they are estimated to be between 36 and 1050 m by the OCEANA Deep Sea Lebanon 2016- a deep-sea fieldwork conducted along the Lebanese coastline in 2016 by the organization of OCEANA in cooperation with SPA/RAC, the Lebanese Ministry of Environment (MoE) and the National Center for Marine Sciences (NCMS). These habitats and the key associated species are described in Figure 1 (Aguilar *et al.*, 2018).

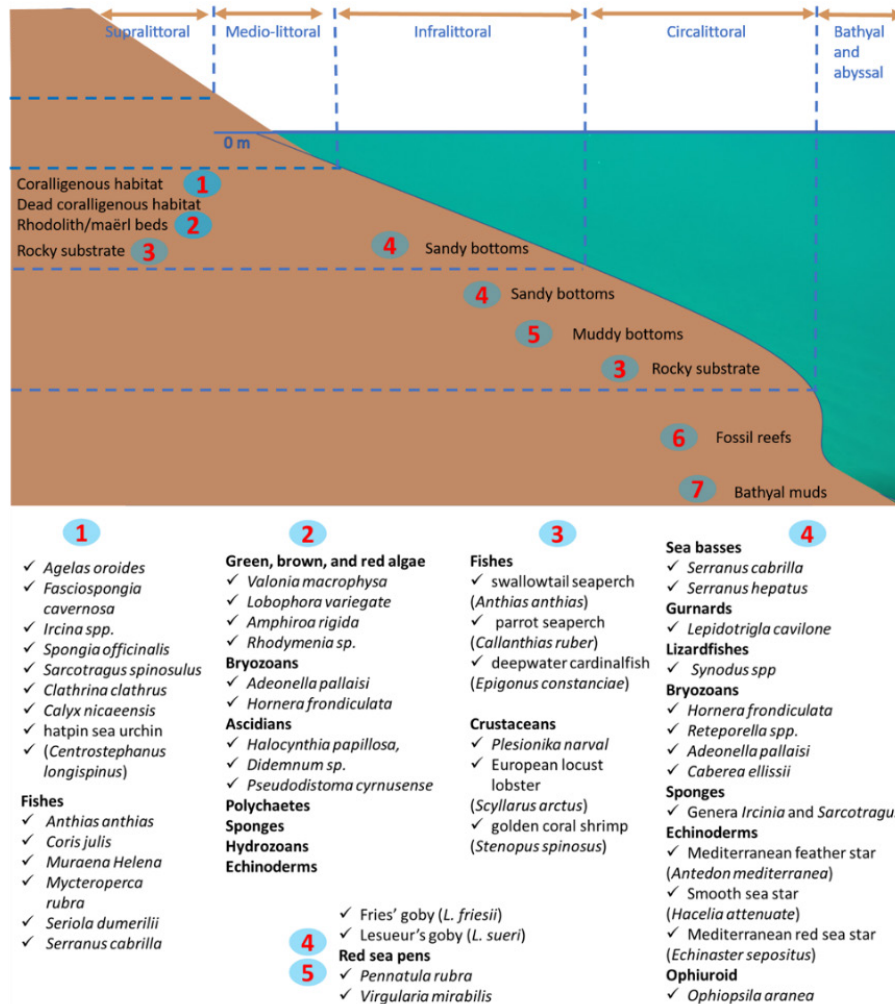


Figure 1. Lebanese coastal habitats and the associated species (Aguilar *et al.*, 2018).

Both The Lebanese coastal habitats and waters host a diverse and abundant endemic marine species where more than 1,500 species are recorded with a geographic distribution represented in Figure 2 (SPA/RAC-UN Environment/MAP, 2018a).

