

# 6 Land Resources



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## ABBREVIATIONS & ACRONYMS

CAS	Central Administration for Statistics
CDR	Council for Development and Reconstruction
CERMOC	Centre d'Etudes et Recherches sur le Moyen-Orient Contemporain
COM	Council of Ministers
DGA	Directorate General of Antiquities (MOC)
DGUP	Directorate General of Urban Planning (MOPWT)
EIA	Environmental Impact Assessment
GDP	Gross Domestic Product
GIS	Geographic Information System
GOL	Government of Lebanon
HCUP	Higher Council of Urban Planning
IDAL	Investment Development Authority of Lebanon
IUCN	International Union for Conservation of Nature
LA	Lebanese Army
LP	Lebanese Parliament
MOA	Ministry of Agriculture
MOC	Ministry of Culture
MOE	Ministry of Environment
MOEW	Ministry of Energy and Water
MOIM	Ministry of Interior and Municipalities
MOPWT	Ministry of Public Works and Transport
MOT	Ministry of Tourism
NCQ	National Council of Quarries
NCSR	National Council for Scientific Research
NGO	Non-Governmental Organization
NLUMP	National Land Use Master Plan
NRP	National Reforestation Plan
OWL	Other Wooded Land
PA	Protected Area
SEA	Strategic Environmental Assessment
SEEL	Supporting the Judiciary System in the Enforcement of Environmental Legislation
SELDAS	Strengthening/State of the Environmental Legislation Development and Application System in Lebanon
SOER	State of the Environment Report
UNRWA	United Nations Relief and Works Agency

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The natural and built environment is strongly affected by land management plans. In Lebanon, the lack of urban planning and/or inadequate urban regulations is facilitating urban sprawl at the expense of natural landscapes and urban living conditions. Construction is consuming agricultural lands, roads and expressways are infringing on scenic mountain landscapes, and real estate speculation is changing the social fabric of some communities and villages. This chapter describes the driving forces affecting land resources in Lebanon (see definition in Box 6.1), the current situation, as well as policy issues and opportunities for improving land resources in the future.

### 6.1 DRIVING FORCES

Current land management practices in Lebanon are not sustainable as they continue to erode the country's natural resource base (soil, water, green cover, and landscapes). Whereas traditional practices such as terracing, controlled grazing and forest management helped protect the lands, modern practices (many of which emerged during the civil war) have significantly altered the natural and social make-up of our lands including our perception of natural resources. Population growth, the continued loss of arable land and biodiversity, concerns about food security and the rising costs of infrastructure due to population growth and urban sprawl are major factors impacting land resources, our natural environment, as well as social behaviors.

#### 6.1.1 Population Growth

The population density in Lebanon is high (about 400 persons/km<sup>2</sup> including Palestinian refugees). An estimated 80 percent live in urban areas and more than half reside in Beirut and its suburb, also known as the Greater Beirut Area (WB Database, 2010). The highest population density is recorded in the coastal zone and the lower mountain areas (up to 500m). Population density is much lower at higher elevations and in the Bekaa Valley. Mass displacement during the civil war (and/or in search of better socio-economic opportunities) have resulted in a noticeable population decline in dozens of villages and the exponential growth of peri-urban areas around major cities but also between secondary cities and towns. See for example Figure 6.1 for a current view of the urban extension linking Zahle to Chtoura, as well Beirut to Bauchrieh, Sin El Fil, Fanar, Zalka and Antelias. These towns were previously distinctly separate but unplanned urban expansion has merged the cities into large agglomerations.



Urban expansion along the northern entrance of Beirut

#### Box 6.1 What are land resources?

A delineable area of the earth's terrestrial surface, encompassing all attributes of the biosphere immediately above or below this surface, including those of the near-surface, climate, the soil and terrain forms, the surface hydrology (including shallow lakes, rivers, marshes and swamps), the near-surface sedimentary layers and associated groundwater and geo-hydrological reserve, the plant and animal populations, the human settlement pattern and physical results of past and present human activity (terracing, water storage or drainage structures, roads, buildings, etc.).

Source: FAO, 1997

Figure 6.1 Urban densification and linkage



(a) Urban linkage-Chtoura to Zahle



(b) Urban densification north of Beirut city

Source: Google Earth Imagery (2009)

As explained in the 2001 SOER and other previous reports, Lebanon has not conducted a national census since 1932. All population estimates are based on surveys and extrapolations. According to the Central Administration of Statistics (CAS), Lebanon's resident population in 2008 was 3.7 million, excluding an estimated 416,600 Palestinian refugees (CAS, 2008 and UNRWA, 2008), bringing the total population including refugees to 4.2 million. Using an annual growth rate of 0.7 percent, total population is expected to reach 5.2 million inhabitants by 2030 (WB Database, 2010 & CDR-NLUMP, 2004).

### 6.1.2 Unplanned Urban Expansion

Population growth is increasing demand for housing; wealth and changing lifestyles are increasing demand for secondary housing including mountain retreats and beach chalets. Cities are consequently growing both vertically and horizontally. For example, developers are erecting buildings in vacant plots (often used as paid parking areas) or in lieu of old buildings which are torn down (sometime illegally) and replaced with new housing units. Meanwhile, cities are also expanding horizontally either in the form of ribbon construction (houses and buildings dotting both sides of a connecting road or highway) or concentrically (peri-urban construction around main cities) or leap-frog development (new residences some distance from an existing urban area). Horizontal growth is happening at the expense of

agriculture fields (e.g., Al Bassatine in Tripoli – see Figure 6.2), forested areas (e.g., Metn areas including Beit Merry, Broumana, Baabdat and Bharsaf), and other natural areas of unique environmental significance (e.g., Faytroun in Kessrouan, Fnaideq in Akkar). Unplanned urban growth is hampering traffic and exacerbating road conditions on major road arteries and intersections.

**Figure 6.2 Rate of urban expansion in Al Bassatine (Tripoli 2003 and 2009)**



(a) 2003



(b) 2009

Source: Google Earth Imagery (2003 and 2009)

### Real estate speculation and remittances

The Lebanese real estate market has by-and-large weathered the global financial crisis unscathed in 2007. Many analysts would argue that Lebanon benefited during the crisis from sizeable cash transfers to Lebanese banks and reinvestments mostly in the construction sector, in and around Beirut. Bankers, promoters, investors, and real estate firms have all reported record sales and profits in recent years. The sector also witnessed a boom in the number of new brokers and real estate agencies. More significantly, the extent of growth in the construction sector can be monitored by reviewing the number of awarded construction permits during a specified time period and the equivalent floor area. For example, in Mount Lebanon alone, the total surface area of construction permits almost doubled between



View of the Mudeiref Bridge destroyed in July 2006, Lebanon's tallest and longest bridge



2007 and 2008, from 4.3 million to 8.4 million m<sup>2</sup>. Nationwide, the surface area leaped from 7.9 million to 14.2 million m<sup>2</sup> (Figure 6.3).

Key factors contributing to this construction boom include:

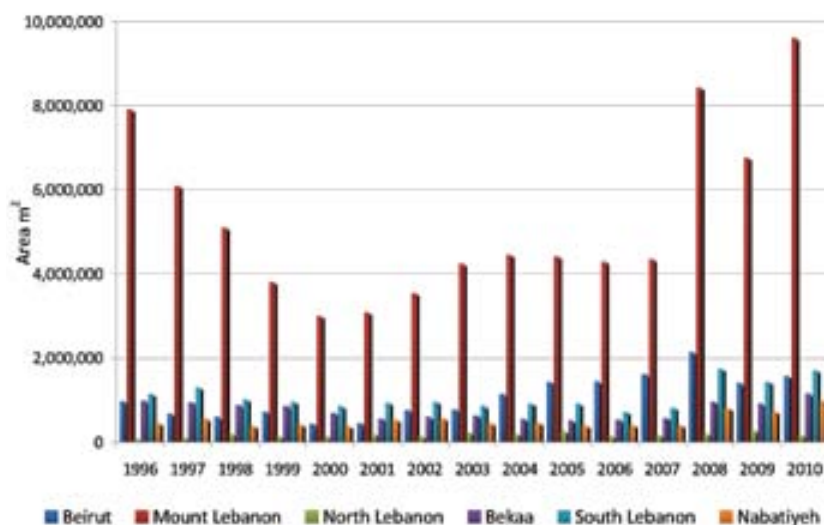
1. The July 2006 war destroyed more than 1,200 buildings, 90 factories, 92 bridges, and about 445,000 m<sup>2</sup> of roads (UNEP/ELARD, 2007). The construction sector rebuilt and replaced damaged buildings and infrastructure, increasing demand for construction aggregates.
2. The Doha Accord of May 2008 brought political stability to the country and renewed investments from neighboring countries.
3. Foreign currency deposits and liquidity encouraged the Central Bank (and commercial banks) to offer attractive housing loans at competitive interest rates.
4. The Government of Lebanon's continued laissez-faire approach to real estate transactions by non-Lebanese (Law 296 dated 3/4/2001). Lured by Lebanon's property tax haven, foreign investors (mostly Arabs) are buying a lot of property, mostly in mountain areas, with little state control and/or oversight.
5. Lebanon's population is young (mean age is 29.4 years compared to 39.7 in France and 44.3 in Germany). A young population increases demand for housing units.

See detailed analysis of construction boom and property demand in Chapter 7.

### 6.1.3 Rampant Road Construction

In 2004, Lebanon's road network totaled 11,600 km including international, primary and secondary roads (CDR-NLUMP, 2004). The road density<sup>1</sup> in Lebanon is high (111 km per 100 km<sup>2</sup>) compared to neighboring Arab countries including Syria (21 km per 100 km<sup>2</sup>), and Jordan (8.75 km per 100 km<sup>2</sup>)<sup>2</sup>. In fact, the road density is almost at parity with Cyprus (132 km per 100 km<sup>2</sup>) which is a member of the European Union and has a much higher GDP per capita. The construction of new roads and highways in mountain areas and over Lebanon's mountain ridges exerts pressure on dwindling land resources and cause irreversible damage to landscapes. Roads impact land resources in many ways by effecting landforms, vegetation cover, ecosystems and habitats. Construction activities cause short-term impacts including noise pollution and emissions from earth

Figure 6.3 Total floor area of construction permits



Source: OEA, 2011

moving vehicles affecting surface water, top soil, and air quality. Ugly billboards on side roads and highways present lasting eyesores. Finally, new roads consume virgin land and open new ones for construction.

<sup>1</sup>Road density is the ratio of the length of the country's total road network to the country's land area—equal to km of road per 100km<sup>2</sup> of land area

<sup>2</sup>Road statistics from [www.indexmundi.com](http://www.indexmundi.com) for year 2007



Beit Misk road construction on Metn expressway

This list of intrusive and ill planned or poorly executed roads is very long. Examples include the 14 km Metn expressway from Nahr El Mot to Baabdat, the Bteghrine-Zaarour-Sannine road, and the 40 km highway linking Sir Al Dinnieh to Hermel. The Metn expressway is a particularly striking example of a high-impact road; not only it scared the landscape and caused significant loss to forests, it also provided access to a new residential complex of 655,000 m<sup>2</sup> (commercially known as *Beit Misk*) that requires additional access roads -see *impact of access roads in Bhersaf* in Figure 6.4.

**Figure 6.4 New access roads in mountain areas (here in Bhersaf)**



(a) 2003



(b) 2009

Source: Google Earth Imagery (2003 and 2009)

## 6.2 CURRENT SITUATION

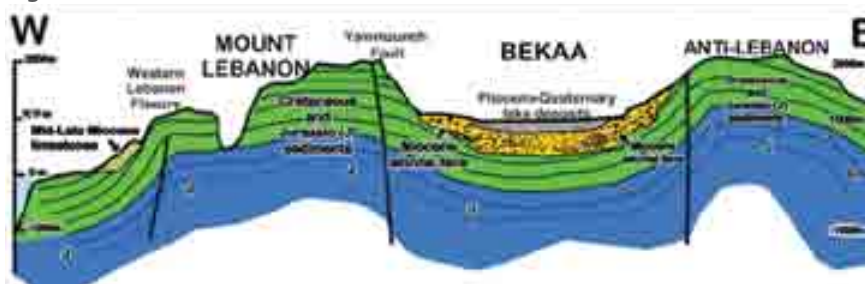
### 6.2.1 Geo-Morphological Regions

Lebanon's geo-morphology has influenced the history and evolution of towns and villages. The country is predominantly mountainous characterized by a rugged terrain, high-mountain peaks, and two mountain ranges that trend north-south, separated by a fertile valley. See *schematic cross-section in Figure 6.5*.

There are 5 distinct geo-morphological regions:

- The Coastal Zone, including the shoreline and continental shelf, the coastal plain, and the foothills of Mount Lebanon rises to 250 meters; it represents 13 percent of the territory.
- The Mount Lebanon Range (or chain), including middle-and high-elevation zones, rises from Akkar in the north and extends south to the hills of Jabal Amel. The highest peak is Qornet el-Sawda (3,087 meters). It represents 47 percent of the territory.
- The Bekaa Valley, a fertile land corridor separating the Mount Lebanon and Anti-Lebanon ranges, is drained to the north by the Aassi River and to the South by the Litani River. It represents 14 percent of the territory.
- The Anti-Lebanon Range, which extends across the Lebanese-Syrian borders along the eastern part of the country and includes, at its Southern terminus, Jabal el Cheikh (Mt. Hermon, 2,814 meters), which distributes rainfall and snowmelt into at least three main watersheds across Lebanon, Syria and Palestine; it represents 19 percent of the territory.
- South Lebanon, an elevated plateau that extends a short distance inland from the western shores of South Lebanon to the Mount Hermon foothills in the East. Seasonal streams flowing from east to west into the Mediterranean Sea intersect this region; it represents 7 percent of the territory.

**Figure 6.5 Schematic East-West Cross Section of Lebanon**



Source: adapted from Walley, C.D., *The Geology of Lebanon*, DDC-AUB

## 6.2.2 Land Cover and Land Use

*Land cover* refers to the observed bio-physical cover on the earth's surface, while *land use* is characterized by the arrangements, activities and inputs that people undertake in a certain land cover type to produce change or maintain it. Definition of land use in this way establishes a direct link between land cover and the actions of people in their environment. The first land cover attributes were generated in 1962 when the Lebanese Army and the French Institut Géographique National produced the first topographic maps of Lebanon in French and Arabic (scale of 1:20,000). They provide extensive (and reasonably accurate) information on Lebanon's spatial attributes including forest cover, urban extension, roads, water streams and other natural features including foot trails and rights-of-way. The Lebanese Army's Directorate of Geographic Affairs is currently updating these maps and started selling the revised maps in 2009 (French only).

Separately, the MOE produced in 2002 in cooperation with the National Center for Remote Sensing (NCRS) a revised *Land Use / Land Cover Map of Lebanon*. The team used pan-sharpened 5m resolution satellite images from 1998 (Landsat and IRS-1C Satellites). The map disaggregated land use and land cover into seven main categories and 23 subcategories (further divided into 57 subcategories). According to this very extensive mapping exercise, Lebanon's built-up area in 1998 covered six percent of the territory (about 650km<sup>2</sup>) -see type and percent land cover in Figure 6.6 and spatial distribution in Map 4.

The National Center for Remote Sensing (part of NCSR) is currently updating the Land Use / Land Cover Map of Lebanon and intends to complete its work in 2011. This report therefore derives its conclusions based on the map produced in 2002.

### Forest Resources

Despite inconsistencies in forest terminology (see Box 6.2) and forest data, there is a general consensus that forests cover about 137,000ha (13% of the territory) and Other Wooded Land (OWL) covers 106,000ha (about 10%). Combined, forests and OWL cover 23 percent of the country (FAO, 2010). Table 6.1 shows the extent of forests and OWL for years 2000, 2005 and 2010. Assuming the data is accurate, there has been remarkably little change in forest and OWL cover in the last decade despite intensive reforestation efforts, widespread and recurring

### Box 6.2 Difference between forest and OWL

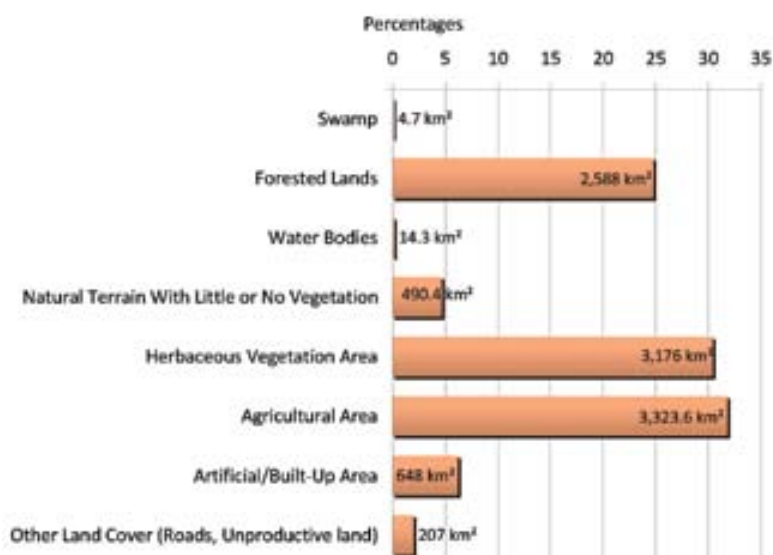
In an effort to minimize confusion in forest data, the FAO has defined forests and other wooded lands as follows:

**Forest:** A land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds in situ. It does not include land that is predominantly under agricultural or urban land use.

