2. CLIMATOLOGY, ENVIRONMENT AND BIODIVERISTY

Morphology

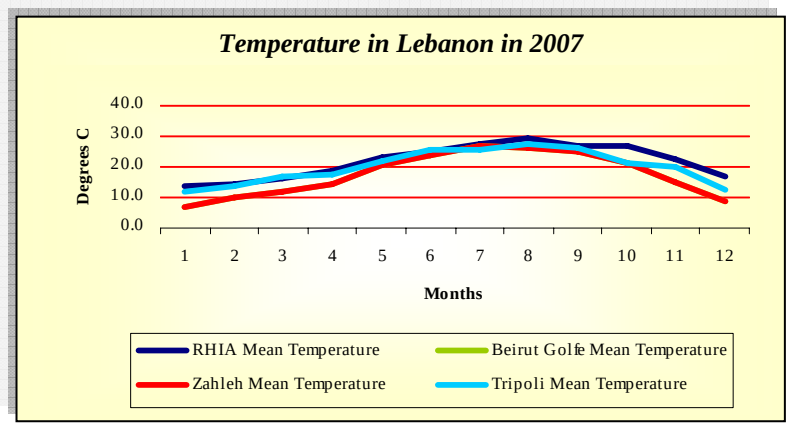
Lebanon mountainous areas vary between 400 m and 3,088 m in height. Thus, Lebanon enjoys an environmental diversity and suffers from a congestion of its medium high zones because it is difficult to live above 1 500 m. Two mountain chains parallel to the coast – Lebanon and Anti-Lebanon – separated by the Bekaa plain, provide the climate, landscapes, and rich biodiversity. The variety of Lebanon natural conditions enriches its ecosystems, thus, enjoying the existence of a variety of plant and animal species. Natural risks are lesser but are very dangerous: land slides, floods and torrential rains, desertification in the North-East, land hydro erosion, forest fires, earthquakes, and tides.

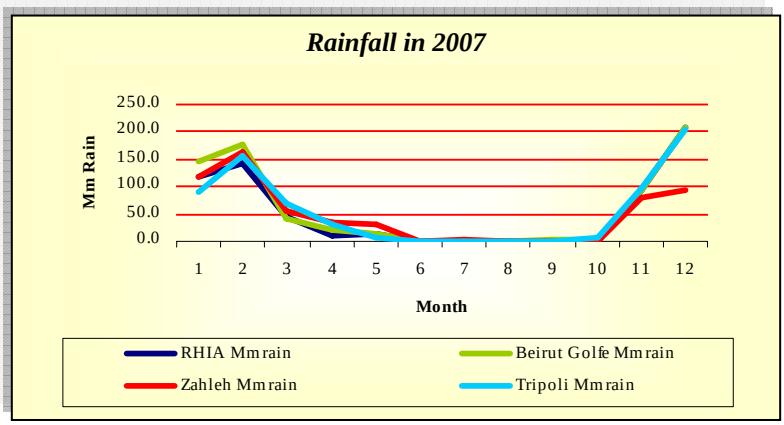
Climatology

Lebanon morphology influences its Mediterranean climate which has two prominent seasons. Prevails in the West a Mediterranean climate with a moderate rainy winter and a dry and hot summer; autumn and spring are too short. Prevails in the East a hot and dry climate of the Arab peninsula. Snow, too scarce on the coast, covers Lebanon and Anti-Lebanon mountain chains during winter.

Temperature in 2007

- The highest maximum temperature was recorded in Zahleh (Bekaa) in September: 39.3°C.
- The lowest minimum temperature was recorded in Zahleh (Bekaa) in February: -1.1°C.