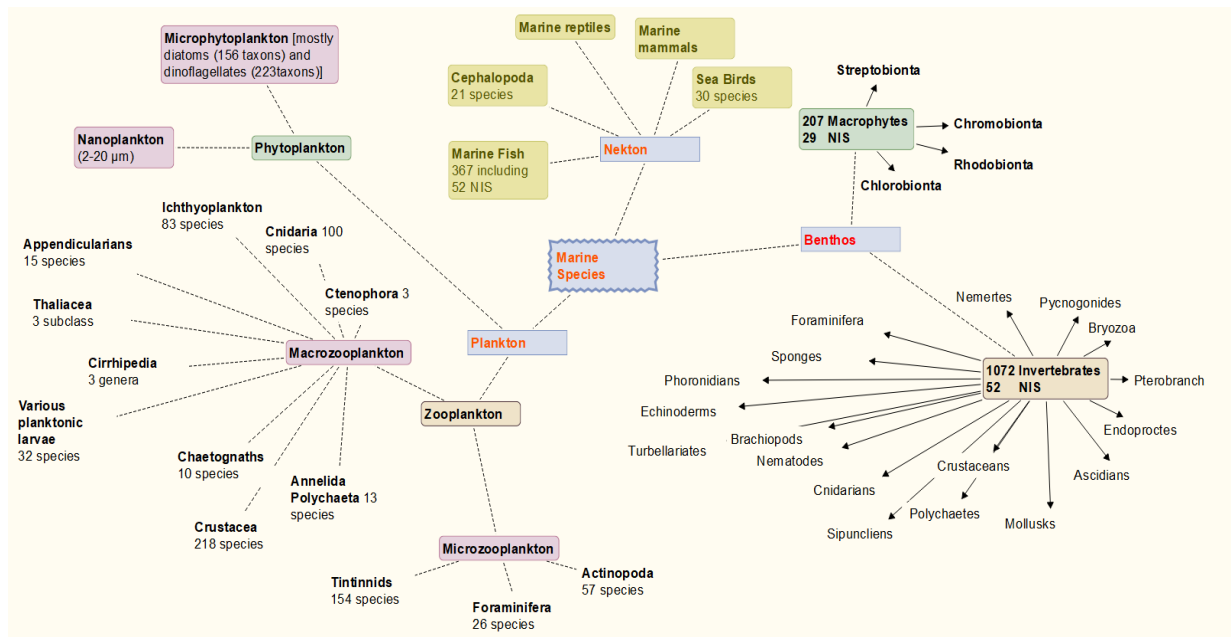


Figure 2. Classification of the Lebanese marine species (Abboud Abi-Saab, 2012).

There are two endangered marine turtle species (the loggerhead turtle (*Caretta caretta*), namely the green turtle (*Chelonia mydas*) that inhabit Lebanese waters and nest on many sandy beaches along the coast (SPA/RAC-UNEP/MAP, 2020a). There is also a less commonly existing species, the leatherback sea turtle (*Dermochelys coriacea*). One cetacean species, the bottlenose dolphin (*Tursiops truncatus*), is also abundant in the Lebanese coastal waters.

However, various iconic species considered at risk of extinction are recorded as visitors. For instance, cetaceans such as sperm whale (*Physeter macrocephalus*), fin whale (*Balaenoptera physalus*), common dolphin (*Delphinus delphis*) and striped dolphin (*Stenella coeruleoalba*), are found in Lebanese waters (SPA/RAC-UN Environment/MAP, 2018a).

In addition, few sightings of the Mediterranean monk seal (*Monachus monachus*) have been confirmed (SPA/RAC-UNEP/MAP, 2020b).

Numerous threatened sharks and rays inhabit the Lebanese coastal habitats and waters (Lteif, 2015; Bariche and Fricke, 2020), including endangered species such as Shortfin Mako (*Isurus oxyrinchus*) and Common Guitarfish (*Rhinobatos rhinobatos*; examples in Figure 3).