**Other Wooded Land (OWL):** Land not classified as *Forest*, spanning more than 0.5 hectares; with trees higher than 5 meters and a canopy closure of 5–10 percent, or trees able to reach these thresholds in situ; or with a combined cover of shrubs, bushes and trees above 10 percent. It does not include land that is predominantly under agricultural or urban land use.

Source: FAO, 2010

Figure 6.6 Type and percentage of Land Cover



Source: MOE/NCSR, 2002

forest fires (see forest fire statistics in Chapter 5) and extensive logging and reconstruction all over the country. Forest fires occur mainly between July and October, during heat spells, and are partly due to changing land uses. Map 3 in Chapter 5 shows the distribution of forest cover in Lebanon, as well as tree nurseries and nature reserves. Chapter 5 also provides a detailed description of forests types.

Table 6.1 Evolution of Forest and Other Wooded Land

Category	Total Area (1,000 ha)			
	FAO 2000	FAO 2005	AFDC 2007	FAO 2010
Forest	131	136	139	137
Other Wooded Land	117	106	108	106

Source: FAO (2010) & AFDC, State of Lebanon's Forests (2007)



### 6.2.3 Urban Planning and Zoning Extent

The Lebanese urban planning system does not adequately address sustainability, livability, environmental, spatial and equity issues. Urban plans in Lebanon focus exclusively on the physical planning of the region under study and do not approach urban planning from a strategic perspective. Services that affect the quality of the urban environment such as accessibility, public transport, renewable energy, sustainable water supply, as well as green and recreational areas are not adequately addressed by urban planners. Currently, urban planning is largely a desktop study that is based on readily available demographic, geographic and socio-economic data. These data are analyzed to produce a zoning system. Data validation and public participation are usually lacking in the urban planning process. The current system is not immune to political interference and is often geared towards maximizing land use coefficients. Naturally, there are positive exceptions. For example, the land use plan of Saghbine (West Bekaa) designated a plot in the vicinity of the Qaroun Lake to establish a Wind Farm (HCUP Decision No. 19 dated 21/5/2010). This initiative can and should be replicated in other urban plans based on the findings of the recently published Lebanon Wind Atlas (see more on Wind Atlas in Chapter 9 Energy Crisis). Another alternative to conventional land use planning is the application of the Strategic Environmental Assessment (SEA) process --see example in Box 6.3.

#### Box 6.3 Strategic Environmental Assessment & Land Use Planning – Tannourine Pilot Project (2006)

The SEA evaluates the environmental and socio-economic impacts of policies, plans and programs. It usually covers large geographical areas and is conducted at a regional level. A pilot land use planning project under the guidance of the MOE/ UNDP was funded by the EU for the region of Tannourine. The planning activity engulfed the nearby site of Baatara Sinkhole in Chatine (protected by MOE Decision 8/2004). The pilot project applied the SEA process to a regional development plan that is based on sound land use planning. The pilot produced encouraging results and was a learning experience for all including the municipality of Tannourine, the regional department of urban planning, and the Ministry of Environment. The project should be replicated in other parts of the country as part of a national effort to go from *physical* master planning to *strategic* planning.

Source: DAR/ELARD/Yazigi Atelier, 2006

In 2000, urban master plans covered 10.3 percent of the Lebanese territory (CERMOC 2000 in SOER 2001). Subsequent analysis showed however that this extent only covered urban master plans that had been both approved by the Higher Council of Urban Planning (HCUP) and decreed by the Council of Ministers (COM), and issued during the period 1960-2000. A study conducted in 2004 identified additional urban master plans that were approved by the HCUP but not yet decreed by the COM (Verdeil et al., 2007). They cover 614.3 km<sup>2</sup> (see **Map 5**). Therefore, the total zoning extent in Lebanon until 2004 covered about 16.2 percent of the territory (or 1,693 km<sup>2</sup>). The number and extent of urban master plans approved and decreed *after* 2004 has not been compiled.

While zoning regulations aim to regulate and organize construction, some regulations can have an opposite impact by accelerating urbanization, resulting in chaotic urban agglomerations. For instance, during the late 1960s and early 1970s, the Directorate General of Urban Planning (DGUP) amended urban planning regulations in several winter and summer destination sites including Broumana, Beit Merry, Bikfaya, Rayfoun and Aajaltoun. See *analysis of the impact of urban master plans, or the lack thereof, on urbanization in Chapter 7*.

### 6.2.4 Coastal Zone

The coastal zone stretches over 240 km in length from north to south, with an average width of less than 500m. Lands located along this zone are in extremely high demand due to their tourism potential and proximity to the sea and a booming real estate sector. This pressure has led to the implementation of large-scale reclamation projects (public and private), the construction of dozens of marinas (for leisure boats and fisheries), and rampant urbanization stretching along vast coastal areas. Violations of the public maritime domain are significant.

#### *Abuses of the public maritime domain*

During the civil war period (1975-1990), there were many abuses to and infringements on the public maritime domain. Hundreds of residential and commercial establishments mushroomed on the seafront without legal permits. According to Ministry of Public Works and Transport (MOPWT) records, the total area of *licensed* developments in the public marine domain before 1975 (onset of Lebanese civil war) was about 876,000 m<sup>2</sup>. These developments are operated by 94 private establishments and/or individuals. During the period 1990-2001 (after

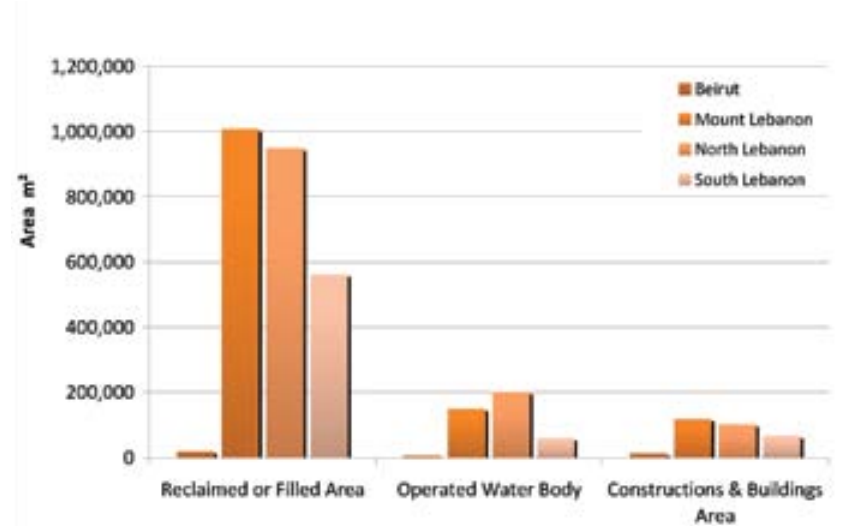


the end of the civil war), successive governments gave licenses covering an additional 732,620m<sup>2</sup> of the public domain (436,601 m<sup>2</sup> on land and 296,019 m<sup>2</sup> at sea). These licenses include port expansion works, recreational pools and gardens, sports stadium, and road works.

Meanwhile, during the period 1975-2001, an estimated 1,269 unlicensed developments mushroomed along the coastline covering about 3.2 Million m<sup>2</sup> of the public maritime domain (see geographic distribution in Figure 6.7). Responsibility for these violations is shared among municipalities (about 22%), fishing ports (about 11.5%), and government agencies (66.5%).

Although government violations of the public maritime domain are not taxed (even if they were licensed), the GOL has yet to come up with a plan for settling (or removing) seafront violations and infringements, pursuant to Decree 2522/92 (which defines levies for using the public maritime domain) and Decree 7919/1996 (which transfers a draft law on the settlement of the violations to parliament for review and approval). A sizeable number of the abuses on the public maritime domain are large-scale development projects, as explained next.

**Figure 6.7 Type and Distribution of Illegal Marine Properties**



Source: Based on Information International, 2003 (statistics from MOPWT)

*Large-scale developments in the coastal zone*

The coastal zone is targeted by promoters and real estate developers. The GOL, usually represented by the MOWPT, receives frequent permit applications to lease the public maritime domain for large-scale developments including marinas, tourism resorts, and other commercial facilities. These applications are normally examined by the HCUP, as well as by the MOE as part of the mandatory Environmental Impact Assessment process and MOE’s mandate (Article 2.20 of Law 690/2005 on setting the environmental conditions to protect beaches, streams, rivers, springs, lakes, wetlands and valleys to safeguard the environment and natural resources). It should be noted that the EIA process is since 2002 fully integrated in the permitting procedure; project proponents must complete and submit the EIA study as part of their application file to the MOPWT. Unfortunately, several project proponents are still able to bypass the MOPWT and MOE, and secure a permit directly from the COM. While many coastal projects are approved for construction, some projects are either downsized or cancelled due to public pressure. The following examples show how the EIA and SEA process can control large-scale development projects, and how the municipality can challenge the decision of the COM.

- 1) **Kfar Abida Coast:** In 2007, a real estate developer presented a large-scale seafront development project to the MOPWT for permit approval. The COM enacted Decree 955 (dated 23/11/2007) authorizing the construction of the resort that would consume 37,000m<sup>2</sup> of sea space, in Kfar Abida (Jbail). Construction would include



Multiple land uses on the coastal zone (here Beirut manara)

land reclamation works, two marinas with L-shaped breakwaters, and the conversion of the rocky coastline into a sandy beach. MOE requested the developer to submit a full EIA study. The study concluded that the project would generate adverse impacts on the environment and MOE therefore requested significant changes to the project design. In particular, the EIA recommended that the developer cancels one of the marinas and the sandy beach, reduces the length of the first breakwater pier and replace some of the housing with floating bungalows. Successive rounds of design modifications to mitigate project impacts on marine ecosystems reduced the reclaimed sea area to 4,000m<sup>2</sup>. The developer eventually scrapped the project and the Kfar Abida beach was saved from yet another infringement on the public maritime domain.

- 2) **Jounieh Bay:** In 2005, a developer approached the DGUP with a project to reclaim the entire seafront in Jounieh Bay (about 4 km long). The developer was deferred to the HCUP who requested the assistance of MOE to review the draft SEA of the proposed project. MOE's review of the SEA study revealed that the project would cause significant environmental damage to marine ecosystems and inland natural resources. The reclamation project was eventually scrapped but discussions could resume again in the future.
- 3) **Jbail sandy beach:** In 1999, the COM passed Decree 1920 (dated 16/12/1999) authorizing a large-scale seafront development in Jbail that would consume

32,000m<sup>2</sup>. The area in question is located in Kartaboun (near Eddé Sands today) and falls within the jurisdiction of the Municipality of Jbail. To protect the public beach from encroachment and to maintain the aesthetic value around the archeological vestiges of Jbail, the Municipality of Jbail appealed Decree 1920/1999. The Council of the State examined and approved the appeal against the developer and Decree 1920/1999 was cancelled by Decree 16798/2006. Although the resort was scrapped, the beaches in question were later targeted by beach developers (Eddé Sands, Voile Bleu, etc.) who rent the beach from the Municipality, have set up high-end beach facilities, and charge pricey admission charges. Although the continuity of the natural beach was maintained, *public* access to the beach has significantly declined.

### 6.2.5 Lebanon's Geology

Lebanon's geology is predominantly Jurassic, Cretaceous and Tertiary karstic limestone with some Cretaceous and Quaternary sandstone and conglomerate. More than two-thirds of the territory consists of carbonated rock formations



Illegal infringements and makeshift structures dot the Lebanese coastal zone and reduce public access to it (here in Chekka)



Proximity of building construction to old quarry site in Nahr El Mot (Metn)

**Table 6.2 Lebanon's earthquake history between 2001 and 2010**

Date	Local Magnitude*	Epicenter	Date	Local Magnitude*	Epicenter
29-Apr-01	4.1	Qaa El Rim (Zahle)	19-May-08	4	Jaouhariye (Sour-Nabatieh)
7-Jun-03	3.5	Majdel El Koura (Koura)	21-May-08	3.6	Jaouhariye (Sour-Nabatieh)
17-Dec-05	3.5	Chabtín (Jbeil)	23-May-08	4.2	Jaouhariye (Sour-Nabatieh)
24-Mar-06	3.5	in the Sea fronting Batroun	23-May-08	3.7	Jaouhariye (Sour-Nabatieh)
28-Mar-06	3.6	in the sea fronting Amchit	12-Jun-08	4	Zaoutar (Sour-Nabatieh)
9-Apr-06	3.5	in the sea fronting Amchit	12-Jun-08	4.1	Zaoutar (Sour-Nabatieh)
11-Apr-06	3.7	in the sea fronting Amchit	12-Jun-08	4	Zaoutar (Sour-Nabatieh)
6-May-06	3.5	Bechmezzin (Koura)	12-Jun-08	4.1	Jaouhariye (Sour-Nabatieh)
19-May-06	3.5	in the Sea fronting Batroun	12-Jun-08	4.1	Zaoutar (Sour-Nabatieh)
11-Feb-08	4.2	Qaaqaait El Jesr (Sour-Nabatieh)	13-Jun-08	4	Zaoutar (Sour-Nabatieh)
14-Feb-08	3.7	Qaaqaait El Jesr (Sour-Nabatieh)	13-Jun-08	3.5	Zaoutar (Sour-Nabatieh)
14-Feb-08	3.6	Kfar Sir (Sour-Nabatieh)	22-Jul-08	3.7	Jaouhariye (Sour-Nabatieh)
15-Feb-08	5	Kfar Sir (Sour-Nabatieh)	4-Nov-08	3.8	Qaaqaait El Jesr (Sour-Nabatieh)
15-Feb-08	4	Marnaba (Sour-Nabatieh)	17-Apr-09	4.3	Maifadoun (Sour-Nabatieh)
15-Feb-08	3.7	Marnaba (Sour-Nabatieh)	17-Apr-09	3.5	Ghandourieh (Sour-Nabatieh)
20-Feb-08	3.5	Marnaba (Sour-Nabatieh)	6-May-09	4.1	Yahchouch (Jbeil)
28-Feb-08	3.5	Qaaqaait El Jesr (Sour-Nabatieh)	10-Jul-09	4	Tayr Semhat (Sour-Nabatieh)
1-Mar-08	3.5	Qaaqaait El Jesr (Sour-Nabatieh)	12-Jul-09	3.5	Qaaqaait El Jesr (Sour-Nabatieh)
30-Mar-08	3.5	Tayr Semhat (Sour-Nabatieh)	28-May-10	3.6	Louaiziye (Sour-Nabatieh)
11-May-08	3.7	Qaaqaait El Jesr (Sour-Nabatieh)			

\*Only earthquakes equal to or higher than 3.5 Magnitude on Richter's scale are listed

Source: NCSR-National Centre for Geophysical Research, November 2010

which make up most of the mountain ranges, rendering them vulnerable to groundwater pollution and natural risks such as landslides and earthquakes. The country is located in an active tectonic area characterized by three major faults (Yammouneh, Roum and Serghaya) and bisected by minor faults (see Figure 6.5 above).

Such faults are a source of concern in relation to built-up areas –see **Map 6** for spatial distribution of major fault and urban agglomerations. Table 6.2 below presents Lebanon's earthquake history covering a full decade (2001-2010). During this period, Lebanon experienced 39 earthquakes with a magnitude equal to or above 3.5 (often felt) on Richter's Scale, of which 29 occurred in the region of Sour-Nabatieh and five were recorded in the sea. The most active year was 2008 with 24 recorded earthquakes in Sour and Nabatieh including one earthquake of magnitude 5.

Although the Lebanese building code (Law No. 646/2004 followed respectively by Application Decree No. 15874/2005 and amended by Application Decree No. 617/2007) includes seismic design standards, enforcement is sporadic especially outside major cities and

during periods of security concerns. Inspection of building foundations and building floors during the 1975-1990 civil war, and immediately after subsequent wars with Israel, was probably very limited to absent. In case of seismic event, there are no publically known evacuation and emergency response measures. Many high-risk areas have yet to be decreed as no-construction zones.