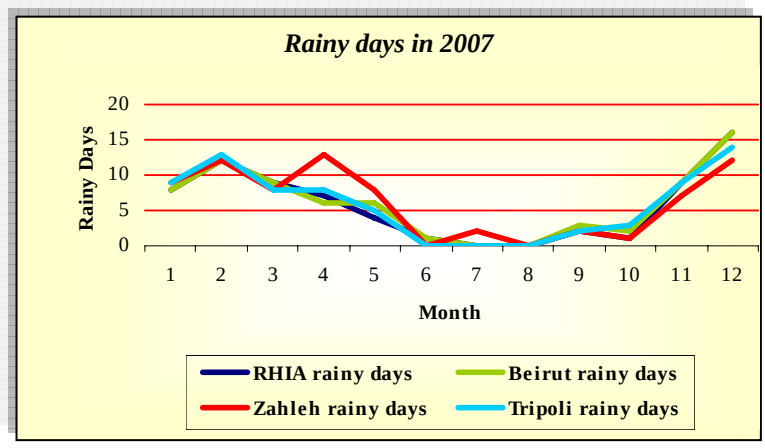


Rainfall in 2007

- Rafic Hariri International Airport: 637.10 mm.
- Beirut Golf: 708.5 mm.
- Zahleh (Bekaa): 581.5 mm.
- Tripoli (North Lebanon): 658.2 mm

Number of rainy days in 2007

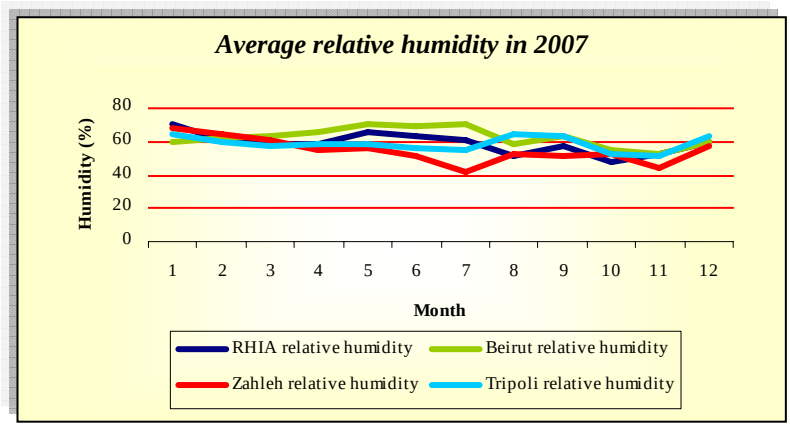
- Rafic Hariri International Airport: 69 days.
- Beirut Golf: 72 days.
- Zahleh (Bekaa): 74 days.
- Tripoli (North Lebanon): 71 days.

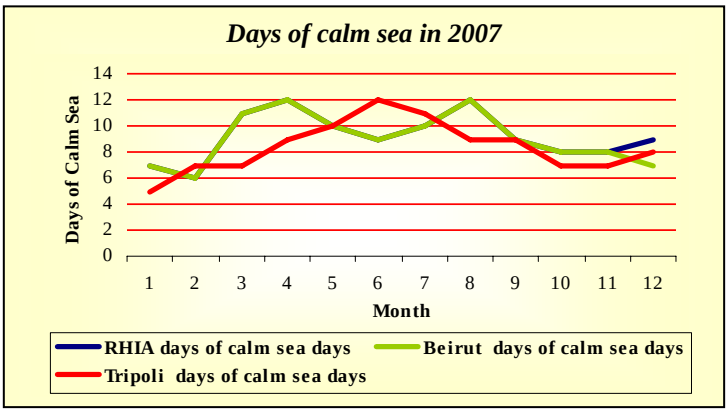


Graphs made by CAS based on General Directorate of Civil Aviation, Climatology Service (2007) data

Average humidity in 2007

- The highest relative humidity was recorded at Rafic Hariri International Airport in February: 71%.
- The lowest relative humidity was recorded in Zahleh (Bekaa) in July: 42%





Number of days of calm sea in 2007

- Rafic Hariri International Airport: 111 days.
- Beirut Golf: 109 days.
- Tripoli (North Lebanon): 101 days.

