

# **DEVELOPMENT—AT WHAT PRICE? A REVIEW OF THE LEBANESE AUTHORITIES' MANAGEMENT OF THE ENVIRONMENT**

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THROUGHOUT THE 1990S WE HAVE SEEN rebuilding activities in Lebanon. The physical remnants of the war, particularly in the greater Beirut area, have been removed and replaced. Much of the media reporting on Lebanon has centered around this rebuilding, the “rebirth of the Phoenix.” Although rebuilding the country is important, such efforts must be examined in their full context, including their impact on the environment and on the people it supports. How are the efforts by the Lebanese authorities at land management and infrastructure development affecting the very land of Lebanon? This question, often disregarded by the Lebanese government and agencies, is the central theme of this article.

Governmental responsibilities for the management of Lebanon’s environment encompass wide aspects: wastewater, pollution, land use and coastal zone management, forests and agriculture, solid and hazardous waste, cultural heritage, industrial pollution, and water resources. These responsibilities are shared among nine ministries and eight key institutions: the Ministries of Agriculture, Environment, Tourism, Housing, Hydraulic and Electrical Resources, Public Health, Urban Affairs, Public Works, and Industry and Petroleum; and the Urban Planning Institution, Municipalities, *Mohafaza, Caza*, Council of Development and Reconstruction, Roads and Planning Institution, Council of Grand Projects, and Department of Antiquities (METAP, 1995). Lack of coordination among agencies hampered effective environmental management.

Numerous laws and decrees were issued by the Lebanese authorities, including the Ministries of Agriculture, Interior, Environment, and Hydraulic and Electrical Resources (Table 1). The problem was not so much with the laws per se as with the enforcement of the laws. Most laws were not implemented due to financial constraints, lack of effective institutional capacity, internal corruption and inter-agency strife, shortage of technical expertise in the private

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and public sector, and/or, occasionally, public opposition. Lack of coordination was rampant between (and among) these organizations, and further served to render enforcement, monitoring, and any productive kind of environmental management weak, at best.

**Table 1. Sample of Environmental Legislation (Laws and Decrees)**

<b>Sector</b>	<b>Target</b>	<b>Year</b>
Agri- culture	Regulations on production, sale, and use of pesticides and fertilizers	1978
	Land, water, flora, fauna	1971
	Agricultural education	1922
Fauna	Ban on hunting from 1/1/1995 until 1/1/2000	1994
	Breeding of birds and animals to release in nature	1974
	Regulations and permits in hunting	1954
Fishing	Guidelines for fishing, including ban on the use of explosives and anesthetics for fishing	1991
	Fresh water fishing regulations	1990
	Ban on fishing in ports; ban on the use of materials to anesthetize or poison fish, or pollute water	1921
Habitat protection	3 reserves (Ihdin Forest, Palm Islands, al-Shuf)	1992
	Protected zones around water sources	1962
	Forest Code	1949
Pollution regulation	Ban on car tire burning (MoE)	1993
	Penalties on violation of regulations regarding hazardous substances; penalties up to hard labor and death penalty	1988
Quarries	Regulations on exploitation of stone and sand quarries, subject to analysis by a national commission; prohibition on work of all unlicensed stone and sand quarries	1994

In certain measures aimed at protecting the environment, the Lebanese authorities have been relatively successful. The Ministry of Environment, in cooperation with the Ministry of Education, increased environmental programs throughout the public schools. The Lebanese authorities have also begun an awareness campaign for solid waste management, as part of the solid waste management program for Beirut. In addition, based on anecdotal evidence, the hunting ban, extending from 1995 until 2000, has resulted in greater protection of birds and animals, and has probably saved certain species from local

extinction. Of all their efforts at positive reform, the conservation of certain important natural sites was most famous.

#### MEASURES AIMED AT CONSERVING NATURAL HERITAGE AREAS

Currently, less than 0.5 percent of Lebanon's total area is protected (Dean, 1994). Several laws and decrees were drafted and passed that aim to protect certain endangered, or high biologically diverse habitats (Table 2). Ihdin Forest, the most floristically rich area in Lebanon, and Palm Islands, the three islands off the coast of Tripoli that serve as prime areas for migratory birds, were declared protected areas in 1992. It took four years for the enforcement of the protective measures to begin.