Major species are represented by fucoid forests (*Cystoseira* spp. and *Sargassum* spp.) (Badreddine *et al.*, 2018), and the sessile marine Gastropod *Dendropoma anguliferum* (endemic for the Levantine basin) are also still present in some coastal patches (Badreddine *et al.*, 2019). A total of 154 taxa of Tintinnids (121 species, 2 varieties and 31 unidentified species) are reported from the Lebanese marine waters (Abboud-Abi Saab, 2008; Ouba and Saab, 2020). In addition, the sponge belonging to the genus *Axinella*, sea star belonging to the genus *Luidia*, and stony coral, as well as three new Mediterranean species of starfish (e.g., *Hacelia superba*, *Leptasterias* spp. and *Luida* sp.), were reported for the first time in the Lebanese marine water (Aguilar *et al.*, 2018).

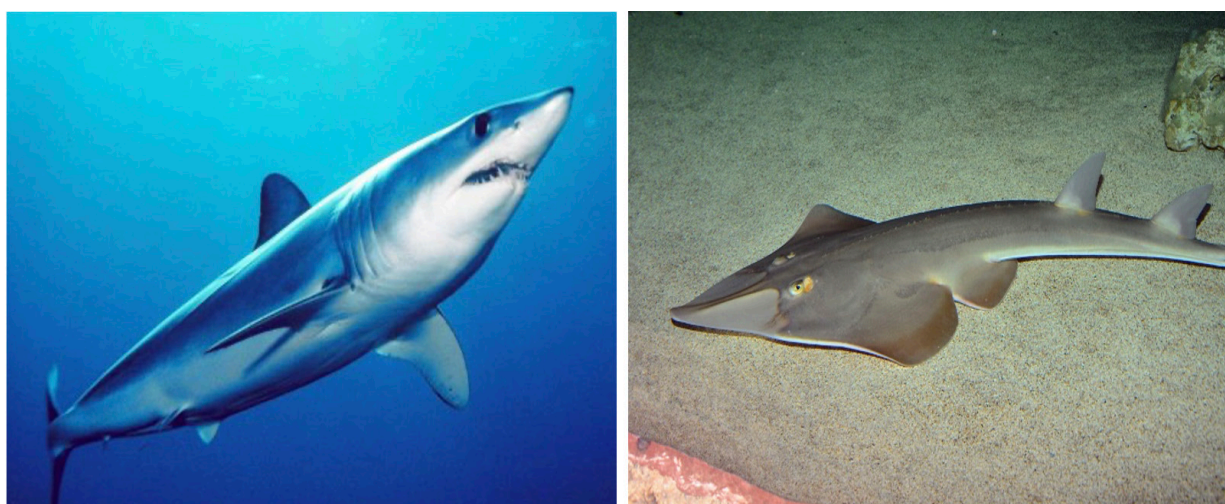


Figure 3. Endangered shark species along the costal Lebanon: *Isurus oxyrinchus* (a) and *Rhinobatos rhinobatos* (b).

II.1.2. Terrestrial species

There are 25 eco-regions listed on Conservation International where the Mediterranean ranks 3rd in vascular plant diversity and endemism, 17th in bird diversity and 14th in bird endemism, 11th in mammal diversity and 13th in mammal endemism, 14th in reptile diversity and 10th in reptile endemism, and 15th in amphibian diversity and 16th in amphibian endemism (Medail and Quezel, 1997).

The most recent Lebanon National Report of the Convention on Biological Diversity (2009) reported that the country is regarded as home to about 2,600 terrestrial plant species with 8.5% being broad endemic and 3.5% endemic to Lebanon. Lebanon rugged geomorphology controls the highest diversity in soil, precipitation patterns as well as temperature. Thereby, creating highly variable and inclusive plant biodiversity well-known with its richness and relatively small ecosystems. Ecologically speaking, the most common plant species are scattered along the following zones (MoE, 1998):