### 6.2.6 Soils of Lebanon

In 2006, the NCSR published *The Soil Map of Lebanon* - a booklet divided into 27 sheets containing detailed information on soils of Lebanon, their location and morphology (scale 1:50000). The most widely represented soils are the calcareous Terra-Rossa and Rendzinas. These soils are located in agricultural plains of Bekaa, Aakkar, Koura, Sour, Saida, Rachaya and Hasbaya. Other soil types include sandstone, basalts and similar older volcanic materials. Generally, soils in Lebanon are young and characterized by fragility, poor consistency and shallowness (especially on sloping terrains). Soil fertility is affected by natural and anthropogenic factors that may result in soil degradation as well as soil erosion --see *Table 6.3 for an overview of pressures affecting soil quality.*



**Table 6.3 Leading causes of soil degradation in Lebanon and their impact**

Source	Cause	Potential Impact
Natural	Climate change	<ul style="list-style-type: none"> <li>Water-borne erosion from torrential precipitation</li> <li>Drought and soil crusting (mainly silty soils)</li> </ul>
	Topography	<ul style="list-style-type: none"> <li>Accelerated soil erosion and landslides</li> </ul>
Anthropogenic	Urban expansion	<ul style="list-style-type: none"> <li>Excavation and removal of top soil, replaced by concrete</li> <li>Desertification of vulnerable lands</li> <li>Deforestation due to fires, overgrazing and quarrying</li> </ul>
	Soil pollution	Chemical degradation of the soil, modification of the biochemical balance of soils, reduced purification and filtering capacity of soils
	Overuse of fertilizers	
Agricultural malpractices		

Source: Prepared by ECODIT for 2010 the SOER

### Soil Salinization

Several studies have observed the occurrence of secondary soil salinization, particularly in the semiarid areas of the northern Bekaa valley and the Anti-Lebanon mountain range as well as in coastal greenhouses (Darwish T., 2001). Salinization is caused by an overuse of fertilizers and poor irrigation management practices. For example, the lack of crop rotation schemes (replaced by monoculture systems) has contributed to soil salinity build-up in El Qaa (Bekaa). Other studies in the Bekaa also show significant nutrient build-up and salinity

under greenhouse conditions. In the coastal zone, salt water intrusion in coastal aquifers may lead to extensive soil salinization – see Chapter 3 *Water Resources* for more information on salt water intrusion in coastal wells and aquifers. Good water and nutrient management will significantly improve plant nitrogen uptake, and therefore help prevent nutrient build-up and salinity hazards (Darwish T., 2001).

### Soil Erosion

Erosion rates in Lebanese mountain areas can reach 50–70 tons/ha/year (FAO 1986). In 2006, Bou Kheir developed a model for mapping soil erosion risk covering a 955 km<sup>2</sup> study area (9% of the territory). This area was representative of the environmental diversity of the country in relation to geology, soil, hydrography, land cover and climate. It extends from west to east covering three major landform zones (coast, the Mount Lebanon range, and the Bekaa Valley). Using Geographic Information System (GIS), the mapping system was produced on a scale of 1:100000. The author classified soils based on their potential for water retention, infiltration and erodibility. Water-borne soil erosion can cause significant land degradation. The most vulnerable soils are shallow soils with low organic matter content. The study indicated that 49 percent of the study area has *high to very high* runoff potential and 24 percent has *very low to low* runoff potential. The erodibility potential was estimated to be (1) low for “terra rossa” on Upper Jurassic and Cenomanian bedrocks of the Lebanon Mountains, (2) medium in the Bekaa Valley, and (3) high on sandy soils. The study also produced several erosion risk maps (Bou Kheir *et al.*, 2006).

### Soil (and groundwater) Contamination

Soils and groundwater are contaminated by the excessive use of crop pesticides and fertilizers, crop irrigation using polluted water, and dumping of non-treated waste onto soils (Darwish *et al.*, 2008). Farmers tend to spray too much and too close to the harvest date, with little knowledge of and compliance with minimum withdrawal periods. Such practices cause considerable levels of contamination in the food chain. In 2008, Darwish analyzed the soil-groundwater vulnerability to contamination by heavy metals in the central Bekaa plain. The study is based on the risks of heavy metal transfer (from top soil to groundwater) and the degree of protection offered by the soil cover and soil-metal interaction. Farmers often resort to irrigation with contaminated water to offset water shortages during dry summer



Extensive excavation for construction leading to loss of top soil and erosion



spells and periods of peak crop water demand. Such practices increase pollution hazards on soil and groundwater quality. The research confirmed that the major sources of heavy metal contamination derive from agro-chemicals and industries. It also explained nitrogen behavior in agricultural soils. In particular, Nitrates follow the wetting front and therefore, as anions, they are not retained by the negatively charged soil mineral complex. Nitrates therefore move easily downward with percolating water to contaminate shallow aquifers, and appear to leach faster with sprinkler irrigation as compared to drip irrigation (higher flow rates). Finally, the research also showed a direct correlation between soil type and soil depth with the rate of heavy metal transfer into groundwater, as determined by heavy metal content in irrigation water from wells in the central Bekaa (Darwish *et al.*, 2008).

### 6.2.7 Karst Features

Much of our knowledge about Lebanon's karst features comes from specialized caving clubs in Lebanon including: Association Libanaise d'Etudes Spéléologiques (ALES) and Spéleo Club du Liban (SCL). Karst is a terrain with distinctive landforms and hydrology created from the dissolution of soluble rocks, principally limestone (USGS, 2010). Karst features are characterized by springs, caves, sinkholes, and a unique hydrogeology system that results in aquifers which are highly productive but extremely vulnerable to water contamination. There are three major categories of karst in Lebanon, each of which has a different landform and unique elements: (1) *surface karst* including



Surface karst in Jajj (Jbail)



Surface Karst in Jabal Moussa (Kesrouan)

#### Box 6.4 Kfardebian Natural Bridge

Kfardebian natural bridge is a majestic and unique karstic feature located in Kesrouan. The bridge was designated a Natural Site by Decree 434/1942, with a 300m protection radius. The integrity and heritage value of the natural bridge are affected by activities that may occur within and beyond the protection zone. In particular, a private land owner has been trying since 1994 to build a residential house on his land located 200m from the bridge (Lot No. 5445, 5446 and 5447). MOE responded by issuing Decision 15/1 (dated 5/10/1995) which (1) bans all forms of construction works on and near the bridge, (2) calls for prosecuting any party that damages the bridge or its protected radius, and (3) requests DGUP not to issue any construction permit that would impact the bridge.

In 1996, the owner asked the Council of the State to designate a team of experts to evaluate the environmental impacts of the project. The resulting study claimed that the project would not impact the bridge and so the owner appealed MOE's decision. The Council of the State accepted the appeal by Decision No. 469 (dated 24/3/2004), overriding MOE's Decision 15/1, but also requested additional studies. MOE accepted the decision of the Council but did not approve the project's EIA study presented by the owner. Grounds for rejection were based on geological and hydro-geological conditions. The owner appealed MOE's rejection of the EIA study in 2008 but, this time, the Council of the State rejected the appeal. During this period, conservationists and civil society groups organized multiple sit-ins at the site to express their grave disapproval of any works on or near the natural bridge. So far, the Kfardebian Natural Bridge has been saved!



cockpit karst, sinkholes entries, natural bridges, pinnacle and broad tower karst, karren and lapiaz, scallops, ripples pans, flutes and rills, and dolines; (2) *subsurface karst* are caves that developed horizontally and vertically; and (3) *underwater karst* which are submerged caves under the sea.

#### *Extent of Lebanon's Karst Heritage*

Karst in Lebanon is widespread and evolved over millennia and during different geological

periods. More than 65 percent of Lebanon's surface area is covered with karstic rocks (Edgell, 1997). Some have spectacular scenery and some are less significant in terms of beauty and biodiversity, however all are important in terms of groundwater resource --see *shortlist of important Karst sites in Lebanon in Annex 1*. Karst is very vulnerable to pollution, contamination and damage. It is easily destroyed by physical activities such as construction (see example of construction pressure on Karst in Box 6.4) and quarrying activities and can be readily polluted by chemical and biological contaminants.

The widest exposed karst is the Sannine-Mameltein Formation of the Cenomanien epoch from the Cretaceous period. It covers approximately 43 percent of the Lebanese territory, extending from the coast to the highest peak in the north and present along the coast in the south and covering most of the western mountain range (see *Map 7*). They are less spectacular than their Jurassic counterpart in surface features but as impressive in underground karst elements. These two formations form the backbone of the groundwater resource in Lebanon. They are recognized for their water basin, caves and springs, such as Ain el Zarka, Jeita spring, and Aanjar spring.





On the contrary, the Kesrouan Formation, of the Jurassic Period, is the most impressive in terms of surface and underground karst. It is widely seen in central Mount Lebanon between the rivers of Nahr Beirut and Nahr el Jaouz. Less spectacular, but still important in terms of hydrogeology, are the ones in Jabal el Cheikh, Niha and Barouk ranges (see *Map 7*). They cover around 12 percent of the surface area of Lebanon. Other karstified formations are the Eocene and the Miocene aged rocks which cover eight percent and 1.25 percent, respectively. The Eocene is present mainly in the south and southern Bekaa and the Miocene in Beirut and Tripoli areas. The Bekaa Valley is covered with extensive non-karstic Quaternary aged deposits beneath which lie karstic formations belonging to the Eocene, Miocene and Cretaceous periods. Moreover, karst areas beneath the sea are less exposed but also important; examples include Chekka, Batroun, and Jounieh in Mount Lebanon and Naqoura in the south.

#### *Sources of Pressure on Lebanon's Karst Heritage*

Many anthropogenic activities threaten Lebanon's unique karst heritage. The most common sources of pressure include quarrying

(mainly blasting), construction, substandard sewage infrastructure, waste dumping, the reckless disposal of construction waste in ravines and along riverbeds, and unplanned road construction. Vandalism is not uncommon and can cause significant and irreversible damage to karst formations (including stalactites and stalagmites). Table 6.4 shows a few recorded examples of damaged karsts due to anthropogenic activities.

**Table 6.4 Sources of pressure on karst formations (Examples from Lebanon)**

Sources of Pressure on Karst Formation	Photos
<p>The karst in Faytroun, Mayrouba, Aachkout and Hrajel (Kesrouan) is threatened by road and building construction. Note only have surface features been degraded but the region is part of the Jeita catchment area (the main water supply to Beirut). Contamination of the Jeita water source is caused by haphazard construction and uncontrolled disposal of solid and liquid waste on karst.</p> <p><i>Photo: Buildings implanted on surface karst in Faytroun</i></p>	
<p>The quarries (sand and aggregates) were recently reopened. One of those quarries is situated less than 500m from Lebanon's most important sinkhole (Fouar Dara) and 1 km from Lebanon second deepest sinkhole (Qattine Azar), which constitutes a major water source for most of the Metn area and also Beirut. The quarries are destroying the precious limestone rocks, releasing suspended particles into underground water, and increasing water turbidity at resurgence points near the coast.</p> <p><i>Photo: View of Tarchich quarry</i></p>	
<p>The Metn Expressway, connecting Nahr el Mot to Baabdat, was built mostly on Jurassic karstic limestone rocks. Although surface karst in the area is not spectacular, the highway has destroyed at least three major sinkholes, including Mar Chaaya sinkhole and Jouret el Ballout sinkhole (each about 30m deep). The middle and upper part of the highway is in the catchment area of Fouar Antelias karstic spring. The construction has reduced the amount of water infiltrating into the Jurassic aquifer feeding this spring mainly because the highway is built along the Nahr el Mot fault. The construction and poor management of unwanted debris have increased the amount of suspended particles in the aquifer (recently observed from the high turbidity in the Fouar Antelias spring recently).</p> <p><i>Photo: Remnants of collapsed sinkhole on Metn Expressway</i></p>	
<p>Vandalism is a behavior (graffiti) or ruthless destruction or spoiling of anything beautiful or venerable. Many caves show signs of vandalism including graffiti and bullet holes. The general public usually is unaware and unappreciative of the time scale needed to grow speleothems. Many homes and home-gardens in Lebanon display pieces of stalagmites and stalactites because they are perceived as ornaments.</p> <p><i>Photo: Graffiti in Zahlan cave (Sir El Dinnieh)</i></p>	



### 6.2.8 Quarrying

Lebanon's quarry sector is very poorly organized --see Box 6.5 on quarry malpractices. Although it is difficult to survey with precision all quarries, a recent study counted 1,278 quarries covering 5,267 ha scattered all over the country (Darwish *et al.*, 2010). Separately, and in response to mounting public opposition and critique of the government's handling of the sector, the Ministry of Interior and Municipalities (MOIM) launched a nationwide survey to assess the number of quarries and their status (data still unpublished and not in electronic format). These quarries scar the Lebanese landscape, and the vast majority remain unlicensed (see distribution of major quarries in **Map 7**). Only one quarry was designed using terracing technique (Qaraoun state quarry) and only one was rehabilitated after closure (Sibline). This dismal performance record for the quarry sector is seemingly unaffected by a battery of measures and incentives to rehabilitate quarries including: MOE decision to rehabilitate quarries (Decision 48/1 dated 17/06/2009), the \$4 million earmark in the MOE budget for rehabilitating public quarries (year 2011), and MOE's public right to deposit and use the money from bank guarantees.

#### Box 6.5 Quarry violations and malpractices

In 2010, MOE and UNDP contracted HAS to review and inspect 150 quarry applications and operations. The aim of this study was to analyze the malpractices and irregularities of quarries during pre-permitting and post-permitting using GPS readings, maps overlay and Quick Bird satellite imagery. The study showed four types of violations: (1) excavation extends outside the designated license area; (2) operators don't respect the stages of the quarry license (e.g., they consume five years --the duration of the license), (3) cliffs and quarry faces exceed allowable heights, and (4) no site rehabilitation after closure.

Source: Pers. comm. Nakhle Hachem, HAS



Rock quarries in Antelias (Metn)

#### Box 6.6 Lebanon's demand for construction aggregates

During the period 1994-2000 (at the peak of post-war reconstruction), the demand for construction aggregates ranged between 10 Mm<sup>3</sup> and 15 Mm<sup>3</sup> per year. About one third of this volume was used for sea reclamation works such as Marina Dbayeh, Beirut Central District and the Beirut International Airport runway. Subsequent demand for construction aggregates dropped and can be summarized as follows:

- 2-4 Mt per year for houses, 0.5 Mt per year for other types of construction and 2 Mt per year for roads
- On average, 200-300 tons of aggregates (sand and gravel) is required to build an apartment
- Roads need 5,000 tons of aggregates per 1 km and highways need 20,000 tons/km
- To extract 3 Mm<sup>3</sup> of usable materials, a quarry must produce 4 Mm<sup>3</sup>, equivalent to about 60-80 ha.



Source: CDR-NLUMP, 2004

The chaotic state of the quarry sector has many root causes including rising demand for construction aggregates, political wrangling, delays in promulgating the long-awaited quarry master plan, and large scale infrastructure projects including sea reclamation. It can also be argued that for a small country the size of Lebanon, the occurrence of five cement plants (Ciment de Sibline, Cimenterie National, Holcim (Liban), Cimenterie du Moyen-Orient, and Société Libanaise des Ciments Blancs) has a perverse effect on the construction sector and on GOL infrastructure plans (see demand estimates in Box 6.6).

Quarrying impacts land resources, ecology, and natural landscapes irreversibly. They remove topsoil, destroy natural vegetation, alter ecosystems, cause air pollution, and reduce the aesthetic value of the surrounding landscape. A 2004 study published by the World Bank and the Mediterranean Environmental Technical



Assistance Program (METAP) on the cost of environmental degradation in Lebanon showed that quarries reduce the value of surrounding land annually by 16-71 percent and the value of apartments by 16-45 percent. This is equivalent to 0.1 percent of Lebanon's national Gross Domestic Product (GDP) or, in monetary terms, \$14-16 million per year (WB, 2004). In 2009, the cost of environmental degradation from quarries was estimated at \$34.5 million based on a GDP of \$34.5 billion (WB, 2010).

### 6.2.9 Land Mines

Lebanon has an estimated 137 km<sup>2</sup> of mine contaminated land (1.3% of the territory). The *caza* of Nabatieh is the most affected area, harboring a quarter of Lebanon's mine infested land; nearly half of recent and reported mine accidents occurred there. Selected areas in the *Mohafaza* of Mount Lebanon are also heavily affected by landmines from the civil war period, followed by the Bekaa Valley (about 15% of contaminated lands). The presence of mines, whether confirmed or presumed mine fields, affect livelihoods and alter land resources. Known minefields are usually cordoned off or sign-posted to alert local populations and discourage activities including shepherding, agriculture, and recreation. Unfortunately, many minefields are not adequately sign-posted and local residents sometimes trespass or decide to resume agricultural activity, including shepherding, to improve their income. Landmine victims are usually picnickers, walkers, and shepherds, but also unsuspecting children who play and tamper with mines, unexploded ordnances, and/or unsuspecting objects (UNCC, 2004).