Graphs made by CAS based on General Directorate of Civil Aviation, Climatology Service (2007) data

Land and forest fires

The National Centre for remote sensing considers that the green space in Lebanon consists of non timber land with low vegetation of height less than 2 meters and of natural open spaces without or with some vegetation. The ministry of Environment figures show the following:

- The agricultural area was equal to: 267.7 ha in 2003, 268.3 ha in 2004, and 273 in 2005. Thus it increased by 1.98% between 2003 and 2005.
- Land in Lebanon suffers from:
  - Erosion: 59.3% of total lands in 2005 especially due to 710 crushing plants operating in Lebanon in 2004 and of which, 50% are located in Mount-Lebanon and in the suburb. Most of them operate without authorisation.
  - Pesticides used by type of agriculture in 2000:

Stone fruits: 7.953 Kg/ha	Olive: 5 Kg/ha
Tobacco: 10.7 Kg/ha	Viticulture: 1.274 Kg/ha
Banana: 1.08 Kg/ha	Vegetables: 16.7 Kg/ha
Citrus: 539-6.15 Kg/ha	Sugar beet: 8.6 Kg/ha
Citriculture: 3.675 Kg/ha	

- Forest area: 139,438 ha or 13% of Lebanon area. Forests suffered from multiple fires since 2004.

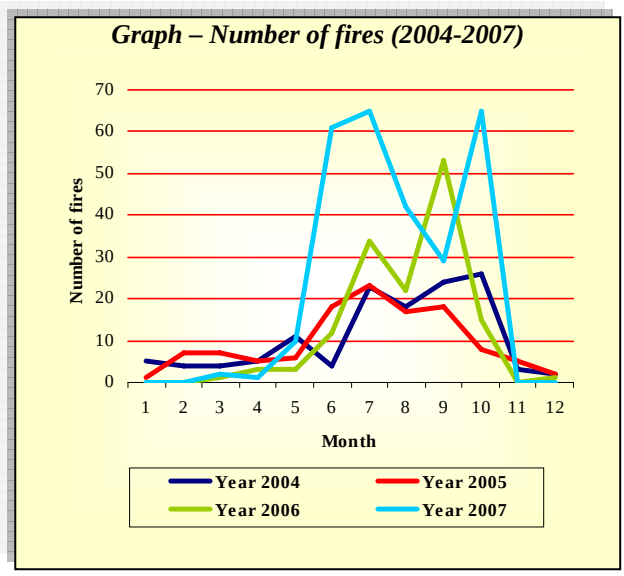
Lebanon fires data base (2004-2007)

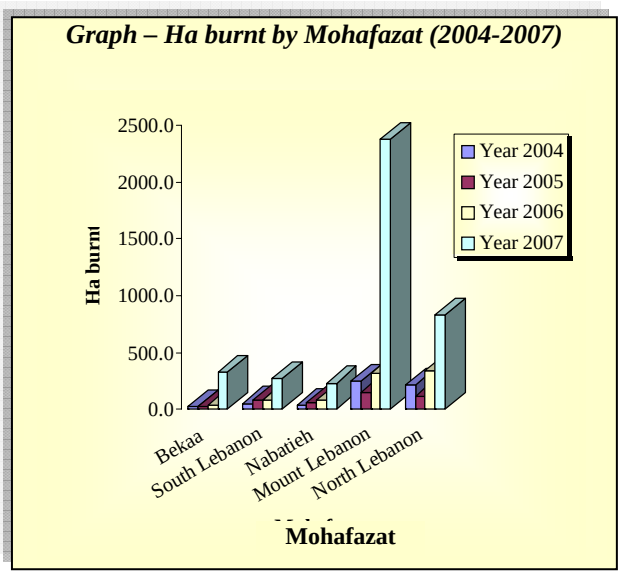
Year	2004	2005	2006	2007
Number of fires	129	117	144	275
Burnt area (ha)	585.63	440	874.6	4,301
Data available for % of fires	76	76	80	Till 25/10/2007

Source: Ministry of Environment (2007)

2007 was a catastrophic year for Lebanon where:

- 14% of fires were classified as catastrophic with a burnt area of 3,401 ha.
- 22% of fires were classified as serious with a burnt area of 401.90 ha.
- 28% of fires were classified as considerable with a burnt area of 148.70 ha.
- 20% of fires were classified as limited with a burnt area of 40.70 ha.
- 16% of fires were classified as insignificant with a burnt area of 8.66 ha.





Graphs made by CAS based on Ministry of Environment (2007) data

Biodiversity

Lebanon enjoys a rich and exceptional biodiversity due to its altitude pillars and to its hillsides exposure. It is essential to preserve the biodiversity in Lebanon in order to preserve the main ecosystem equilibriums. Fauna and flora are composed of living non human organisms and of their ecosystems and their preservation is the object of several international conventions.