- Lower Mediterranean – below 500 m altitude: *Ceratonia*, *Pistacia*, *Pinus* and *Myrthus*.
- Euro-Mediterranean - 500 to 1,000 m altitude: *Quercus*, *Pinus* and *Cupressus*.
- Supra-Mediterranean – 1,000 to 1,600 m altitude: *Quercus*, *Ostrya*, *Fraxinus*, *Cystisus*, *Halimium* and *Pinus*.
- Mediterranean mountain -1,500 to 1,800 m altitude: *Cedrus*, *Abies*, *Juniperus*, *Quercus* and *Berberis*.
- Oro Mediterranean zone - above 2,000 m altitude: Junipers, Rhamnus, Berberis, Pirus, Prunus, Daphne and Cotoneaster.
- Pre-steppe Mediterranean -900 to 2,400 m altitude: *Quercus* and *Junipers*. Of the 4,486 known fauna species in Lebanon, about 46% are terrestrial. Most of these species are classified as follows:

a. Mammals: There are 61 mammal species in Lebanon with 10 species already extinct including the Syrian boar, the Persian Lynx and the Arabian Gazelles. 36.54% of the existing mammals are rare (including several species of shrews, bats, weasel, otter and the Syrian mouse), 1.92% are near threatened, 7.7% vulnerable, and 1.92% close to extinction (such as the wolf, the wild cat, the mongoose and the squirrel) (MoE/UNDP/ECODIT, 2011).

b. Birds: There are 395 bird species in Lebanon (Ramadan Jaradi *et al.*, 2008) compared to 337 in the Biological Diversity of Lebanon Report (MoA/UNEP, 1996). Out of Lebanon's avifauna, 3 species (*Sterna bengalensis*, *Francolinus francolinus* and *Merops persicus*) have vanished, 6.3% are threatened and 32% are rare. According to the 2007 IUCN Red List, Lebanon's bird species include 1 Critically Endangered, 2 Endangered, 8 Vulnerable and 17 Near-Threatened species (Ramadan Jaradi *et al.*, 2008).

c. Invertebrates: The number of invertebrate species in Lebanon is estimated at 3,835 species (MoE/UNDP/ECODIT, 2011).

d. Amphibians and reptiles (herptile): The reported number of herptile species is 62, with 7 amphibians and 55 reptilian species. Two amphibian species and 17 reptile species are globally threatened, including four snake's types. Except for the Lebanon Viper, none of the amphibians or reptiles is considered endemic in Lebanon (MoE/UNDP/ECODIT, 2011).

II.2. Threats and impacts on coastal ecosystems

The Mediterranean hotspot is characterized by ten “mini hotspots” including Lebanon as one of them. These mini hotspots cover about 15% of total land area but account for 37% of the region's endemic species. The Lebanese coast occupies the major component of this mini-hotspot, and it is like any Mediterranean coast, where major natural and anthropogenic threats exist, including mainly urbanization and privatization

of the coastline with uncontrolled and widespread illegal construction. There are several threats defined by many authors, but most of them are attributed to human activities and the increased urbanization (Figure 4).

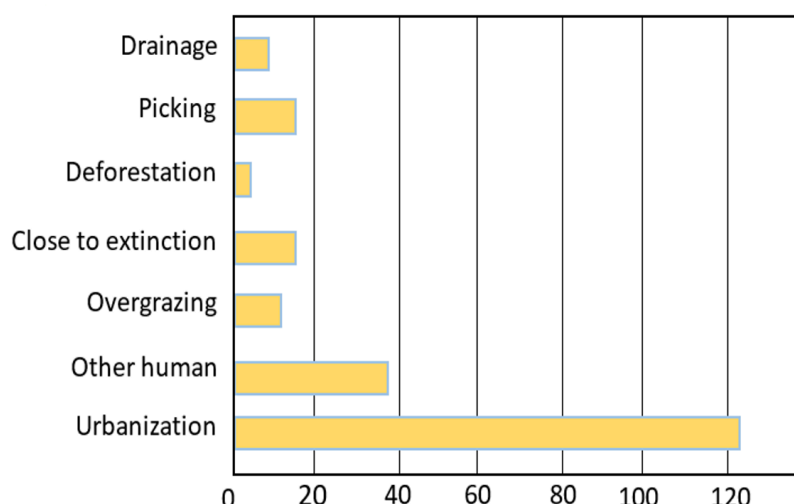


Figure 4. Number of threatened plant species by type of threat (MoA/UNEP, 1996).