During the July 2006 war, unexploded cluster bombs contaminated an estimated 35 km<sup>2</sup>. Israel dropped an estimated four million cluster bombs over South Lebanon, of which at least 25 percent (one million) don't detonate upon impact. Following this war, landmines, cluster bombs and unexploded ordnances resulted in the death and injury of 313 persons (UNDP, 2008).

## 6.3 KEY ACTORS, LAWS AND REGULATIONS

The following section describes key laws and regulations related to land and the environment. Each text cited here is also listed chronologically at the end of the chapter. For a more complete analysis of environmental legislation related to land resources, please refer to Chapters 1, 2 and 11 of SELDAS (EU/UOB/MOE/ELARD, 2005). For



Sand quarries in Rihane, south Lebanon



Land mine warning signs on Jabal Hermon

a review of environmental jurisprudence cases related to land resources in Lebanon and other countries, please refer to Chapters 1, 2 and 11 of SEEL (MOJ/MOE/UNDP, 2010).

### 6.3.1 Institutions Related to Land Management

Land management is directly related to ownership (see different categories of land tenure and ownership in Lebanon in Box 6.7). The ministries and institutions involved in land management are presented in Table 6.5.

**Table 6.5 Distribution of responsibilities related to land management**

<i>Responsibility</i>	<i>Party</i>	<i>MOPWT (DGUP)</i>	<i>MOE</i>	<i>MOA</i>	<i>MOC (DGA)</i>	<i>MOEW</i>	<i>MOIM</i>	<i>CDR</i>	<i>Religious Orders</i>
National land use master planning		X						X	
Protected areas management			X	X					
Forest Management			X	X					
Urban planning regulations		X							
Public maritime domain (coastal zone)		X							
Protection of cultural heritage					X				X
Protection of rivers and waterways		X	X			X			
Management of religious estates									X
Quarry sector			X			X	X		

Note: The above delineation of responsibilities is not exhaustive and subject to change.

**Box 6.7 Land tenure type in Lebanon**

Land tenure in Lebanon is complex. It consists of at least five principle categories:

1. *mulk*: private ownership
2. *amiria*: State owned and managed by MOF (Directorate General of Cadastral Affairs, DGCA)
3. *matrouka/machaa*: State owned and managed by municipalities.
4. *matrouka mahmiya*: can be owned by the State or by municipalities. Considered public and managed by MOF (DGCA).
5. *Khāliya moubaha*: also stated owned and similar to *amiria* lands but they have not been identified nor delineated.

Source: MOF Decision 3339 and its amendments (Dated 12/11/1930)

*Ministry of Public Works and Transport / Directorate General of Urban Planning*

The Directorate General of Urban Planning (DGUP) falls under the authority of the MOPWT. Its mandate is to develop urban regulations and coordinate urban planning activities. The directorate prepares and reviews urban master plans all over Lebanon except in Beirut and Tripoli, and three federations of municipalities (Jbail, Kesrouan and Metn) who have an urban planning / engineering unit. It is also involved in the building permit application process. Urban master plans are either prepared by the DGUP or by a private urban planning office.

The DGUP plays a key role in the building permitting process (see Figure 7.5 in Chapter 7) and in the formulation and/or review of proposed urban master plans. Completed master plans are submitted to the concerned municipality, which has one month to provide comments and critique. If accepted, the plan is then sent to the COM for endorsement. The DGUP is also involved in the protection of archaeological and cultural heritage. All urban plans have to be approved by the DGUP before implementation –see *functions of the Higher Council of Urban Planning in Chapter 7*.

*Ministry of Environment*

Law 690/2005 defines the mandate of the MOE and its organization. In particular, Article 2 describes the responsibilities of the ministry

across all environmental sectors. See targeted selection of responsibilities related to land use and land resources below:

Article 2.16 Determine the environmental conditions for zoning classification in different regions through regional and detailed master plans in collaboration with MOPWT

Article 2.17 Determine the environmental conditions necessary for establishing and managing gardens, parks, public swimming pools and cemeteries

Article 2.20 Determine the environmental conditions to protect beaches, streams, rivers, springs, lakes, wetlands and valleys to safeguard the environment and natural resources

Article 2.21 Determine the environmental conditions related to land use, if such use causes any harm to the environment or natural resources

Article 2.23 Determine candidate areas and sites for Protected Area (PA) designation as well as develop criteria and guidelines for PA management. The ministry is the lead government agency responsible for nature reserves. See *proposed new category system in Section 6.4.1*

Article 2.27 Require and enforce the EIA and/or IEE process on all projects

### *Ministry of Agriculture*

The management of forested areas in Lebanon is the responsibility of the Department of Forest and Natural Resources under the Directorate of Rural Development and Natural Resources at Ministry of Agriculture (MOA). Lebanon has two overlapping forest laws: (1) the Forest Code of 1949 and (2) the Law on Forest Protection, Law 85 of 1991 amended by parliament in 1996. While the law of 1949 regulates forest activities including pruning, coppicing, thinning and charcoal production, the laws of 1991 and 1996 imposed severe restrictions on forest activities and a total ban on harvesting resinous trees including pines (Calibrian, Aleppo and Stone Pines), Lebanese cedar, juniper, cypress and fir. The law of 1949 recognizes three types of forests based on land ownership (private, municipal and state) and therefore continues to provide the basis for the management of forests by the MOA. Unfortunately, the Ministry is understaffed and unable to effectively monitor and manage recreational and economic activities or risks within forests.

### *Ministry of Culture / Directorate General of Antiquities*

The Directorate General of Antiquities (DGA) falls under the authority of the Ministry of Culture (MOC). It is responsible for implementing the provisions stipulated in regulations related to antiquities (Decision No.166/L.R. dated 7/11/1933 and its amendments), and other legal and regulatory provisions related to archeological remains, antiques, traditional and historical monuments. DGA comprises three units: (1) Directorate of Archeological Monuments and Built Heritage; (2) Directorate of Archeological Excavations and (3) Directorate of Movable Archeological Property.

### *Ministry of Energy and Water*

The Ministry of Energy and Water (MOEW) is responsible for the water sector under Law 221 dated 26 May 2000. According to Article 2 of this law, the Ministry has the following responsibilities in relation to land resources and water protection: (1) provide advice in the licensing of mines and quarries when such mines and quarries impact on water resources; and (2) protect water resources from pollution and waste by issuing laws and regulations and their application and enforcement. *See additional details on MOEW responsibilities in Chapter 3.*

### *Ministry of Interior and Municipalities*

Municipalities, Federation of Municipalities, Governors, and Kaemakam fall under the

responsibility of the MOIM. These four bodies play a modest role in the issuance of permits related to construction and quarries as well as other procedures related to land management and urban planning. The mandate of Municipalities is stipulated under Legislative Decree 118/1977 (and its amendments) and under Decree 4082/2000 on the organization of the MOIM. Legislative-Decree 116/1959 (and its amendments) delineates Lebanon's Mohafazas and Caza and defines the responsibilities of the *Mohafez* (Governor) and the *Kaemakam*.

### *Council of Development and Reconstruction*

Reporting to the Council of Ministers (COM), the CDR is a public institution established in 1977 (Legislative-Decree No.5 dated 31/1/1977). Article 3 of that decree mandates CDR to establish "the general framework for urban planning" in Lebanon and submit it to the COM for approval. In 2002, the COM requested CDR to prepare a National Land Use Master Plan for Lebanon. Following an international tender, CDR contracted the consortium DAR-IAURIF to prepare the required studies and articulate the master plan in concert with CDR and the DGUP. The final analysis was published in 2004 including a Final Report, maps, and a Geo-Database (a spatial database that includes shapefiles of different themes such as water, administration, land cover, etc. that can be manipulated using ArcGIS).

The Master Plan describes holistically the physical realities impacting land use, future challenges, alternative configurations for land use and development, land use principles, as well as sectoral action plans (transport, tourism, energy, water, environment, education, etc.). In particular, the plan proposes a unified set of land use categories covering the entire territory, and delineated several protection zones of ecological and patrimonial importance. Five years later, and after protracted debates and under pressure from the European Union, the COM approved the Master Plan (Decree 2366 dated 20/06/2009) –*see overview of the Master Plan in Sections 6.5.1.*

### *Public Properties*

Public properties are lands used for public interests; they cannot be sold and do not acquire ownership over time. In Lebanon, Legislative-Decision 144 dated 10/06/1925 classifies public properties and stipulates their management and penalty in case of violation. They include the public maritime domain, salty ponds and lakes, land protrusions into the sea including



promontories, waterways, underground rivers and springs, waterfalls suitable for hydropower, navigation and irrigation channels, dams, military structures, telegraph and telephone lines, roads, streets, passageways, railways, ports and marine terminals and bays.

Several ministries share responsibility for the management of public lands (and related infrastructure). For example, the MOPWT is responsible for the maintenance of primary roads and the railway right-of-way, as well as the public maritime domain including its ports and marine terminals. The Ministry of Energy and Water (MOEW) is responsible for waterways, underground rivers, springs, rivers and riverbanks.

support economic development and other public interest projects. This loophole has led to many flagrant abuses of the religious estate in the form of commercial centers and residential blocs, serviced by new roads that dissect pristine forest landscapes.

A controversial example of urban encroachment on church land is the hill surrounding the Jounieh Bay (Harissa), which has been scarred by a large zigzag road and dotted with residential buildings blocks. The Sunni estate are managed by the Department of Sunni Estates presided by the Mufti of the region. They are concentrated in major cities such as Beirut, Tripoli, and Saida. The Shiite estate is administered by the Supreme Islamic Shiite Council and they are primarily concentrated in Tyre, Beirut's southern suburb, and the regions of Baalbek and Hermel. The Druze estate is managed by the Sectarian Council of Druze and is primarily located in the Shouf region.

Makeshift structures dot the Lebanese coastal zone and damage natural rock edges



### Religious Orders

Religious orders, *Awqaf*, are important land owners. Every religious communion in Lebanon has a unit in charge of the management of their estate. The total area owned by the Christian, Muslim and Druze orders represents an estimated 35 percent of Lebanon's territory (unpublished data). Accurate data on the composition and the location of each estate are not available and would constitute the basis for a detailed land survey, in coordination with the Directorate General of Cadastral Affairs at the Ministry of Finance.

The church owns large swaths of land in valleys and mountains in several governorates and usually observes a very strict land policy dictated by the Vatican Church<sup>3</sup> and supervised locally by the Archbishopric. While the Church cannot sell the land it owns, it can rent it to

<sup>3</sup>This restriction applies only to the Maronite and Catholic Church, but not the Orthodox Church.

### 6.3.2 Conservation Legislation

Lebanon has been designating protected areas since 1942 when the GOL established eight protected sites pursuant to Decree 434 (dated 28/03/42) –see *definition of protected area in Box 6.8*. These early protected sites were very diverse ranging from urban parks (Horsh Beirut), to springs (Nabaa el Laban), natural sites (Yammouneh Lake and Kfardebian Natural Bridge), forests (Bologna pine forest, Mrouj oak forest, and the cedars of Bsharre) and historic monuments (temple of Baalbeck, Deir el Kalaa). Since 1942, several ministries have been proclaiming protected areas including the ministries of Tourism, Agriculture, Culture and most recently Environment.

#### Box 6.8 What is a Protected Area?

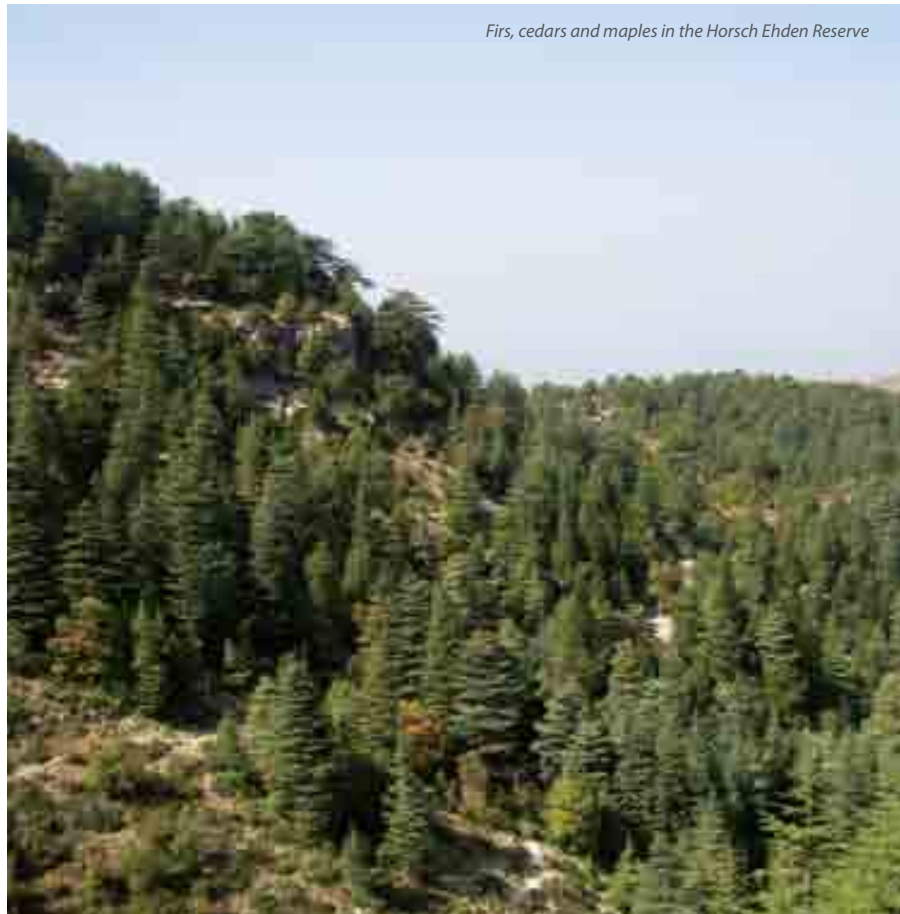
A clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values.

Source: IUCN, 2010

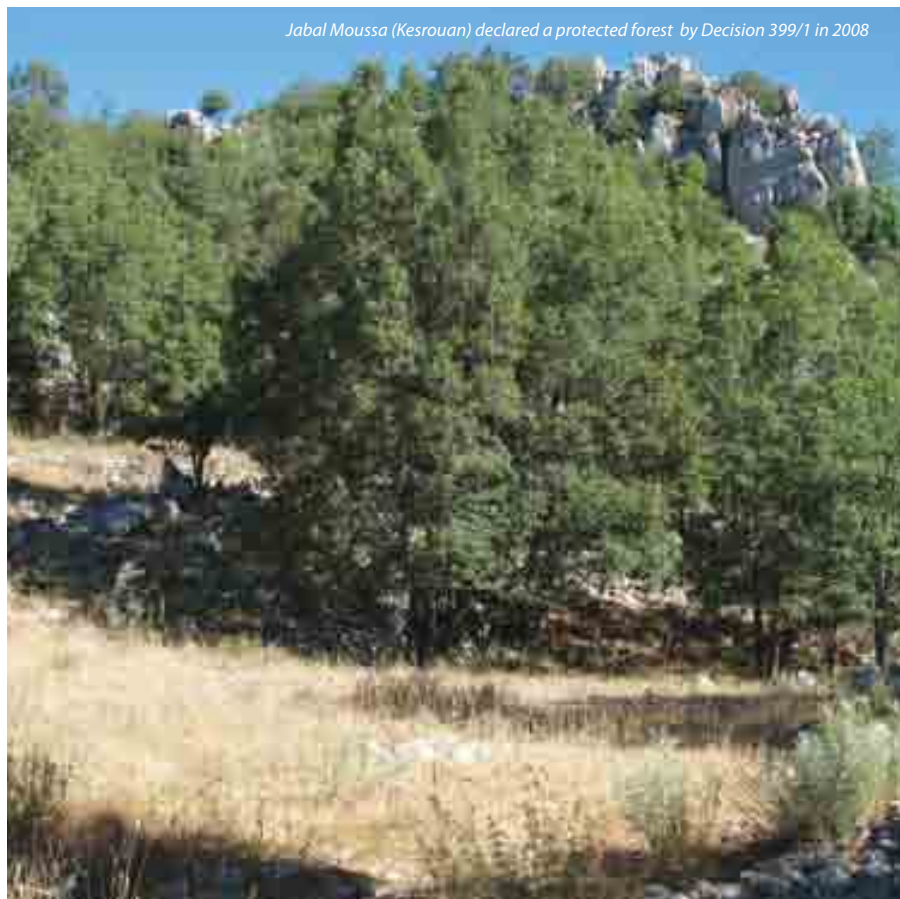
Lebanon today offers several nature reserves, protected forests, and protected sites many of which have also acquired international designations including Ramsar Sites, Special Protected Areas of Mediterranean Importance, Important Bird Areas, and World Heritage Sites. While *protected area* is the broad term encompassing all forms of conservation areas and perimeters, a review of Lebanon's conservation legislation reveals that there are at least six different categories of conservation: (1) nature reserves, (2) natural sites, (3) hima and forests, (4) touristic sites, (5) monuments and (6) sites of natural and/or ecological importance in need of protection including wetlands, caves, sinkholes, natural bridges and peaks. Managing these areas is a complex responsibility shared among several public institutions and agencies –see complete list of nature reserves in Chapter 5. Nature reserves promote ecotourism in Lebanon and play an important role in local development. They represent nuclei for scientific research and conservation. Between 2000 and 2007, the number of visitors to Lebanon's nature reserves was highest in 2004 (56,000 visitors) and lowest in 2007 (14,500) due to the war's residual effect. The highest number of visitors was recorded in the Al-Shouf Cedars and Palm Islands nature reserves, as per the breakdown in Figure 6.8. New data from these two reserves show an upward trend in visitor number; from 21,308 visitors in the Al-Shouf Cedars in 2008 to 57,963 visitors in 2010; and from 17,100 visitors in Palm Islands in 2007 to 23,250 visitors in 2010.