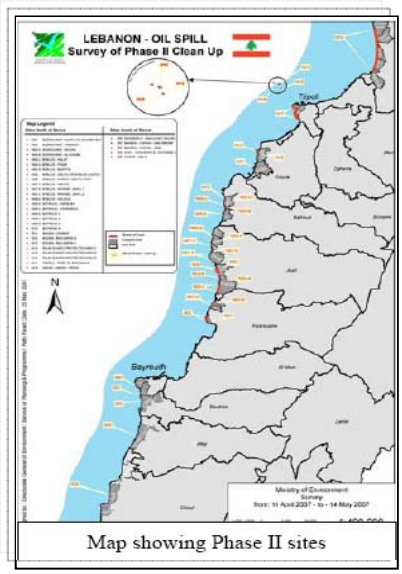
Nevertheless, Lebanon had in 2001:

- 4,486 animal species: 46% on land, 38% in the sea, and 16% in water;
- 4,633 plant species: 81% on land, 13% in the sea, and 6% in water.

Coastal zone and oil spill

The characteristics of the Lebanese coastline are physical (beach, fjord, estuary, etc.), ecological, and human (presence of big and dense agglomerations). Polluted surface and groundwater go directly to the sea without treatment and thus they pollute the sea bottom. The 2004 figures provided by the Ministry of Environment in 2004 show that the coastal zone was occupied by the following:

Port area: 27.54%	Tourist resorts: 26.2%
Non built-up area: 17.59%	Urban fabric: 14.48%
Industrial or commercial area: 11.03%	Archaeological site: 1.2%
Roads: 0.79%	Equipment: 0.72%.



Source: Ministry of Environment (2007)

On July 13, 2006 at 4:23 a.m., Jieh power utility located 30 Km South of Beirut on the coastline was bombed. Storage tanks burnt and **the blast spilled 15,000 tons of heavy oil fuel into the Mediterranean Sea, thus causing an environmental catastrophe**. Due to wind blowing and to waves, the oil spill affected 140 Km of rocky and sandy beaches along the coast including ports for fisherman boats/ships from Jieh to the northern border. Many partners helped the Ministry of Environment to manage the oil spill crisis offering their knowledge, financing and pilot cleaning of sites, etc.

The Ministry of Environment set two priorities. Phase I, which ended in January 2007, removed the free floating oil and the bulk of the oil from all heavily affected coast sites. Phase II removed the remaining fuel oil off rocks and structures using high pressure pumps from sites surrounding Dalieh Fisherman's Wharf in Beirut and Jieh sites, sites from Anfeh to Tabarja and sites North and South of Beirut.

The cost of cleanup was estimated between 137 and 205 millions USD. Financial assistance that Lebanon received to date is less than 5%. The direct financial aid was estimated to 400,000 USD.

As for the waste recovered form August 2006 till January 2007:

- 1,026 cubic meters of liquid fuel were removed.
- 6,254 cubic meters of polluted waste (heavily polluted sand, garbage, debris and equipment) has been recovered.

Air and air pollution

Industrial, transportation means and heating equipment emissions reduce oxygen quality and harm ecosystems. Air pollution caused bronchitis, respiratory disorders, cancer, etc. and killed 350 people by year in Beirut and Tripoli in 2004. Air pollution components are lead, sulphide, oxidized nitrogen particles, etc.

There were 2000 stable and mobile stations available in Lebanon to measure air quality in 2000.

Ozone indicators (2001-2005)

Indicator	2001	2002	2003	2004	2005
CFC's (Tons/year)	562.4	595.6	499	355.4	329
Methylbromide (Tons/Year)	354	341.7	257.15	128.6	72

Source: Ministry of Environment (2007)

Water in Lebanon

Lebanon enjoys 2 000 springs and 40 rivers of which 17 are permanent and 23 seasonal. The total length of Lebanon rivers is 730 Km. The groundwater quantity is 2.6 billions CM whereas 2 billions CM are effectively exploited.

Water exploitation:

- 1 billion CM of water through the Water and Wastewater Establishments.
- 250 millions CM through private dwellings.

Annual water demand:

- Domestic consumption: 195 – 405 millions CM.
- Irrigation: 670 – 875 millions CM.
- Industry: 36-65 millions CM.