This has been reflected in inducing coastal hydrodynamic modifications, coast degradation, soil erosion and loss of biodiversity. Deforestation, urban encroachment, new roads, drainage of wetlands, bioaccumulation of agro-chemical residues and hunting are major threats to the fauna in Lebanon (Table 1).

Table 1. Conservation status of Lebanese fauna (MoE/UNDP/ECODIT, 2011).

	Endemic	Rare	Threatened & Endangered	Economic species	Breeding birds
Birds	0	126	25	-	103
Mammals	2	22	9	-	-
Amphibians & Reptiles	1	6	19	1	-
Total	3	154	63	1	103

The marine litter pollution is being exacerbated due to the presence of dumpsites for solid waste disposal along the coast. Besides, the direct untreated discharge of domestic and industrial raw sewage to the sea is the main contributor to marine pollution along the coast. Lately, it has been reported in 47 major pollution localities (hotspots), where the largest number is related to constant pollution discharges (e.g., sediments along estuaries & sewers), whether permanently or temporarily. Thus, most pollution sources are found to be derived from the soil environment. The recognized marine hotspots are found as: 19%, 13%, 36 %, 8.5 %, 15% and 8.5 % corresponding to sediments and turbid water, landfills, wastewater effluents, chemical and medical products, oil residues, and thermal water, respectively (Shaban, 2008).

II.2.1 Habitat degradation

The loss of habitats is the main cause of ecosystem disintegration and species decline because habitats provide species with all the requirements and elements of their ecological niches (MoE/GEF/UNDP, 2015). The main causes of coastal habitat degradation in Lebanon are:

- Construction of beach resorts and hotels on coastal areas
- Coastal land reclamation
- Beach recreational activities generating marine litter
- Dumping of municipal waters including solid wastes and outfall of sewage waters
- Sediments' transport along rivers and streams
- Industrial, chemical and oil residues' outfall into the sea
- Shoreline backfill to assure larger land for construction
- Sand dredging from shores for construction purposes
- Coastal erosion and shoreline collapse

II.2.2 Climate change

Climate change has been well pronounced in Lebanon. It has been touched by the changing in rainfall patterns and increased torrential rainfall, as well as by the increased temperature (*i.e.*, approximately 1.8°C). The changing climate has been demonstrated over the past few decades by several extreme events, such as floods and mass movements, wet and dust storms, heat waves which resulted in forest fires (Bitar, 2008). This, with the negative human interference (*e.g.*, abusive harvesting, overgrazing, *etc.*) has been reflected on the biodiversity and forest cover. Hence, the baseline of biodiversity for Lebanon was applied to deduce the severity on forest species (MoA, 1996). Selected results are shown in Table 2.

Table 2. Threats to selected forest species based on the degree of severity (MoE, 1996).

Species	Abusive harvesting	Overgrazing	Urban development	Fires
Kermes oak (<i>Q. calliprinos</i>)	3	4	3	3
Haired oak (<i>Q. cerris</i>)	4	4	4	-
Aleppo pine (<i>P. halepensis</i>)	3	3	4	5
Brutia pine (<i>P. brutia</i>)	3	3	3	5
Stone pine (<i>P. pinea</i>)	1	2	4	3
Cedar of Lebanon (<i>Cedrus libani</i>)	2	2	1	-
Fir (<i>Abies cilicica</i>)	3	4	3	-
Juniper (<i>Juniperus exclesa</i>)	4	5	2	-
Cypress (<i>Cupressus sempervirens</i>)	3	4	2	2

Severity scale is from nil (lowest) to 5 (greatest)

Occasional events in response to any ecosystem alteration due to climate change, have been observed: for example, the impacted benthic communities were noticed in Lebanon marine water.

