



SMART: Sustainable Management of Scarce Resources in the Coastal Zone



Model Time Series
GIS DATA

RRM Model
Climate Data

WRM Model
PPT Presentation

Image Gallery

LEBANON: Tripoli and the Batroun Coastal Area

The case study addresses the City of Tripoli and the Batroun Coastal Area. The area stretches along the northern Lebanese coast covering Tripoli City to the north, the second largest in Lebanon, southward to the town of Batroun. The coastline length is about 30km, and the coastal zone width varies between 8-12km inland. The area typifies the Lebanese coast in consisting of a narrow plain followed inland by a series of foothills, plateau, then rising through steep slopes to the coastal mountain chain. It is crossed by a river (Abou Ali) passing in Tripoli and another minor one (El-Jawz) near Batroun, with intermittent streams, dendrite drainage and dry wadis. It is hot sub-humid at the coast becoming milder inland.

The major urban complex is Tripoli, with about 300,000 people in the city, which may add another 100,000 from the surroundings. It used to be a dominantly agricultural region, but the last three decades witnessed a rapid development of urban construction, including some industries, recreations and power plants at the expense of agriculture. The urban/rural interface around Tripoli has changed dramatically with great losses in prime land and resources. The immediate coastal foothills are highly urbanized close to cities, but outside they are cultivated. In the Chekka stretch and just north of Batroun there are heavy industries, phosphoric acid, asbestos tiles/pipes and cement. This is among the highest polluted areas in Lebanon, where quarrying, water, soil and air pollution is very noticeable. But just at the limit, the sloping plateau are cultivated, agriculture is mostly citrus and olives. The coastal valley slopes are of high relief, and where slightly levelled are heavily terraced for agriculture. In plateaus, greenhouses have spread dramatically which, because of improper control on watering, fertilizing and use of agro-chemicals have led to soil and ground water pollution.



Tourist pressure is a matter of concern in the area as it is typical of the Region, and there is a fairly dense road network for easy accessibility. There are many venues of significance, both in the cities, and scattered elsewhere including archaeological as well as scenic sites inland along the coastal valleys. Most tourism takes place in summer when water is at its lowest.

Precipitation essentially covers two ranges from coastline inward, 800- 950mm, and 900-1,000mm annually, though it falls within 3-4 months episodically and often torrential. But almost 50% of the water is lost through evaporation. Karst systems are rather well developed, which explains both the fresh-water springs in the marine environment and seawater intrusion through fractures and conduits, especially where water demand is stressing. Water wells are drilled abundantly, and yet with very loose control, further stressing the hydro-regime. Excessive water pumping resulted in salinisation of the ground and water that reflects on the secondary soil salinity and farmers income.

There is neither a well-developed sewage network, nor wastewater control, nor proper solid waste collection and/or disposal. Most need upgrading, or to actually install a service system. The major problem is the seepage of pollutants, leachates, and chemicals into the ground water affecting its quality. Thus, often spring water is polluted, and water-related diseases, especially in the suburban and rural areas, are recurrent. Some major springs occurring there are treated and sparingly monitored, with clues that the treatment plant itself needs to be upgraded (example in Tripoli). Upstream of Abou Ali river, electricity (hydropower) is generated, but unless closely screened, and because of frequent landslides, earth movements, and heavy human interference, erosion is rather high and causes siltation or blocking. In fact, every spring season, with snowmelt, flowing water turns reddish.

There are many problems encountered along the area, and they can be categorized as natural or human-made. The former include forest fires, strong erosion during heavy rains, droughts and some difficult inaccessible terrain with rock falls and landslides, as well as coastal floods and relative rise in sea level. Forest fires also occur due to human interference, as are the more serious problems in the area. These include unsustainable exploitation of natural resources, i.e. quarrying, destroying scenic terrain, degrading forests, eroding soils, blocking natural beaches, extracting sediments polluting and depleting water. Even the hydropower scheme needs to be

upgraded and modernized, as it is rather old. There are three human induced stresses in the area: chaotic urban sprawl, improper agricultural practices, and tourism. Uncontrolled development is in several areas threatening natural amenities. It is unfortunate that up to this moment there are no integrated approaches followed that would secure the most suitable management, not to mention a sustainable one. Coordination among the multitude of public agencies in Lebanon is lacking, which makes it more difficult to improve quality control, and implement relevant policies. In this regard, the "strategy of the Environment", i.e. at Ministry of Environment (MoE) has been studied and proposed several times together with its policies but ratifying it by the Parliament is a slow process. Although Lebanon enjoys a wealth of active NGOs, their poor finances and lack of know-how does not help much. Even though the MoE is trying to contribute some aspects along improving "hot spots" areas, the problems felt at the urban/rural interface are not decreasing. The lacking needed integrated approaches, and capacity building of employees in vital sectors, i.e. water, agriculture, land-use are very significant. Environmental regulations are being upgraded and homogenized, but again implementing them is weakly controlled. Recently, EIA is being worked on by the MoE to be introduced as a binding process for projects. Until this is properly implemented, the environment is suffering and affecting the quality of living.