Yearly evapotranspiration: 1,300 – 1,400 mm.

Water in North Lebanon

The North Lebanon Water and Watsewater Establishment figures for the year 2007 are as follows:

- Total number of offices: 8.
- Total number of sources: 64.
    - Exploited number: 48.
    - Available average cubic meters per day: 387,478 CM.
- Total number of wells: 128
    - Exploited wells: 98.
    - Total production capacity of cubic meters per day: 140,833.
- Total number of tap water treatment plants: 3
    - Exploited number: 3.
    - Treated cubic meters per day: 49,000
- Total water tanks in North Lebanon: 481
    - Exploited tanks: 445.
    - Stocked volume: 95,740.
- Irrigation network and channels:
    - Total conduction networks: 845,790 meters.
    - Total distribution networks: 1,690,484 meters.
- Total tapwater subscriptions:
    - Subscriptions: 102,932.
    - New subscriptions: 1,760.
    - Installed counters: 30,000.
    - Installed gauges: 72,923.
    - Volume of charged water (CM/day): 87,453 CM/day.
- Total irrigation water subscriptions: 6,925.
- Total area of irrigated agricultural land in dounams: 76,315.
- Tap water daily consumption:
    - Daily water demand in CM: 193,230.
    - Subscribers: 102,932.
- Total complaints and offences: 9931.
- Current water projects: 13.
- Employees in exploitation departments: 195.

Waste

- Solid waste:
  - Production of 1.44 million tons in 2001.
  - Municipal solid waste in 2004:
    - Landfill: 77%.
    - Recycle: 7.67%.
    - Other: 15.33%.
- Wastewater in 2001:
  - House wastewater: 249 millions cubic meters.
  - Industrial wastewater: 43 millions cubic meters.
- Annual produced, imported and exported hazardous waste in 2001: 108,218 tons.
- Hazardous waste: 108,218 tons in 2001.

Cost of environmental degradation

The environment suffers from the fatal consequences of human intervention such as uncontrolled well digging and proliferation of crushing plants, air and water pollution and wastes, etc. Thus, the Ministry of Environment was created in 1993. The average cost of environment degradation was estimated in 2000, to 565 millions distributed over: water (31.0%), Air (30.1%), land and wild life (17.7%), coastal zones and cultural heritage (19.5%) and waste (1.8%).

Environmental Protection Expenditures

- Environmental institutions in Lebanon in 2007: 80 consultancy establishments and 331 NGO.
- Number of environmental agreements in Lebanon in 2006: 37 agreements.
- Number of environmental projects (1996-2007): 37 projects.
- Number of environmental complaints: 190 in 2000; 531 in 2001; 197 in 2002; 197 in 2003; 185 in 2004; 220 in 2005; 250 in 2006. Thus, the increase of complaints number was 31.6% between 2000 and 2006.
- Ministry of Environment expenses on protected areas: 140 millions LBP in 1998; 140 millions LBP in 1999; 220 millions LBP in 2000; 420 millions in 2001; 391 millions in 2002; 560.1 millions in 2003; 560.1 millions in 2005. Thus, the increase of these expenses was 300.1% between 1998 and 2005.
- International projects expenditures on reserves:
  - Protected Areas Project: 2.5 millions USD (1996-2004).
  - Med Wet Coast: 0.55 million USD (2002-2006).
  - SISPAM: 0.55 million USD (2004-2006).
  - Tannourine GEF UNEP Project: 0.87 million USD (2004-2007).

Wastewater management and waste treatment expenses in USD

	2001	2002	2003	2004
Wastewater management	29,954,647	85,163,064	16,483,003	9,757,732
Waste treatment	2,580,106	30,256,680	1,761,000	367,490

Source: Ministry of Environment (2007)

Data Sources:

- ***Central Administration for Statistics, Ministry of Social Affairs, UNDP (2004-2005), Living Conditions of Households, The National Survey of Household Living Conditions, Beirut, Lebanon.***
- ***Administration Centrale de la Statistique et al. (2006), Compendium statistique national sur les statistiques de l'environnement au Liban 2006.***
- ***Ministry of Environment (2007).***
- ***Ministry of Energy and Water (2007).***