Figure 5, as well as there is massive, exceptional efflorescence of a centric diatom *Skeletonema costatum* and of an ichthyotoxic raphidophyte *Heterosigma akashiwo*, occurred for the first time in shallow waters between Zouk and El Kalb River coast, affecting plankton and pelagic fish (Abboud-Abi Saab *et al.*, 2008). Moreover, the seagrass *Posidonia oceanica* and the sea fans *Paramuricea clavata* and *Eunicella* spp. considered as engineering species, became extinct along the Lebanese coast due to anthropogenic activities and climate change that can have an altering effect on water quality (Harmelin *et al.*, 2009; Harmelin *et al.*, 2016).

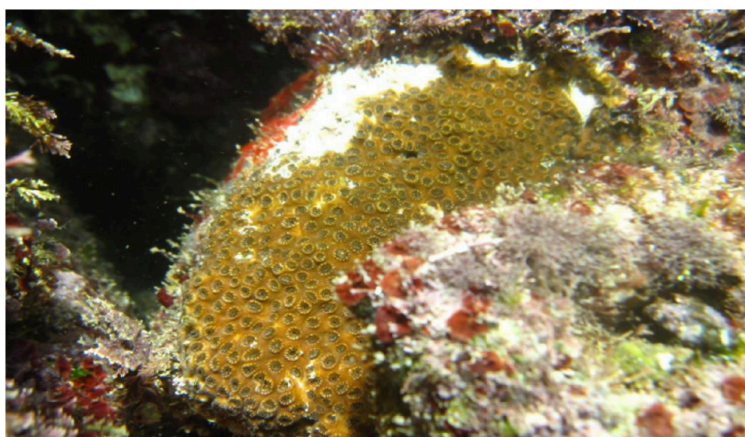


Figure 5. Effect of climate change including sea warming on benthic communities. *Oculina patagonica* under the virulence of *Vibrio shiloi*, observed at Nakoura, south of Lebanon (Badreddine, 2018)

II.2.3 Unregulated fisheries

Lebanon's fisheries sector usually consists of a little artisanal fishing fleet, estimated at 2,005 licensed vessels (according to the DFW, 2015) predominantly operated by rather aged fishers using old boats with dated equipment (Pinello and Dimech, 2013). Most of these boats are motorized and with length below 12 m, and the used fishing techniques are mostly based on passive gears such as gillnets, trammel nets, longlines, and purse seines. Fishing operations are mostly carried out at depths of up to 50 m (Sacchi and Dimech, 2011).

The Lebanese marine water contains a significant richness of marine organisms, with more than 80 fish species being of commercial importance (Nader *et al.*, 2012). However, illegal fishing and unsustainable detrimental practices, such as the use of small mesh nets and explosives, are widely spreading as a result of an outdated legislation and the lack of its enforcement (Sacchi and Dimech, 2011). Apart from the unregulated fishing practices, the frequent use of poisons has worsened the situation by damaging the coastal ecosystems (Abboud Abi-Saab, 2012).

II.2.4 Invasive species

In Lebanon, at least 67 recorded species (nektons, nektobenthos, benthos fauna and flora) originated from the Red Sea. In fact, the Lebanese coast is relatively at proximity to the Suez Canal (400 km). Therefore, the coastal waters have been fully exposed to the invasion of Indo-Pacific marine organisms (Lessepsian species) immigrating from the Red Sea via the Suez Canal since its opening (SPA/RAC–UN Environment/MAP, 2018b; SPA/RAC–UN Environment/MAP, 2018a). Lessepsian species, that is becoming more invasive, have significant effects not only on the environment (biodiversity loss, habitat modifications and alterations in fish community structure) and economy (fishermen) but also on human health (UNEP-MAP/RAC/SPA, 2010; UNEP-MAP-RAC/SPA, 2011) (For example, the bivalve *Mytilus galloprovincialis*, which was abundant in Lebanon in the past according to Gruvel, 1931, is now totally replaced by the tropical bivalve *Brachidontes pharaonis*, and the gastropod *Cerithium scabridum* (Bitar, 2008).