#### *Protected Forests*

The Forest Code (Law 85 of 12/9/1991), amended by Parliament in 1996 (Law 558 of 24/7/1996) stipulates that all cedar, fir, cypress, oak, juniper and other forests in Lebanon are protected by ministerial decision. Based on the amended 1996's forest code, MOA declared 13 protected forests between 1996 and 1997. In 2008, the ministry also declared the forest of Jabal Moussa protected (Decision 399/1 dated 18/9/2008). There was a visible hiatus in the designation of protected forests by MOA during the period 1997-2008, partly due to the fact that the anticipated Department of Forest Protection did not come to fruition at MOA. Separately during this period, MOE started to play a more pronounced role in (1) the establishment and management of nature reserves some of which harbor significant forests and, (2) reforestation. See complete list of protected forests in Chapter 5.



*Firs, cedars and maples in the Horsch Ehdén Reserve*

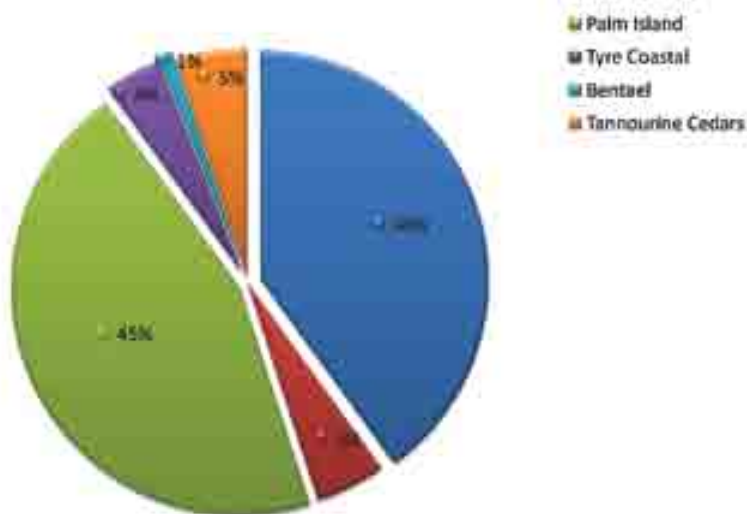


*Jabal Moussa (Kesrouan) declared a protected forest by Decision 399/1 in 2008*





Figure 6.8 Number of visitors to Lebanon's Nature Reserves (2005 data)



Source: MOE Leaflet on Ecotourism in Nature Reserves, 2008

#### Protected Sites

Important sites in Lebanon are protected by decisions from the ministries of Environment, Agriculture, Tourism and Culture (in the case of World Heritage Sites which are classified by UNESCO). They include landscapes, rivers streams, valleys, forests, caves, sinkholes, archeological monuments and touristic sites. See full list of protected sites in Lebanon in **Annex 2**. Decisions emitted by MOE to protect special sites stipulate that MOE and DGUP will jointly develop permitting standards for the construction and operation of facilities within a 500-meter protection radius (buffer zone). Other conservation legislation derives from international conventions including the 1971 Ramsar Convention.

#### 6.3.3 Quarry Legislation Affecting Land Resources

Lebanon has seen a string of regulations related to the quarry sector. The following list describes the most important decrees affecting quarrying from 1996 to 2009.

- Decree No. 5616/1996 was enacted to regulate the quarry sector in Lebanon but enforcement has been noticeably cavalier and/or absent. Separately, MOIM would issue quarry permits, sometimes after consultation with MOE.
- Decree No. 8803/2002 canceled Decree 5616/1996. It organizes the activity of quarries and crushers, licensing procedures, as well as the operation, management and rehabilitation of quarries. The decree established the National Council of Quarries (NCQ) which brings together representatives from nine public agencies and is presided by MOE. It requires operators to obtain a declaration (statement) from the MOEW (General Directorate of Exploitation). The decree presented the long-awaited National Master Plan for Quarries indentifying four regions: (1) Aarsal, (2) Tfail and Ain El Jaouz in Baalbek, (3) Yanta and Aita El Fokhar in Rachaiya and (4) Qousaya and Deir El Ghazal in Zahle. All these regions are located in the Anti-Lebanon Mountain Range and cover about 163 km<sup>2</sup>. The decree requires quarry contractors to rehabilitate the site at owner expense by terracing and replanting the site after closure; brings local municipalities into the licensing process; and imposes fines on non-complying operators. It also requires owners to present a bank guarantee to ensure the rehabilitation of the quarry.
- Decree No. 16456/2006 amends Decree 8803/2002. It brought further improvements and restrictions to the quarry sector. For example, the decree manages blasting operation, bans quarrying inside protected areas, and requires the owners to hire a supervising engineer to oversee geotechnical, civil and hydro-geological works. As of 31 December 2010, MOE had 135 bank guarantees on



file worth LBP4.6 billion (or \$3.07 million). Despite widespread noncompliance by the vast majority of operators, MOE has yet to exercise its public right to deposit bank guarantees and use the money to finance site rehabilitation.

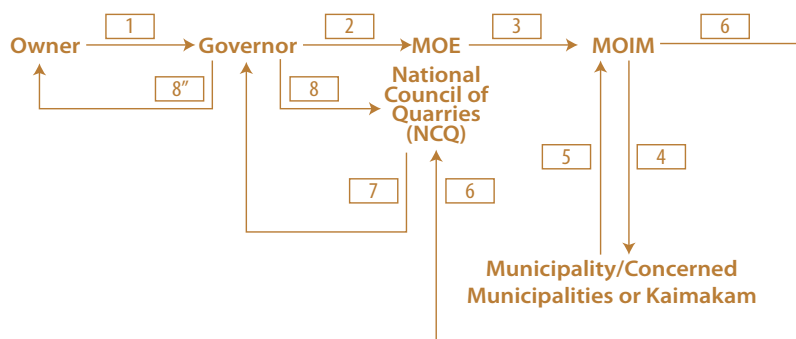
- *Decree No. 1735/2009* also amends Decree 8803/2002. It explicitly requires the declaration (statement) that operators must obtain from the MOEW (General Directorate of Exploitation) to address the potential impacts of the proposed quarry on surface and groundwater and on transmission lines. The decree also expanded the list of designated quarry areas to include 12 new areas: (1) Qaa Baalbek, Qaa Baayoun, (2) Ras Baalbek, (3) Ain Bourday, Brital, (4) Taraiya, Chmestar, (5) Ftouh Kesrouan, (6) Fnaydeq, (7) Michmich (Akkar), (8) Kfour El Aarabi, (9) Rihane, Aaramta, (10) Aachiyeh, Mazraat El Ouzaaie, (11) Tiri, Ain Ebl, and (12) Majdelzoun. Combined, these sites cover an additional 74 km<sup>2</sup>, bringing the total designated quarry area to 237 km<sup>2</sup>.
- Environmental conditions based on Decree No. 8803/2002 and its amendments. MOE issued many operational and license decisions related to the quarry sector including four decisions in 2009 and three in 2010 as described below:

Decision 16/1 (1/04/2009)	Defines the license conditions and documents required for crushers for gravel production only (no quarry)
Decision 17/1 (1/04/2009)	Defines the license conditions and documents required for rock quarries for crushers and rubble
Decision 18/1 (dated 1/04/2009)	Defines the license conditions and documents required for rock quarries for producing mosaics
Decision 20/1 (1/04/2009)	Defines the license conditions and documents required for sand quarries or naturally fragmented gravel
Decision 48/1 (17/06/2009)	Defines procedures for quarries rehabilitation
Decision 136/1 (23/08/2010)	Defines procedures for operating small-sized quarries
Decision 137/1 (23/08/2010)	Defines the Daily Activity Report template for quarrying

Decision 138/1 (23/08/2010)	Provides a template for the "commitment" (to be provided by the quarry operator)
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The quarry owner / operator can obtain a quarry license (after submitting the required documents) that extends up to five years. Figure 6.9 presents an illustrative flowchart of the current licensing procedure. The NCQ meets periodically to review, approve and/or reject license applications. The Council issued 52 licenses in 2009 and 69 licenses in 2010.

**Figure 6.9 Licensing procedure for quarries**



Source: MOE Decree 8803/2002 and its amendments

**Legend:**

**Steps 3, 4 and 5** apply if there is a municipality (of federation of municipalities); if the municipality does not exist, then the authority to deny document approval to an operator is relegated to the Kaemakam. **Step 8** is the acknowledgment by the Governor of the approval from the National Council for Quarries. **Step 8'** is the issuance of the license by the Governor after approval by the National Council for Quarries.

**6.4 SELECTED RESPONSES TO LAND ISSUES**

In an effort to increase awareness of the country's natural and cultural heritage, and in response to mounting urban pressure, there has been a noticeable increase in conservation activities and programs, engaging several governmental and non-governmental actors including Non-Governmental Organizations (NGO). The following sections describe selected responses related to protected areas management, land use planning, and reforestation.

**6.4.1 Attempts to Reorganize Lebanon's Protected Area System**

Although Lebanon has an impressive catalogue of protected areas and other protected sites, there is currently no overall vision for protected areas in the country. As part of the EU-funded SISPAM program (2004), ECODIT and MOE

proposed the following national category system for PA designation (adapted from the IUCN classification system) and secured widespread acceptance for this new system among conservationists and PA staff:

1. *Category A - Habitat/Species Management Area (IUCN Category IV)*: area of land and/or sea managed to maintain and/or restore the habitat conditions necessary for the persistence of significant species (e.g., rare, endemic, threatened or vulnerable), groups of species, or biotic communities; as well as to preserve vulnerable and/or rare ecosystems or habitats.
2. *Category B - National Park (IUCN Category II)*: natural area of land and/or sea designated to (a) protect the ecological integrity of one or more ecosystems for present and future generations, (b) exclude exploitation or occupation inimical to the purposes of designation of the area and (c) provide a foundation for spiritual, scientific, educational, recreational and

visitor opportunities, all of which must be environmentally and culturally compatible.

3. *Category C - Natural Monument (IUCN Category III)*: area containing specific natural or natural/cultural feature(s) of outstanding or unique value because of their inherent rarity, representativeness or aesthetic qualities or cultural significance.
4. *Category D - Protected Landscapes/Seascapes (IUCN Category V)*: area of land, with coast or sea as appropriate, where the interaction of people and nature over time has produced an area of distinct character with significant aesthetic, ecological and/or cultural value, and often with high biological diversity.

To implement this category system, the Lebanese Parliament must first approve the draft Framework Law for Nature Reserves, and then COM (upon the recommendation of MOE and MOA) would need to reclassify individual sites according to the four categories --see *tentative reclassification of a dozen nature reserves and protected sites in Table 6.6*.



Barouk cedar forest inside the Al-Shouf Cedars Nature Reserve

**Table 6.6 Proposed reclassification of protected areas (illustrative list)**

Site	Current Status	Proposed Category			
		A	B	C	D
Horsh Ehden	Nature Reserve	X			
Palm Island	Nature Reserve	X			
Karm Chbat	Nature Reserve	X			
Shouf Cedars	Nature Reserve		X		
Tyre Coastal	Nature Reserve				X
Bentael	Nature Reserve	X			
Yammouni	Nature Reserve	X			
Tannourine Cedars	Nature Reserve	X			
Baloo Baatara	Protected Site			X	
Faqra Natural Bridge	Protected Site			X	
Pigeon Rocks	Protected Site			X	
Jeita Grotto	Protected Site			X	
Cedars of Bsharre	Protected Forest			X	

Legend: A: Habitat/Species Management Area, B: National Park, C: Natural Monument, D: Protected Landscapes/Seascapes

**Box 6.9 Deforestation, reforestation and afforestation**

*Deforestation* refers to change of land cover with depletion of tree crown cover to less than 10 percent. Changes within the forest class (e.g. from closed to open forest), which adversely affect the stand or site and, in particular, lower the production capacity, are termed forest degradation. *Reforestation* is the artificial establishment of forest on lands which carried forest before. *Afforestation* is the artificial establishment of forest on lands which previously did not carry forest within living memory.

Source: FAO, 2010

**6.4.2 Reforestation Efforts**

Forests provide many ecosystem services including air quality improvement, carbon sinks, protection against soil erosion, timber, wildlife habitat, and recreation. Forests protect watersheds and ecosystems and help combat desertification.

MOA and MOE are spearheading several programs to upscale reforestation efforts in the country (see forest terminology in Box 6.9). The Department of Forests and Natural Resources at MOA is in charge of reforestation program in small scale. In 2008, it produced about 200,000 seedlings in nine plant nurseries across the country (see **Map 3** in Chapter 5). The MOA distributes the seedlings for free and therefore has little control over them after handover; they are usually planted along roadsides and on communal lands. Although MOA has banned the import of cedar seeds and seedlings (Decision 108/1 of 1995), enforcement is questionable as reforestation programs frequently rely on imported seedlings.

At MOE, reforestation is carried out under the National Reforestation Plan (NRP) managed by the Service of Natural Resources. The Lebanese Parliament approved in 2001 Framework Law 326 (dated 28/6/2001 and subsequently updated by a Law-Decree 40 dated 22/2/2007) allocating LBP25 billion to MOE over a five-year period to implement large-scale reforestation activities in carefully selected areas. Subsequently, the MOE formulated the NRP and started implementing the plan (Phase I between 2002 and 2004, and Phase II between 2004 and

2006) by contracting private nurseries to collect the seeds, produce and transplant the seedlings on municipal/government land and irrigate and maintain the seedlings over a two-year period. *See achievements of the NRP and more analysis of current and future reforestation programs in Lebanon in Chapter 5.*

**6.4.3 Green Plan**

A public administration under the authority of the MOA, the Green Plan was established in 1963 (Decree No. 13335) to “improve Lebanese mountains” through land reclamation, irrigation and reforestation. Starting 1965, the Green Plan helped farmers enhance the productivity of their farmland by terracing their lands and building or expanding agricultural dirt roads. Later, during the late 1960s and early 1970s, the administration pioneered large-scale reforestation programs across the country, with a great deal of success and national pride. Millions of trees were planted and/or seeded in vast areas of the country.

The Green Plan is today a semi-autonomous directorate and its mandate has entirely shifted to land rehabilitation. It provides grants to farmers (up to LBP15 Million) to repair and/or build stone terraces and retaining walls, build hill lakes and install irrigation networks. In the period 2001-2009, the Green Plan provided technical and financial assistance to 14,451 farmers; reclaimed 5,390ha of bare lands; built 906,452m<sup>3</sup> of earth-lined hill lakes and 285,865 m<sup>3</sup> of concrete reservoirs; built or rehabilitated 187 km of agricultural dirt roads (Green Plan, 2009). Green Plan activities are



not always subject to environmental scrutiny or examination and therefore may cause local environmental degradation. For example, it has been widely reported that farmers have asphalted agricultural dirt roads using resources received from the Green Plan, contrary to regulations. Illegally asphalted dirt roads may invite unwanted urban development.



Agricultural terraces is part of Lebanon's unique mountain heritage (Jezzine)



Hill Lake in Zaarour (Metn)

#### 6.4.4 Other Responses by Non-Governmental Organizations

NGOs are playing an active role in lobbying against unwanted development and raising awareness of important conservation issues.

Selected NGOs have been working actively to protect forests, landscapes, land resources and historic monuments -see *targeted selection of NGOs who are implementing projects affecting land use and land resources in Lebanon in Annex 3*.