**Table 2. Biodiversity In-Situ Conservation—Protected Areas**

<b>Organization</b>	<b>Target</b>	<b>Year</b>
Ministry of Agriculture	Fir forest of Qammouaa	1996
Ministry of Environment	Karm Shbat	1995
Ministry of Agriculture	Reserve of Khurbet Sleem	1992
Ministry of Agriculture	Reserve of Kfar Zabad	1992
Ministry of Agriculture	Reserve of Hbaleen	1992
Ministry of Agriculture	Palm Islands, Ihdin Forest, Jabal al-Barouk	1991-1992
Ministry of Agriculture	Nature Reserve of Saissouk	1991
National Council for Scientific Research	Batroun maritime reserve	1991
Ministry of Agriculture	Arz Bsharri	1939
Ministry of Agriculture	Valley of Qannoubeen	1939
Ministry of Agriculture	Reserve, region of Bass in Tyre	1933

In 1996 the Lebanese government signed the UN proposal for Protected Areas for Sustainable Development in Lebanon, thus declaring Ihdin Forest, Barouk Mountain, and Palm Islands to be nationally protected areas. The project was initially funded with US\$2.5 million from the United Nations and US\$ 578,000 from the Lebanese government; the Lebanese government will also provide annual support of approximately US\$ 32,000. The project aims to conserve endemic and endangered wildlife and their habitats, incorporate wildlife conservation as an integral part of sustainable human development, and strengthen the institutional capacity of governmental agencies and non-

governmental organizations (NGOs). By 1998 the vegetative cover and the sightings of mammals, birds and reptiles in the reserves had increased. Various municipal bodies and NGOs have sought to establish additional protected areas in Lebanon (Abu-Izzedin, 1998). Although the creation of protected areas in Lebanon is a preliminary step toward the protection of Lebanese natural resources and their heritage, comprehensive environmental management confronting the roots of the problems is necessary if Lebanon's health is to be restored. Did the Lebanese authorities' land management and infrastructural development policies comprise a holistic approach to the environment?

## LAND MANAGEMENT

### *Land Use Planning or Land Use Gorging?*

While the Lebanese authorities created islands of protection in Lebanon, the increase in unplanned urbanization threatened the remaining fertile and productive lands. The governmental failure in implementing adequate land use planning resulted in loss of prime habitat for agricultural land and forestry. Currently agriculture and annual crops cover over one-fifth of Lebanon. Between 30 and 50 percent of the population is estimated to be involved in agriculture and agriculture-related activities (Abi-Antoun, 1998).

The increased urbanization, encouraged by the high prices offered by developers, has been the most devastating and long-lasting effect on arable land in Lebanon. In agricultural land around major cities, landlords are offered US\$ 3 million for property they lease to farmers for only US\$ 4,000 a year (Doueiri, 1996). In the past 20 years alone, urbanization around cities and highways has taken approximately 20,000 hectares (7 percent) of all cultivated land, and a higher proportion (15 percent) of irrigated land (METAP, 1995). A large part of this agricultural land is situated near the bases of urban extensions in the suburbs of Tripoli, Jounie, Beirut, Sidon, Tyre, and Zahle. The loss of land also affected the vegetation used by grazing animals. Half the wild species of fodder plants are endangered due to uncontrolled urban development (Abi-Antoun, 1998).

The loss of fertile land affected agriculture by more than simply transforming potential agricultural land into urban concrete. The loss of habitat encouraged the disappearance of primary predators and consequently resulted in an increased population of field mice and rats. Carefully planned—and enforced—land-zoning systems were desperately needed to allocate primarily non-arable land to urban development needs. In the words of the Ministry of the Environment, “if strict measures are not taken and applied by the authorities, the agricultural sector would be under the threat of disappearance in Lebanon” (MoE, 1991). However, the Ministry of the Environment, itself one of those authorities responsible for urban planning, did not undertake any of these “strict measures.”

*Forests—Neglecting the Poetry of the Earth*

"Trees are poems that the earth writes upon the sky," wrote Kahlil Gibran. The poetry of the Lebanese earth has been cut down for thousands of years, reducing the once "green Lebanon" to patches of greenery and woodland. Forested areas are estimated at roughly 5 percent of the total land area (approximately 51,000 hectares), down from 7 percent in 1966. Most of the woods are of poor quality, degraded, or offer little economic incentives for management. The main species are oak (56.2 percent), pine (21.5 percent), juniper (17.5 percent), cedar (2.5 percent), beech (1.9 percent), and cypress (0.4 percent). Three tree species are known to be endangered: Cilician fir (*Abies cilica*), turkey oak (*Quercus cerris*), and the true locust bean (*Ceratonia silica*). Along the western slopes of Mount Lebanon, the oak forests have almost completely disappeared, primarily due to logging and fires. The once dominant fir, juniper, and cedar along the higher elevations of the mountain have been reduced to sparsely distributed stands. On the eastern slopes of Mount Lebanon, and on the Anti-Lebanon mountains, trees are scattered and rare, if present at all. These are fragile ecosystems that are grazed extensively in the spring and fall (Zurayk, 1995a). Human activities, inducing accelerated erosion, further exacerbate these problematic factors.

Of the primary trees, the Italian stone pine (*Pinus pinea*) accounts for a proportionally significant economic production and constitutes half of the pine composition. The stone pine is localized on the sandy soils of al-Matin and Jizzen, where it has been diminished by war, urban development, and neglect, and its habitat threatened by the encroaching sand quarries (METAP, 1995; Masri, 1996). In addition to urbanization, forests throughout Lebanon are also threatened by fire and insects. Lack of forest management and silvicultural care creates circumstances favorable to propagation of fires and diseases.