II.2.5 Port activities

The dumping of litter and other wastes from ships into the sea as well as the use of other possible endocrine-disrupting chemicals in anti-fouling paints together with the introduction of alien species from ballast water, and the potential of oil spills from maritime can all contribute in damaging both marine life and water quality. In order to contain all this scourge several measures have been taken under the assistance of the UNEP Mediterranean Action Plan. However, the protocol's ratification has been delayed, as well as the protective mechanisms implementation and precautional practices which remain badly needed (Abboud Abi-Saab, 2012).

II.2.6 Lack of governance

There is no “Lead Agency” with overall responsibility for the efficient management of the marine environment and its resources in Lebanon. The existing organizational structures and the legislative frameworks are at times overlapping with jurisdictions of various stakeholders.

Coastal resorts' construction is often illegal and not subject to law enforcement. There is also the lack of an adequate strategy in managing the development of resorts. Besides, there is a lack of enforcement of construction regulations as well as a lack of enforcement of EIA studies recommendations, and a lack of awareness, too (Abboud Abi-Saab, 2012).

II.2.7 Lack to comprehensive and updated datasets

Due to the lack of communication and interaction between scientific communities, decision-makers, private sectors and the general public, it has become so difficult to manage the biodiversity in Lebanon. In fact, the gap between all the above-mentioned sides is embodied obviously in the lack of accurate updated data, which has led to

major threats on coastal biodiversity. In addition, poor coordination and cooperation between concerned organizations is a matter of data and expertise exchange and sharing. This is clearly reflected in Lebanon on the current status of biodiversity and ecosystems, notably the marine one. Thereby, affecting the process of issuing both national policies and mitigation measures.

III. Relationships between habitat, endemic species, and coastal tourism

Marine and coastal ecosystems provide the community with several economic, social and environmental services including food and other goods, shoreline protection, water quality maintenance, waste treatment, support of the tourism industry and other socioeconomic benefits. Among the most important cultural services provided by the coastal and marine ecosystems are mainly tourism and entertainment. However, the capacity of these ecosystems to provide/deliver these services is seriously degrading today. Coastal tourism is becoming one of the fastest growing sectors of global tourism and provides employment for many people and generates local incomes. It is a major source of employment, often in developing countries (UNEP, 2006).

Biodiversity plays a key role in the nature-based tourism industry of many coastal zones. The majority of tourism centers exist on aesthetically pleasing landscapes and seascapes which represent the healthiest coastal ecosystems known for their fresh, clean air, high water quality as well as diverse wildlife. For instance, coral reefs support high biodiversity which in its turn supports a thriving and valuable dive tourism industry and recreation industry (UNEP, 2006).

The 1993 Convention on Biological Diversity outlined 20 clear targets to safeguard biodiversity and displayed extensively its benefits for a better sustainable tourism that can help meet at least 12 of them (Convention of biological biodiversity, 2011).

Tourism activities in Lebanon coastal zone consist mainly of leisure and recreational activities, which cover 8.5% of the coastal zone (Assaf, 2009), archaeological monuments (e.g., Byblos, Sidon and Tyre), natural areas (e.g., Ras Chaqaa in the north, Pigeons' Rock in Beirut, and Ras Naqoura in the south), and three coastal nature reserves: Tyre Coast Nature Reserve (TCNR), Palm Islands Nature Reserve and Al-Abbasiyeh Nature Reserve.

Tourism is increasingly being recognized as a significant beneficiary of biodiversity (Michael Hall, 2010). Meanwhile, the development of the tourism industry is also linked to biodiversity loss such as land clearance, pollution, *etc.* Therefore, the tourism industry in Lebanon has both positive and negative contributions to coastal biodiversity, which is important for the sustainability of the sector (Table 3).