### 6.5 EMERGING ISSUES AND POLICY OUTLOOK

The current trend in construction (roads, housing, and commercial developments) as well as in sea reclamation projects (marinas, fishing harbors, sports facilities, and wastewater treatments plants) is alarming and not sustainable. Lebanon is too small to sustain this construction drive in the medium to long-term, without causing irreversible damage to its natural resources and landscapes. Urban development projects are not only increasing in number, but they are also increasing in size. The GOL should enact and enforce regulations to curb construction and speculative investment, and to improve the management of public resources including the public maritime domain and municipal *mashaa*. The following paragraphs highlight priority investments and actions for improving the management of land resources in Lebanon.

#### 6.5.1 Implementing the National Land Use Master Plan

The Master Plan presents a holistic vision for national urban planning and critical recommendations for enhancing and harmonizing land uses in Lebanon while protecting the natural and cultural resource base. Key recommendations related to the environment include: (1) preparing legal instruments for establishing regional parks and the national park (in North Lebanon); (2) updating inventories of natural sites in need of protection (e.g., grottos, cliffs, fossil deposits, natural bridges, valuable geological formations, wetlands, etc.); (3) updating land use and land cover maps every five years; (4) implementing cedar and other forest corridors between 1,500m and 1,900m; and (5) revising and reforming urban planning regulations, including urban planning operations, and identifying priority sites for local urban planning.

The COM endorsed the National Land Use Master Plan (NLUMP) in June 2009 (Decree No. 2366 dated 20/6/2009). The Master Plan is a reference document for several administrations including the DGUP (which has to refer back to the Master Plan when preparing, reviewing or approving new urban master plans) and line ministries (Agriculture, Environment, Public Works and

Transport, Water and Energy, Industry, Economy and Trade and Culture/Directorate General of Antiquities). They should refer to the Master Plan when making decisions related to urban development, the provision of public services, and environmental heritage conservation.

The decree recognizes nine planning zones (denoted U, R, A, **N**, **P**, **S**, F, G and W) including three zones related to natural and cultural heritage conservation: **Zone N** are areas of national natural assets such as high mountain plateaus, cedar corridors, mountain horticulture, connection areas of forests, valleys and other natural sites; **Zone P** are great landscapes; and **Zone S** are archeological, historical, patrimonial and other natural sites. The nine zones include servitudes for land management: (1) exploitation factors for construction, (2) construction height, (3) construction setbacks, (4) provisions for urban expansion around exiting urban areas, (5) land parceling for construction activity, (6) large scale projects, (7) quarries, and (8) industries.

The NLUMP is a marvelous planning tool that helps the GOL make lasting impressions on the form and orientations of Lebanon's future land use. The NLUMP decree and related zoning should be widely circulated among urban planning agencies, municipalities, the Order of Engineers and Architects in Beirut and Tripoli, and private sector urban planning offices. For reference, this SOER has reproduced in English the zoning classification in **Annex 4**. The GOL must work proactively and commit sustained resources to ensure phased implementation of the NLUMP over the coming years.

### 6.5.2 Mainstreaming Geographic Information System in Land Use Planning

In Lebanon, some of the information related to cadastral boundaries, ownership, roads, water ways and sewage networks are still stored on paper. It is crucial that the Lebanese public administration computerizes and digitizes all spatial information to facilitate the consolidation of such data at the national level and the exchange of relevant data groups between line ministries and other public agencies. The Geographic Information System is today the reference software for the compilation and analysis of spatial data. Simply put, GIS is a system that captures, stores, analyzes, manages and presents geographic data. GIS applications merge cartography, statistical analysis and database technology. GIS was extensively used during the preparation of the National Land Use Master Plan (see structure of geodatabase

in Chapter 2) and should be mainstreamed in the Lebanese administration system including urban planning departments, water and energy utilities, environmental monitoring, transport, and agriculture to name a few.

### 6.5.3 Curbing Real Estate Speculation

Demand for property grew exponentially in the last decade and Lebanon witnessed record investments in its real estate sector from nationals, expatriates and foreigners. Around fifty percent of total Arab Foreign Direct Investment in Lebanon targeted large property developments (ESCWA-UN, 2008). Projects such as the Four Seasons Hotel in Beirut, City Center in Hazmieh, Habtoor Grand Hotel, Le Mall and Metropolitan Palace Hotel in Sin El Fil, City Mall in Dora, Habtoor Land in Jamhour in addition to many other developments testify to the nature of Arab investment in Lebanon which increased 20 percent in 2009, reaching \$4.3 billion from \$3.6 billion in 2008 (Daily Star, 2010).



*New and cluttered buildings in the Beirut suburbs*

Foreign ownership in Lebanon is regulated by Decree 11614 dated 4 January 1969 and its subsequent amendments notably Law 296/2001. This Law eases the legal limits on foreign ownership of real estate properties in Lebanon, and stand as another important factor behind the Arab capital inflow towards this sector –see *analysis of foreign ownership law in Lebanon in Chapter 7*. Statistics on the size and distribution of property and land ownership by foreigners in Lebanon is sketchy. For example, land holdings by Gulf Cooperation Council (GCC) investors in Lebanon totaled 2 million m<sup>2</sup> in 2005, up from 0.5 million m<sup>2</sup> in 2002 (BLOM Invest Bank, 2010). Most of the investments come from Saudi Arabia, Kuwait, Qatar and the UAE, and are oriented towards residential, commercial, and touristic projects. Gulf citizens invest mostly in Beirut and the Southern Metn region but recently expanded into northern Metn and Kesrouan.

Despite the fact that foreign investments create jobs potential and an added economic value to Lebanon, the expansion in this sector has also negative consequences on Lebanon. First because the Lebanese economy will be highly vulnerable and dependent on international developments, in particular to the movement in oil and gas prices as they heavily affect the wealth state of Gulf citizens and thus, their investment decisions. Secondly, Lebanese citizens will feel deprived from their own space as foreign are purchasing their lands to create a project or to buy a property. Therefore, a legislative action must be taken to limit the excessive desire of foreign on the real estate sector and preserve Lebanon's land legacy such as the approval on the proposed law on foreign ownership in Lebanon presented to the Lebanese Parliament on 2/1/2009.

#### **6.5.4 Controlling Large Scale Development Projects**

The nature of local Lebanese economy deeply affects and attracts real estate investment to Lebanon. The tax system is one of the lowest fiscal charges worldwide, with maximum tax rates of 15 percent for companies and 20 percent for individuals. Lebanon adopts a liberal financial environment with a free foreign exchange market, full currency convertibility policies, banking secrecy law and no restriction on the movement of capital, which makes the country ideal for conducting business. Furthermore, the country holds a well-developed, transparent and non-discriminatory legal framework that protects private property

and provides Lebanese and Non-Lebanese with equal business rights (BLOM Invest Bank, 2010).

In addition, the GOL launched in 1994 the Investment Development Authority of Lebanon (IDAL), a public institution enjoying independent legal personality with financial and managerial independence, under the direct administrative authority of the Prime Minister. IDAL was established by virtue of decree No. 5778 dated 11 October 1994 to spearhead Lebanon's investment promotion efforts. On 16 August 2001, the role of IDAL was reinforced by the enactment of the Investment Development Law No. 360. It regulates the investment promotion of domestic and foreign entities and strives to stimulate Lebanon's economic and social development and enhance its competitiveness. Large projects that go through IDAL enjoy tax exemptions for a period of 10 years, with a maximum 50 percent reduction in permit fees for construction works.

These factors lure developers and holding companies who wish to invest in Lebanon, on a big scale. Illusive projects such as *Sannine Zenith* in Ouyoun el Siman, and *Cedar Island* in coast of Damour, would impact the environment and land resources in many ways and irreversibly. They require significant infrastructure works and construction materials that Lebanon doesn't have. It is important to review these projects more critically and seek public opinion as part of the mandatory EIA and/or Strategic Environmental Assessment process prior to permit approval.

#### **6.5.5 Preparing a Mountain Law**

The mountains of Lebanon constitute a national treasure and a repository for heritage, landscapes, biodiversity, water, and renewable energy namely sun and wind. Unfortunately, the current myriad of laws and regulations related to urban planning, water, forests and protected areas do not recognize the intrinsic value of mountains as a system and tend to approach development piecemeal. The conservation, protection and sustainable management of mountain ecosystems require public participation in decision-making, coordination, and long-term and strategic planning. In France, for instance, mountains are protected by Law No. 85-30 dated 9/1/1985 called "Loi Montagne". This law delimits mountain zones, provides guidelines for construction, recognizes specific institutions dedicated to the management of mountain areas, approaches sustainable economic development of rural areas, and



regulates tourism projects in mountains. In countries such as Nepal, Peru, Italy, and Cyprus, several mountains are classified as national parks<sup>4</sup>.

In Lebanon, only Makmel Mountain in North Lebanon is classified as a Natural Site based on MOE Decision No. 187/1 (dated 17/11/1998). Unless the site is proclaimed a National Park consistent with the recommendations of the National Land Use Master Plan, the mountain will come under increasing pressure from urbanization including logging, hunting, and quarrying. Other mountains and plateaus such as Sannine, Kneiseh, Hermon (Cheikh), Barouk, Aaqoura, Tannourine and Aakkar are not protected by any regulation and are therefore vulnerable to large-scale urban developments that will inevitably change their natural features including karst, springs, caves, sinkholes and dolines<sup>5</sup>. These mountains constitute Lebanon's water reservoir which feeds its rivers and groundwater.

A supporting tool to review and control development in mountain areas is the EPIK method for assessing karst systems vulnerability (see application in Box 6.10). The EPIK method is based on specific geological, geo-morphological and hydro-geological factors. *EPIK* stands for **E**pikarst (the surface

and subsurface karstic features); **P**rotective cover (the distribution of the soil thickness); **I**nfiltration condition (the relation between the slope and the different land use pattern in the watershed); and **K**arst network (the degree to which the karst network is developed). This method produces vulnerability maps that can support land use management and assist in the permitting process as it shows areas of potential groundwater contamination and identifies protection perimeters.

#### Box 6.10 Application of EPIK method in Lebanon

The EPIK method was used to evaluate the potential impacts on underground water from a proposed development on Kneiseh Mountain. The EPIK method produced maps to show areas vulnerable to contamination. EPIK findings helped the project.

The protection of high-altitude areas by a national mountain law is a national priority. Prospective large scale developments will sooner or later pollute groundwater resources and reduce aquifer recharge. The ministries of Agriculture, Environment, Tourism, Energy and Water, and Public Works and Transport (DGUP) must work collaboratively to prepare a framework law for mountains that would articulate a long-term vision for harmonizing development and conservation in high-altitude areas, say above 1,500 m.

<sup>4</sup>Protected areas declared or owned by the government, set aside for human recreation and enjoyment, wildlife, and environmental protection and restricted from most development

<sup>5</sup>A closed depression in karst areas draining underground system from snow melting



Scenic view of dolines in Jabal Sannin (with Mount Hermon in the background)

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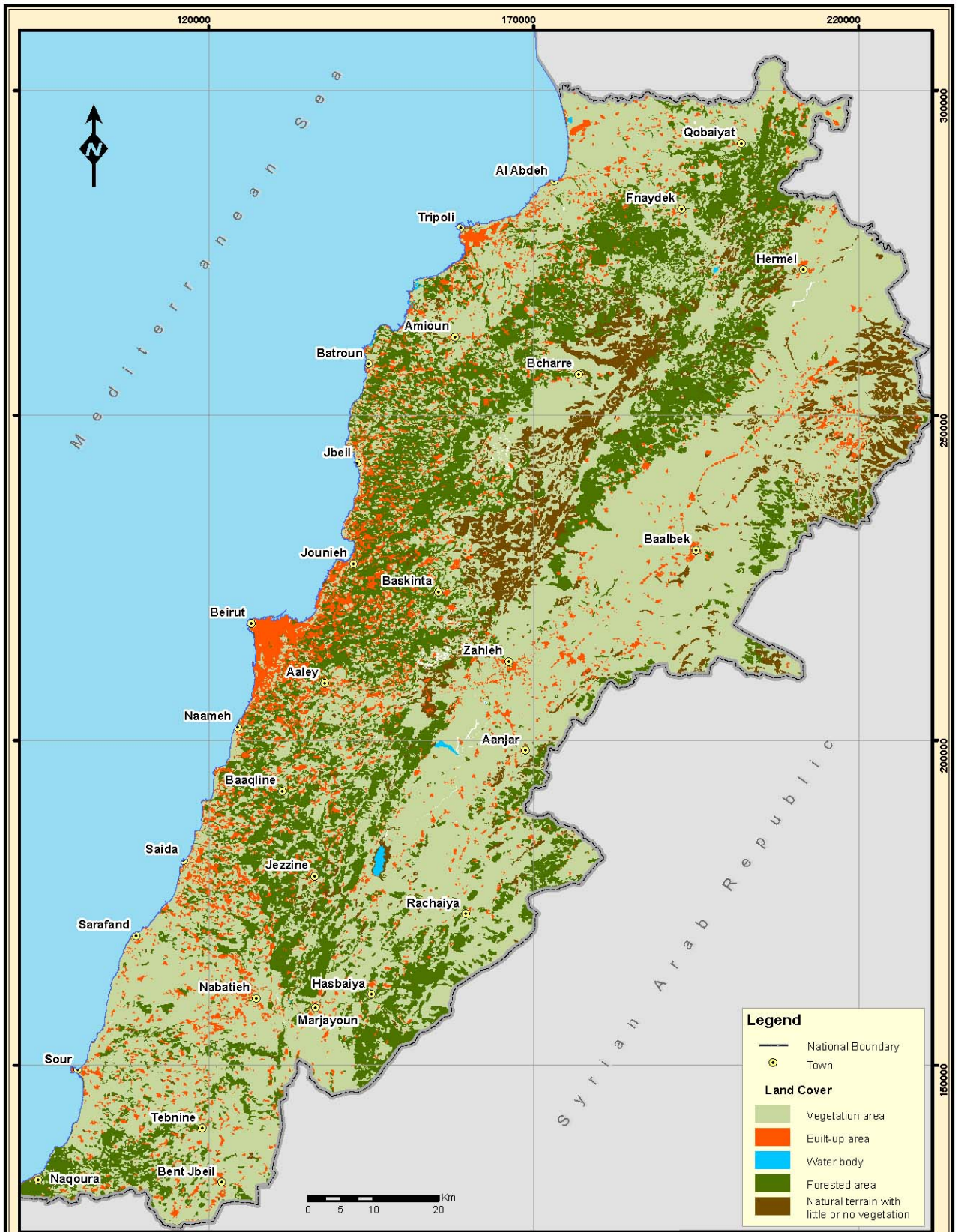
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## CITED LEGISLATION RELATED TO LAND RESOURCES