Tourism directly affects habitat due to tourism urbanization processes. Such processes are spatially and geographically distinct because they are often related to high natural amenity areas such as the coast where coastal ecosystems are subject to urbanization, land clearance as well as to wetlands draining and clearance.

Table 3. The positive and negative contribution of tourism to coastal biodiversity.

Contribution of Tourism to Coastal Biodiversity	
Positive contribution	Negative contribution
An economic, financial, and political justification for biodiversity conservation practices, including the establishment of coastal nature reserves and the designation of RAMSAR sites	In many instances, touristic recreational activities in coastal reserves and other areas contribute to their degradation and to the change in several ecosystem components (habitat and endemic species)
An economic alternative to other forms of development that can negatively impact biodiversity and can cause inappropriate exploitation of natural resources	Contributes to the invasion of exotic species ² and the related diseases
Education and awareness about the benefits of biodiversity conservation. Thereby, creating sensitization about sustainable tourism options	Contributes to global warming and climate change
Further local community involvement in biodiversity maintenance as well as wider awareness on the level of management practices concerning local ecological knowledge of biodiversity	Recreational fishing performed by tourists can lead to species overexploitation if poorly managed
Provide additional services for the community, including food and other goods, shoreline protection, better water quality maintenance, waste treatment and other cultural benefits	causing enormous stress on local land use, and leading to soil erosion, increased pollution, natural habitat loss, and more pressure on endangered species
developing many sectors and providing more employment for many people and generating local incomes	Depletion of natural resources and exhausting the locally existing ones
The development of touristic sites usually results in aesthetically pleasing landscapes; perfect healthy coastal ecosystems with clean air and high-water quality, a sort of smart cities.	

The introducing exotic species into an ecosystem often greatly affects the biodiversity associated with tourism because tourists and Tourism infrastructure can act as carriers of such species.

The increase of greenhouse gasses emission through aviation, transportation and infrastructure (accommodation). The data released by the World Tourism Organization (2008) revealed CO₂ emissions in three touristic sectors: transportation, accommodation, and leisure tourist activities.

Given the importance of the tourism economic and social impact, it is necessary to perceive it through an environmental perspective as well, since its sustainability can only be achieved by reaching a balance between the three pillars, namely the economic, social, and environmental aspects (Nunes *et al.*, 2020).

Tourism significance, together with its environmental and biodiverse dimensions, has been given much concern with several sustainable development goals (SDGs). In fact, the report of the Inter-Agency and Expert Group on Sustainable Development Goal Indicators, mentioned tourism as in Table 4.

Table 4. Tourism importance and its environmental and biodiverse dimensions (UN Statistics Division, 2021).

<u>SDG-8</u> : Promote sustained, inclusive, and sustainable economic growth, full and productive employment and decent work for all	
Target	Indicator
<u>SDG-8.9</u> : By 2030, devise and implement policies to promote sustainable tourism that creates jobs and promotes local culture and products	<u>SDG-8.9.1</u> : Tourism directs GDP as a proportion of total GDP and in growth rate. <u>SDG-8.9.2</u> : Proportion of jobs in sustainable tourism industries out of the total tourism jobs.
<u>SDG-12</u> : Ensure sustainable consumption and production patterns	
Target	Indicator
<u>SDG-12.b</u> : Develop and implement tools to monitor sustainable development impacts for sustainable tourism that creates jobs and promotes local culture and products.	<u>SDG-12.b.1</u> : Implementation of standard accounting tools to monitor the economic and environmental aspects of tourism sustainability
<u>SDG-14</u> : Conserve and ensure sustainable use of oceans, seas and marine resources for more effective sustainable development	
Target	
<u>SDG-14.7</u> : By 2030, increasing the economic benefits of small island. Developing States and least developed countries in terms of the sustainable use of marine resources, including sustainable management of fisheries, aquaculture and tourism .	/

IV. References

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