نوع النص	الرقم	التاريخ	عنوان النص
قرار وزارة المالية	٣٣٣٩	١٢/١١/١٩٣٠	أنظمة الملكية العقارية
قانون		١٩٣٩/٠٧/٠٨	حماية المناظر والمواقع الطبيعية في لبنان
مرسوم	٤٣٤	١٩٤٢/٠٣/٢٨	تصنيف واخضاع المواقع والمباني الطبيعية في الجمهورية اللبنانية لنصوص قانون ١٩٣٩/٠٧/٠٨
مرسوم	١٣٣٣٥	١٩٦٣/٠٧/١٠	احداث مشروع استصلاح الاراضي "المشروع الاخضر"
مرسوم	١١٦١٤	١٩٦٩/٠١/٠٤	اكتساب غير اللبنانيين الحقوق العينية العقارية في لبنان
مرسوم اشتراعي	٥	١٩٧٧/٠١/٣١	انشاء مجلس الانماء والاعمار
مرسوم اشتراعي	١٤٨	١٩٨٣/٠٩/١٦	قانون البناء (ملغى)
قانون	٨٥	١٩٩١/٠٩/٠٧	الحفاظة على الثروة الحرجية والأحراج
قانون	١٢١	١٩٩٢/٠٣/٠٩	انشاء محميتين طبيعيتين في بعض الجزر أمام شاطئ طرابلس
مرسوم	٥٦١٦	١٩٩٤/٠٩/٠٦	تنظيم المقالع والكسارات (ملغى)
مرسوم	٥٧٧٨	١٩٩٤/١٠/١١	إنشاء مؤسسة عامة تدعى « المؤسسة العامة لتشجيع الاستثمارات» (ملغى)
قرار وزير البيئة	١/١٤	١٩٩٥/١٠/١٦	انشاء محمية طبيعية «كرم شباط»
قانون	٥٥٨	١٩٩٦/٠٧/٢٤	حماية الغابات
قانون	٥٣٢	١٩٩٦/٠٧/٢٤	انشاء محمية طبيعية ارز النشوف
قانون	٧٠٨	١٩٩٨/١١/٠٥	يرمي الى انشاء محمية شاطئ صور الطبيعية في جفتلك رأس العين - منطقة صور العقارية
قرار وزير البيئة	١/١٨٧	١٩٩٨/١١/١٧	تصنيف الموقع المعروف بجبل المكمل القرنة السوداء من المواقع الطبيعية
قانون	١١	١٩٩٩/٠٢/٢٠	انشاء محمية طبيعية في بنتاعل
قانون	١٠	١٩٩٩/٢/٢٠	انشاء محمية طبيعية في اليمونة
قانون	٩	١٩٩٩/٠٢/٢٠	انشاء محمية غابة ارز تنورين الطبيعية
قانون	٢٩٦	٢٠٠١/٠٤/٠٣	تعديل بعض مواد القانون المنفذ بالمرسوم الرقم ١١٦١٤ تاريخ ١٩٦٩/١/٤
قانون	٣٦٠	٢٠٠١/٠٨/٠٦	تشجيع الاستثمارات في لبنان
مرسوم	٨٨٠٣	٢٠٠٢/١٠/٠٤	تنظيم المقالع والكسارات
قرار وزير الداخلية والبلديات	٨	٢٠٠٤/٠١/١٣	انشاء بلدية في بلدة رشاف قضاء بنت جبيل محافظة النبطية
قانون	٦٤٦	٢٠٠٤/١٢/١١	تعديل المرسوم الاشتراعي رقم ١٤٨ تاريخ ١٩٨٣/٩/١٦ قانون البناء
مرسوم	١٥٨٧٤	٢٠٠٥/١٢/٠٥	المرسوم التطبيقي لقانون البناء
قانون	٦٩٠	٢٠٠٥/٠٨/٢٦	تحديد مهام وزارة البيئة وتنظيمها
مرسوم	١٦٤٥٦	٢٠٠٦/٠٢/٢٧	تعديل المرسوم رقم ٨٨٠٣
مرسوم نافذ حكماً	٦١٧	٢٠٠٧/٠٨/٠٨	تعديل المرسوم رقم ١٥٨٧٤ المرسوم التطبيقي لقانون البناء
قرار وزير الزراعة	١/٣٩٩	٢٠٠٨/٠٩/١٨	انشاء غابة محمية في جبل موسى
قرار وزير البيئة	١/١٦	٢٠٠٩/٠٤/٠١	تحديد المستندات والشروط العائدة للترخيص لاستثمار كسارات بحص (منفردة دون مقالع)
قرار وزير البيئة	١/١٧	٢٠٠٩/٠٤/٠١	تحديد المستندات والشروط العائدة للترخيص لاستثمار مقالع الصخور للكسارات والردميات
قرار وزير البيئة	١/١٨	٢٠٠٩/٠٤/٠١	تحديد المستندات والشروط العائدة للترخيص لاستثمار مقالع الصخور لصناعة الموزاييك

نوع النص	الرقم	التاريخ	عنوان النص
قرار وزير البيئة	١/١٩	٢٠٠٩/٠٤/٠١	تحديد المستندات والشروط العائدة للترخيص لاستثمار محافر الرمل أو البحص المفتت طبيعياً
مرسوم	١٧٣٥	٢٠٠٩/٠٤/١٤	تعديل المرسوم رقم ٢٠٠٤ م/٨٨٠٣ وتعديلاته لا سيما المرسوم رقم ٢٠٠٦/١٦٤٥٦
قرار وزير البيئة	٤٨/١	١٧/٠٦/٢٠٠٩	آلية الترخيص لتأهيل مواقع المقالع
مرسوم	٢٣٦٦	٢٠٠٩/٠٦/٢٠	الخطة الشاملة لترتيب الأراضي اللبنانية
قرار المجلس الأعلى للتنظيم المدني	١٩	٢٠١٠/٠٥/٢١	المخطط التوجيهي لمنطقة صغيبين
قرار وزير البيئة	١/١٣٦	٢٣/٠٨/٢٠١٠	آلية لتحديد الكسارات الصغيرة الحجم وعملها
قرار وزير البيئة	١/١٣٧	٢٣/٠٨/٢٠١٠	تحديد نموذج عن السجل اليومي الخاص بعمليات الإستثمار
قرار وزير البيئة	١/١٣٨	٢٣/٠٨/٢٠١٠	تحديد نموذج تعهّد

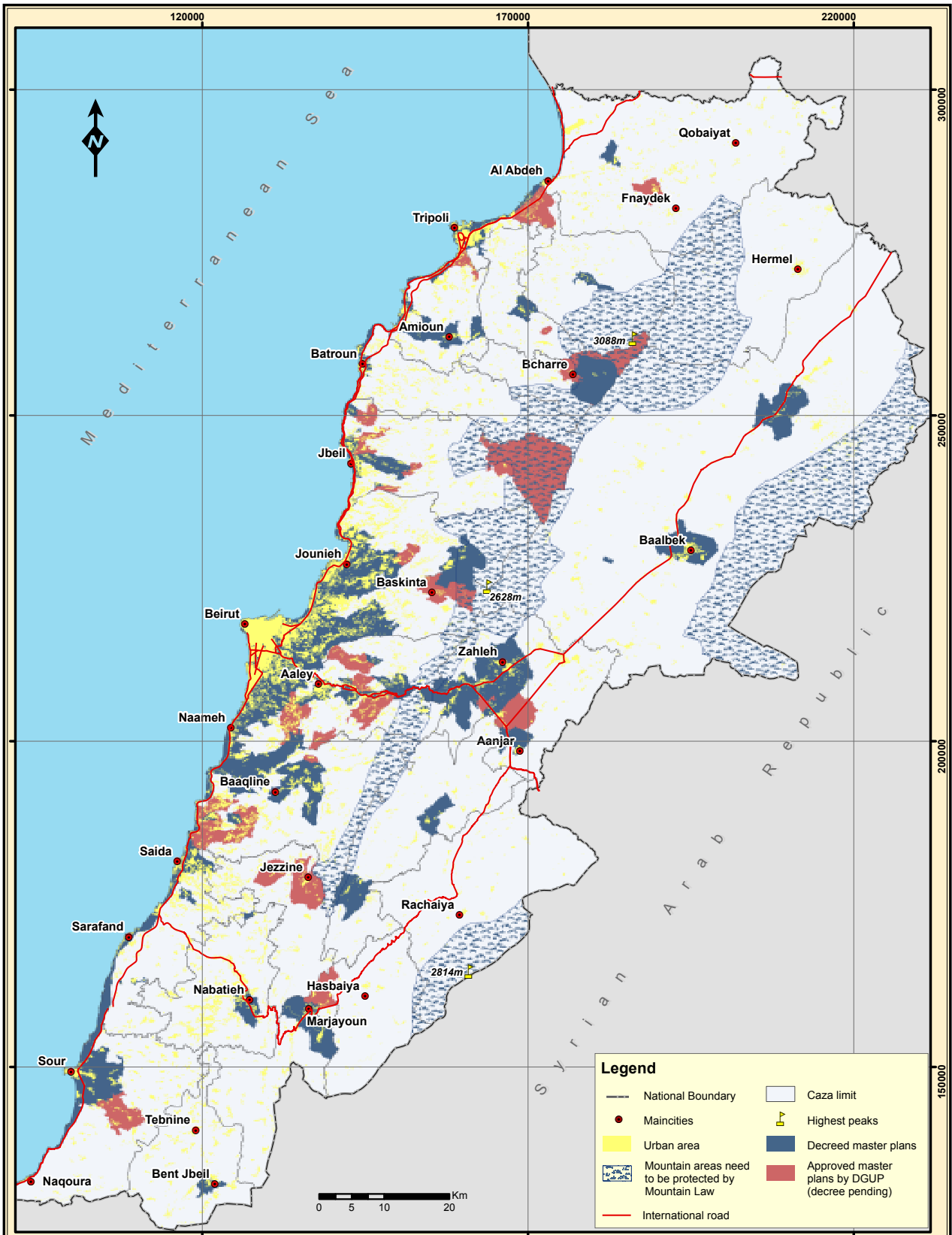


State & Trends of the Lebanese Environment  
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Map 4 - Lebanon's Simplified Land Cover Map (2002)

DISCLAIMER: This map was prepared by ECODIT based on MOE-NCSR (2002) and National Land Use Master Plan (2004). Every effort has been made to ensure the accuracy of the information displayed on this map. The international boundaries are approximate. MOE/UNDP/ECODIT do not assume any responsibility for any decision that may arise from the use of the map.

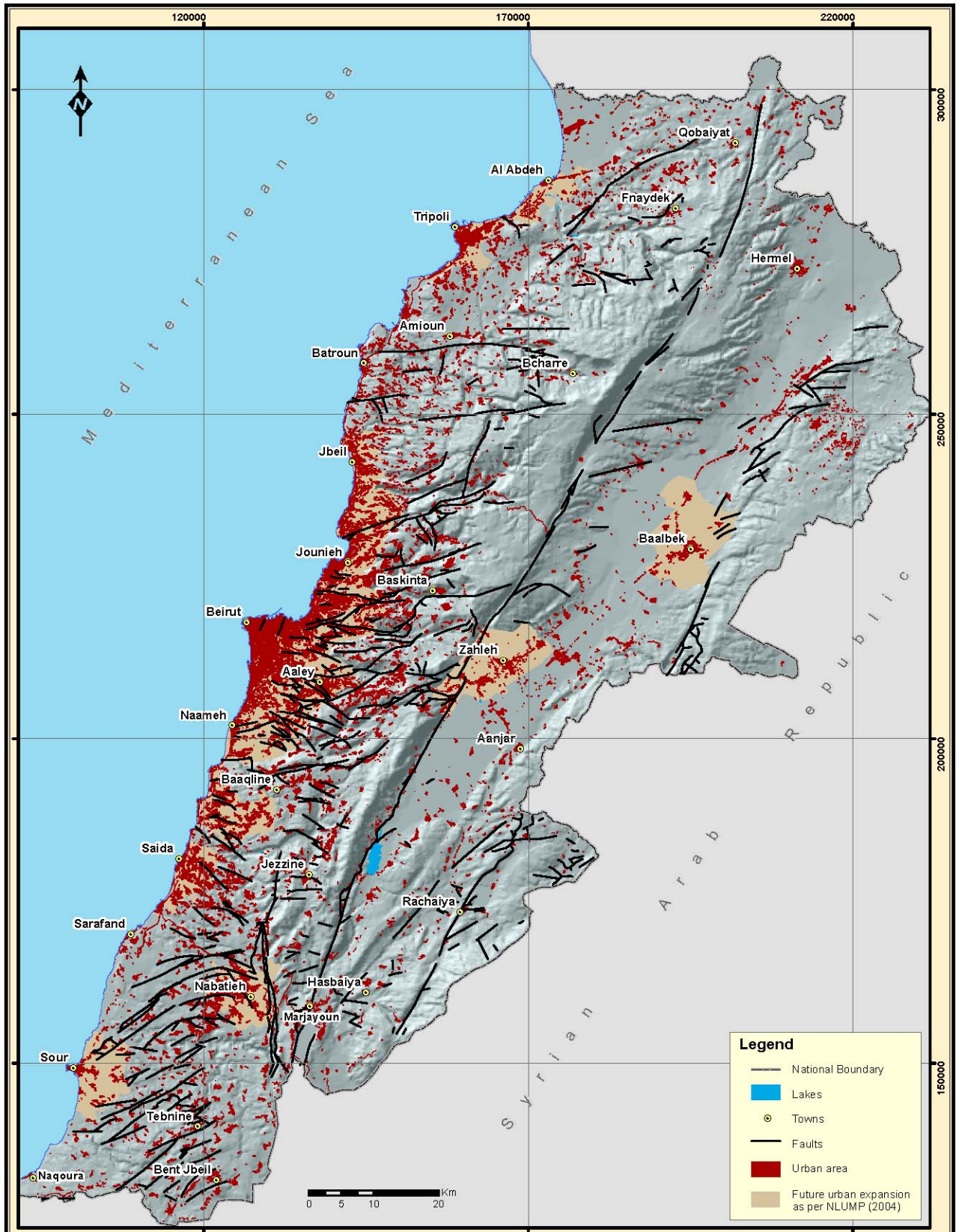




**State & Trends of the Lebanese Environment**  
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**Map 5 - Extent of Zoning and Urban Master Plans in Lebanon (2004)**

DISCLAIMER: This map was prepared by ECODIT based on National Land Use Master Plan (2004). Every effort has been made to ensure the accuracy of the information displayed on this map. The international boundaries are approximate. MOE/UNDP/ECODIT do not assume any responsibility for any decision that may arise from the use of the map.

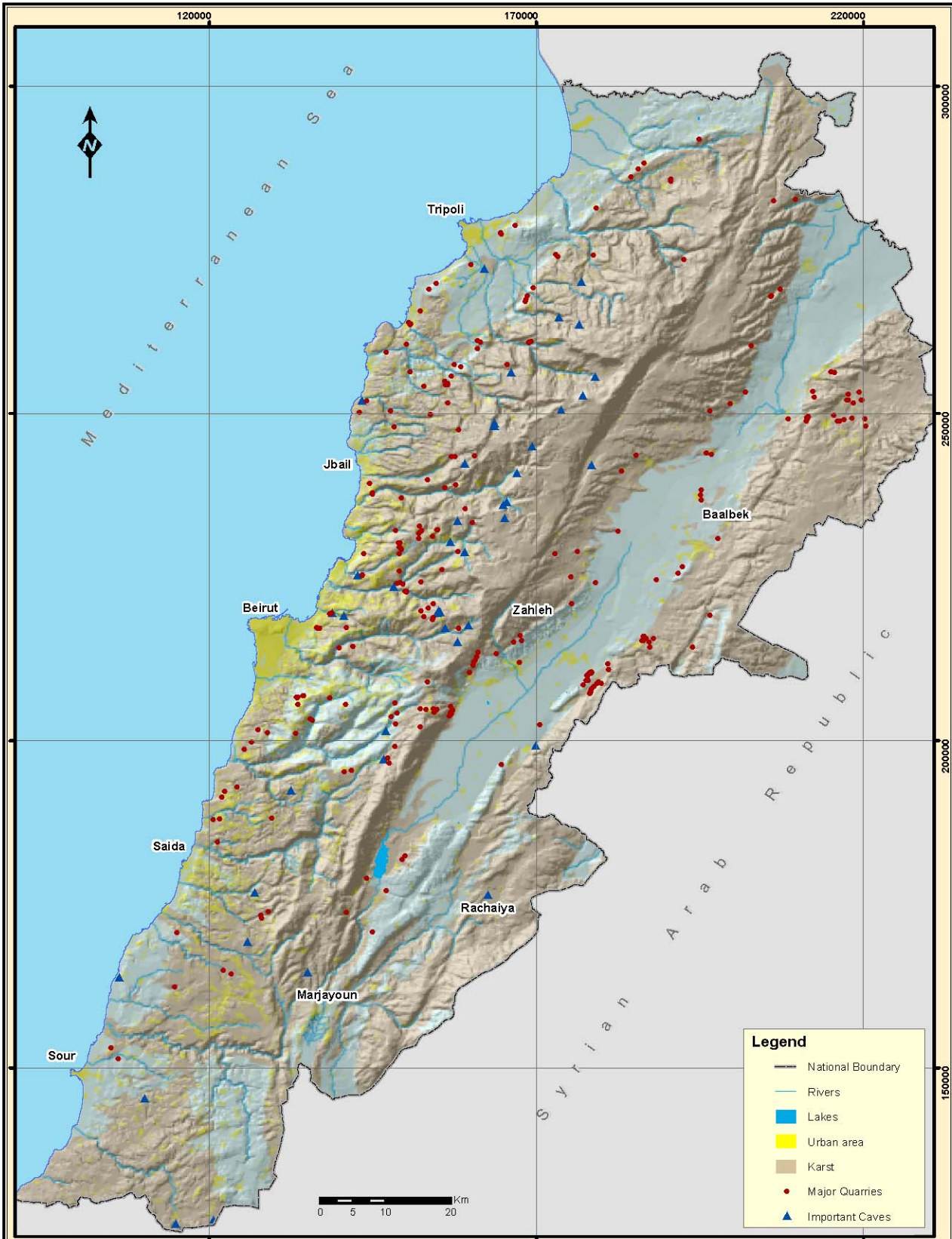


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Map 6 - Location of Major and Minor Faults and Urban Agglomerations

DISCLAIMER: This map was prepared by ECODIT based on National Land Use Master Plan (2004). Every effort has been made to ensure the accuracy of the information displayed on this map. The international boundaries are approximate. MOE/UNDP/ECODIT do not assume any responsibility for any decision that may arise from the use of the map.





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**Map 7 - Lebanon's Karst Heritage and Vulnerability**

DISCLAIMER: This map was prepared by ECODIT based on National Land Use Master Plan (2004). Every effort has been made to ensure the accuracy of the information displayed on this map. The international boundaries are approximate. MOE/UNDP/ECODIT do not assume any responsibility for any decision that may arise from the use of the map.



## ANNEX 1 IMPORTANT KARSTIC SITES IN LEBANON

Site	Age & Formation	Type & importance to GW	Protection Status	Condition	Require spatial expansion	Remarks
Baatara (Tannourine)	Jurassic rocks / Kesrouan	Sinking Stream/ High	Protected under MOE Decision 8/1 dated 2004	Good	Yes	Need to extend the protection perimeter to also include Balaa pothole and Jouret el Abeb
Qammouaa (Akkar)	Cretaceous Rocks / Cenomanian	Polje/High	MoA Decision 165 dated 1991 to protect the forests in the Mountain. Touristic Sites declared by MoT Decision no. 198/1993	Moderate	Yes	Need to cover the entire doline area and surrounding mountains
Afqa	Cretaceous Rocks / Cenomanian	Cave-Spring / High	Need protection as of MoE	Bad	Yes	Need to be part of the area that of the high mountain protection zone
Tarchich	Jurassic rocks / Kesrouan	Sinking stream-underground river / High	Need protection as of MoE	Bad	Yes	Need to extend it to become part of Beirut river along with Qattine Azar sinkhole
High Mount Lebanon area: Jabal Kneisseh, Jabal Sannine, Ouyoun el Siman, Jabal Kesrouan, Aaqoura-Tannourine Plateau, Jabal El Makmel	Cretaceous rocks / Cenomanian	Doline field, sinkholes and caves / High	Needs protection as of MoE	Moderate	Yes	Small portions protected but its importance natural beauty, Biodiversity and source of groundwater requires protection
Kfardibian Natural bridge	Cretaceous rocks / Mdairej	Natural Bridge / No	Natural Site by Decree 434/1942	Moderate	Yes	Need to expropriate lands and compensate owner
Jaj Mountain (Between Jajj-Tannournine-Qartaba and Ehmej villages)	Jurassic rocks / Kesrouan	Doline field / High	Hima and Forests by MoA Decision 499 of 1996	Moderate	Yes	Natural beauty and biodiversity and importance for groundwater require extension to cover the rest of the Mountain.
Barouk Mountain	Jurassic rocks / Kesrouan	Doline / High	Natural reserve by Law no. 532 of 1996. Hima and Forests by MoA Decision 127 of 1991	Moderate	No	Natural beauty and biodiversity and importance for groundwater. Under threat from quarrying.
Shatawie Cave	Jurassic rocks / Bikfaya	Cave and spring / high	Needs protection as of MoE	Bad	Yes	Natural beauty and importance for groundwater require extension to cover the rest of the area
Jeita cave	Jurassic rocks / Kesrouan	Cave and spring / high	Show cave	Moderate	Yes	Natural beauty and importance for groundwater require extension to cover the rest of the area

## ANNEX 2 OTHER PROTECTED SITES IN LEBANON

Decision	Date	Description	Location
Decree 434	1942	Cedars of the Lord Deir El Kalaa Bolonia Forests Mrouj Oaks Beirut Pine Forest Baalbek Heritage Constructions Yammouneh Lake Natural Bridge Site on Al Laban Spring	Bcharre Metn Metn Metn Beirut Baalbek Bekaa Kesrouan
<b>Ministry of Environment</b>			
15/1	1995	Prevent any action or making any changes in the vicinity of Faqra Natural Bridge in the district of Kesrouan	Kesrouan
151	1997	Kadisha Valley	Bcharre
34	1997	Ibrahim River to sea outfall	Jbail
200	1997	Coastal Front Rocks of Wata Silm	Tabarja
22	1998	Al Jawz River to sea outfall	Batroun
29	1998	Al Damour River to sea outfall	Shouf
97	1998	Al Kalb River to sea outfall	Kesrouan
130	1998	Beirut River to sea outfall	Beirut and ML
131	1998	Al Awali River to sea outfall	Saida
132	1998	Forests between Ain El Hour- Daraya- Debiyé- Bérjin; Sheikh Osman Forest; Deir al Mokhalis surrounding; Ain w Zein Hospital surrounding; Dalboun forest; Al Mal valley; Kafra wells; Ainbal valley sites	Shouf
187	1998	Al Makmel Mountain	North Lebanon
188	1998	Arka River to sea outfall	Aakkar
189	1998	Al Assi River to sea outfall	Hermel
19	2002	Al Kammoua Area	Aakkar
21	2002	Al Qaraqeer Valley	Zgharta
22	2002	Dalhoun Forest	Shouf
8	2004	Baatara Sinkhole	Tannourine
<b>Ministry of Tourism</b>			
198	1993	Arqa Village - Historical monuments	Aakkar
198	1993	Kammoua Village - Natural landscape	Aakkar
634	1999	Beni Saab Farm - Natural landscape	Bcharre
262	2004	Al Shawaghir Village - Historical monuments and natural landscape	Hermel
263	2004	AlHibariya Village - Historical monuments and natural landscape	Hasbaya
264	2004	Zanoubiya Village - Historical monuments and natural landscape	Baalbeck-Hermel
265	2004	Shaqra & Dobiya Villages - Historical monuments & natural landscape	Bint Jbeil
266	2004	Jbaa Village - Historical monuments and natural landscape	Shouf
267	2004	Arnoun Village - Historical monuments and natural landscape	Nabatieh
268	2004	Mezyara Village - Historical monuments and natural landscape	Ehden
269	2004	Shameh Village - Historical monuments and natural landscape	Sour
270	2004	Hardeen Village - Historical monuments and natural landscape	Batroun
271	2004	Kosba Village - Historical monuments and natural landscape	Koura
325	2004	Qaa El Rim Village - Historical monuments and natural landscape	Zahleh
<b>UNESCO World Heritage</b>			
SC-84/ CONF.004/03	1984	Anjar	Bekaa
SC-84/ CONF.004/03	1984	Baalbek	Baalbek
SC-84/ CONF.004/03	1984	Byblos	Jbail
SC-84/ CONF.004/03	1984	Tyre	Sour
WHC98/CONF.203/ 10Rev.	1998	Wadi Qadisha (the Holy Valley) and the Cedars Forest of Bsharre (a.k.a. Ghabet Arz el-Rab)	Bcharre
<b>UNESCO Biosphere Reserve</b>			
-	2005	Shouf Biosphere Reserve	Shouf
-	2009	Jabal Moussa Biosphere Reserve	Kesrouan
-	2009	Jabal el Rihane	Jezzine

## ANNEX 3 SELECTION OF NGO'S WITH ACTIVITIES RELATED TO LAND RESOURCES

(Listed by establishment year)

NGO Name	Field of Activity	Achievements
Association pour la Protection des Sites et Anciennes Demeures au Liban, APSAD (established in 1960)	Promote the protection and restoration of ancient buildings that carry historical and/or unique architectural value. Lobbies for promulgating laws and regulations protecting the architectural heritage	Active since 1962 in the restoration and rehabilitation of traditional Lebanese houses (historical façades), old souks, khans, and old streets (Jbeil, Jounieh, Bikfaya, Zouk Mikhael, Deir El Kamar, etc.). Lobbied for protecting a historical building in Sodeco (Beirut) and converting it into a museum <i>Beit Beirut</i> .
Friends of the Cedars of Bsharre Committee (established in 1986)	Charged by the MOT to oversee and manage the ancient cedar grove of Bcharre (Arz el Rab, a World Heritage Site). Implement increasingly larger and bolder reforestation activities in the area of Bcharre.	The organization manages its own plant nursery (located in Bcharre) and transplants approximately 10,000-12,000 seedlings per year, mostly cedars, to restore the cedar mantle overlooking the Qadisha Valley.
Association for Forest Development and Conservation, AFDC (established in 1995)	Community-based forest management and conservation including fire prevention. Build awareness and raise capacities in support of national efforts to improve environmental management.	COM approved a MOU between MOE and AFDC to develop and implement an action plan for forest fire prevention and landscape restoration (Decision 138 dated 27/10/2007). Working in collaboration with the World Conservation Union (IUCN), AFDC released in May 2009 the long-awaited "Lebanon's National Strategy for Forest Fire Management: Building Partnerships".
Mada (established in 2000)	Reinforce the relationship between local communities and their natural environment for the satisfaction of their subsistence needs especially in Aakkar, Donnieh and Hermel	In 2006, Mada defined a pilot zone (about 270 km <sup>2</sup> ) stretching from Brissa to Qbaiyat, and signed cooperation protocols with the municipalities of Qbaiyat, Hrar, Michmich and Fnaideq to formulate a regional action plan to promote and enhance the natural resources of the area. The organization also conducted studies on flora and avifauna and will soon extend those studies to fauna as well. The proposed national park is today embedded in the NLUMP (Decree 2366 dated 20/06/2009) along with six other regional parks.
Lebanon Mountain Trail Association, LMTA (established in 2007)	Develop, maintain and promote the Lebanon Mountain Trail, a 440km path that crosses 75 towns and villages; protect the natural, cultural and architectural heritage and landmarks near the trail; enhance economic opportunities by promoting responsible tourism	Prepared and updates a complete set of communication material including brochures and maps; attracts more than 30,000 visitors on the trail every year; organizes an annual thru-walk spanning 30 days; co-sponsored the production of a coffee-table book <i>A Million Steps</i> ; organizes training for local guides; lobbies MOT for recognition of local guesthouses and MOE for protection of trail corridor.
Jouzour Loubnan (established in 2008)	Participate in the restoration of Lebanese woodland and promote sustainable forestation in arid regions	Implemented dozens of reforestation campaigns including in Ehmej and Chabrouh (Oct-Nov 2009) and in Kfardebian (Oct-Nov 2010) with local community participation .



## ANNEX 4 ZONING ACCORDING TO NATIONAL LAND USE MASTER PLAN

Based on Decree No. 2366 dated 20 June 2009

**Table A – part of Decree 2366 dated 20/6/2009**

	<b>U Urban</b>	<b>R Rural</b>	<b>A Agricultural</b>	<b>N1 Natural/Peaks</b>	<b>N2 Natural/Cedars</b>	<b>N3 Natural/Corridor</b>
<b>General exploitation factor</b>	Medium to high	Medium	Medium inside the residential areas Low outside the residential areas	Very low except for general technical facilities and military facilities	Very low except for ski resorts	Medium inside the residential areas Low outside the residential areas Very low in forests and on slopes of 30%
<b>Buildings Height</b>	Medium to high	Medium inside the residential areas Low outside the residential areas	Low to medium inside the residential areas Very low outside the residential areas	Very low	Low in the residential areas Very low outside the residential areas According to a carrying capacity plan for ski resorts	Medium inside the residential areas Low outside the residential areas
<b>Buildings Setbacks</b>	According to local guidelines	10 meters from rivers border	10 meters from rivers border	No specific additional conditions	20 meters from forests border according to village Master Plan recommendations	10 meters from rivers border during winter
<b>Urban expansion and its location in respect to the current urbanized areas</b>	No specific additional conditions	Preferably near the urbanized village, unsuitable far from it	Preferably near the urbanized village, unsuitable far from it	No specific additional conditions	Preferably near the urbanized village, unsuitable far from it	Preferably near the urbanized village, unsuitable far from it
<b>Land sorting for construction</b>	Possible	Possible near the urbanized village	Preferably near the urbanized village	Not possible except for general technical facilities and military facilities	Preferably near the urbanized village, unsuitable far from it	Preferably near the urbanized village, unsuitable far from it except for touristic resort after the submission of EIA and landscape study
<b>Large Scale Projects</b>	Possible	Possible	Preferably near the urbanized village	Not Possible	Possible for ski resorts after the submission of EIA and landscape study	Possible for touristic resort after the submission of EIA and landscape study
<b>Quarrying</b>	Not possible	Forbidden in the forests Possible on a distance above 500m from rivers border	Possible after the submission of EIA and re-vegetation study for the cover of the quarry site	Not possible	Not possible	Forbidden in the forests Possible on a distance above 500m from urbanized areas and from shore border
<b>Industries and industrial facilities</b>	Possible for industries of 1 <sup>st</sup> , 2 <sup>nd</sup> , 3 <sup>rd</sup> class after the submission of EIA and landscape study	Possible	Possible for industries of 3 <sup>rd</sup> , 4 <sup>th</sup> , 5 <sup>th</sup> class, must abide by environmental guidelines	Not possible	Possible for mineral waters facilities, for vital cooperative facilities such as petrol stations after the submission of EIA and landscape study	Possible for industries of 3 <sup>rd</sup> , 4 <sup>th</sup> , 5 <sup>th</sup> class, must abide by environmental guidelines

**Table B – Part of Decree 2366 dated 20/6/2009**

	<b>P</b> <b>View area of natural sites</b>	<b>S1</b> <b>500 Radius around classified sites</b>	<b>S2</b> <b>500 Radius around special natural sites</b>
<b>General exploitation factor</b>	Very low, except inside the residential areas	<ul style="list-style-type: none"> <li>• Nil outside the residential areas</li> <li>• Very low for zones classified A, N, R</li> <li>• Designated as per terms of zone U</li> </ul>	<ul style="list-style-type: none"> <li>• Nil outside the residential areas</li> <li>• Very low for zones classified A, N, R</li> <li>• Designated as per terms of zone U</li> </ul>
<b>Buildings Height</b>	<ul style="list-style-type: none"> <li>• Low to medium in the residential areas</li> <li>• Very low outside the residential areas</li> </ul>	Low for zones classified A, N, R and in a distance selected as per terms of zone U	Very low for zones classified A, N, R and in a distance selected as per terms of zone U
<b>Buildings Setbacks</b>	According to local guidelines	50 meters from site's border except for zone U	50 meters from site's border except for zone U
<b>Urban expansion and its location in respect to the current urbanized areas</b>	Preferably near the urbanized village	No specific additional conditions	No specific additional conditions
<b>Land sorting for construction</b>	Possible following the submission of Project's landscape study and its impact on the general view	Possible following the submission of Project's EIA study and its impact on the site	Possible following the submission of Project's EIA study and its impact on the site
<b>Large Scale Projects</b>	Possible following the submission of Project's landscape study and its impact on the general view	Possible following the submission of Project's EIA study and its impact on the site	Possible following the submission of Project's EIA study and its impact on the site
<b>Quarrying</b>	Not possible	Not possible	Not possible
<b>Industries and industrial facilities</b>	Possible following the submission of Project's landscape study and its impact on the general view	Not possible on 50 m radius from the site	Not possible on 50 m radius from the site

**Table C – Part of Decree 2366 dated 20/6/2009**

	<b>F*</b> <b>Prone to flooding</b>	<b>G**</b> <b>Prone to landslides and rock fall-down</b>	<b>W</b> <b>Prone to underground water pollution</b>
<b>General exploitation factor</b>	Very low to take into account existing conditions	<ul style="list-style-type: none"> <li>• Very low</li> <li>• nil or close to nil on slopes above 10% (natural land before settlement) taking into account existing conditions</li> </ul>	In case of no existing wastewater network, medium in zones U and R, low in zones A and N3, very low in N2 zone, non-existent in N1 zone
<b>Buildings Height</b>	Low taking into account existing conditions	<ul style="list-style-type: none"> <li>• Construction forbidden in zone N1</li> <li>• Low taking into account existing conditions</li> </ul>	No specific additional conditions
<b>Buildings Setbacks</b>	80% of the plot area remain natural (gardens without tiling) taking into account existing conditions	80% of the plot area remain natural taking into account existing conditions	No specific additional conditions
<b>Urban expansion and its location in respect to the current urbanized areas</b>	Imposed along residential areas taking into account existing conditions	No specific additional conditions	No specific additional conditions
<b>Land sorting for construction</b>	Possible with a study that proves there are no threats and no double threats in the neighborhood	Possible along residential areas with a study that proves there are no risks, no threats and non-double threat in the neighborhood	Possible if existing wastewater network. If not, a wastewater network and a wastewater treatment plant must be totally implemented before any execution of road networks and construction activities
<b>Large Scale Projects</b>	Possible if a study proves the safety of the Building occupants	Possible with a study that proves there are no threats and no double threats in the neighborhood during and after investment	Possible if existing wastewater network. If not, a wastewater network and a wastewater treatment plant must be totally implemented before any execution of road networks and construction activities
<b>Quarrying</b>	Possible with a study that proves there are no threats and no double threats in the neighborhood during and after investment	Possible with a study that proves there are no threats and no double threats in the neighborhood during and after investment	Possible with a study that proves the absence of any possibility of destabilizing the rock formation in the ground that would change groundwater streams or impact springs
<b>Industries and industrial facilities</b>	Possible for industries that do not generate solid or liquid waste that contain poisonous or toxic components that will possibly leak into the underground in case of floods	Possible with a study that proves there are no threats and no double threats in the neighborhood during and after investment	If no wastewater network prevention of industries that could contaminate groundwater
<b>Public facilities</b>	Possible if a study proves the safety of the Building occupants	Possible if a study proves the safety of the Building occupants	Possible if total implementation of procedures to treat wastewater