But why care so much about the welfare and regeneration of these forests? Certain important reserves, such as the cedars of Bsharri, Ihdin Forest, and Barouk Mountain, are now protected, and the demand for firewood has significantly declined.<sup>1</sup> Perhaps, then, all that is necessary is protection of the economically-valuable stone pine and continued maintenance of a few remnants of forests for cultural and historical value. Trees, however, are more than mere containers for wood and portraits of beauty; they are the very basis for a healthy ecosystem. Trees reduce air pollution, protect against soil erosion, provide habitat for wildlife, and serve to conserve water.

In Mount Lebanon, where soil erosion rates are estimated to be the highest, 20 percent of the permanent soil productivity was lost in one year alone (Dregne, 1982). In these hilly lands, soil erosion occurs mainly on the extensive areas of abandoned, dilapidated terraces and overgrazed marginal land. Nearly half of the cultivated lands in Lebanon are on mountain slopes, where terracing is necessary to decrease erosion (METAP, 1995). Approximately 25 percent (36,000 hectares) of these terraces are degraded (Andraos, 1998). In 1995, nationwide soil erosion rates equaled the annual loss of 500 hectares of fertile

agricultural land and millions of dollars. According to a World Bank study, US\$10.3 million were lost due to soil erosion in 1995 (Table 3). Increasing the forested areas would have significantly protected the soil. For example, increasing forest cover to 25-30 percent on the western slopes of Mount Lebanon would have cut by half the rates of soil erosion (Zurayk, 1995a).

**Table 3. Estimated Cost of Soil Erosion in 1995**

Type of Land	Area (ha)	Rate of Soil Loss (ha/year)	Loss (US\$ Million)
Degraded agricultural terraces	36,000	200	2.5
Degraded range lands	210,000	100	7.4
Degraded forests	70,000	17	0.4
Total	316,000	317	10.3

Source: Environment Resources Management/World Bank (1995).

In addition to protecting the productivity of the land, forests also have a positive effect on the micro-climate. Based on historical data and scientific estimates, when Lebanon's forest cover was more extensive, the perennial springs of higher Lebanon were much fuller and more constant, and the lower slopes green and moist. There may even have been greater annual rainfall through the recirculation of water on the western slopes of Mount Lebanon by the transpiration of the forest (Brown, 1969). Simply put, more trees lead to more water. According to the Ministry of the Environment, "a judicious reforestation policy, implemented today, could reduce water lost into the sea by 20 percent, and increase water availability in the country by 50 to 100 percent" (MoE, 1991). Such a policy was not implemented.

Both the Ministries of Agriculture and Environment clearly recognized the importance of forest cover and supported increasing the percentage of forest cover to the recommended 20 percent (200,000 hectares). However, in practical terms, both did little to protect or regenerate the forests. In 1991, the Ministry of Environment cited reforestation "at a 5 percent rate," yet it has undertaken almost no monitoring or even simple assessment after planting. The governmental plans for reforestation did not result in an increase in forest cover, nor did they even slow down the loss of forest cover in Lebanon.

The government was also unsuccessful in protecting the remaining forests from fires, one of the primary threats to the forest cover.<sup>2</sup> Uncontrolled fire events have destroyed vast expanses of land, often irreversibly due to the

ensuing grazing which prevents regeneration. The Lebanese forestry service estimated an annual loss of 1,000 to 1,200 hectares (Zurayk, 1994). According to Ministry of Agriculture statistics, the number of fires reported fell from 112 in 1995 to 79 in 1996, but jumped to 127 in 1997. Due to extremely high summer temperatures, lack of adequate fire-fighting capacities, and poor forest management, the number of fires continued to rise in 1998. Between the months of July and October, several hundred fires swept through the country. More than 200 fires occurred in October, the month when fires are most common (*Daily Star*, 15 October 1998). The fires resulted in the loss of millions of dollars. Environmental Minister Akram Chehayeb reflected that, "so much of what we planted over the last five years is gone, as well as irreplaceable ancient trees" (*Daily Star*, 15 October 1998).

The Ministry attributed most of these fires to carelessness, yet the ensuing damage from these fires was a result of negligence on the part of the ministries themselves. Fires are expected during the Summer and Fall months in Lebanon, and preparations to minimize the effect of the fires should have been taken.<sup>3</sup> The authorities not only failed in minimizing the effect of the fires through preventive measures, but they also simply neglected to be adequately prepared to control the fires.

After months of destructive fires raging through the scant remaining wooded areas in Lebanon, Minister Chehayeb ceded that most of the damage from the fires could have been avoided if the government only had a Canadair fire-fighting plane. The plane had demonstrated its abilities in 1995, when a sample aircraft was brought to Lebanon for a trial run; three years later the government still had not made any decision on purchasing an aircraft. Chehayeb was quoted as saying, "Had the government bought the plane at the time, we could have saved our forests and the plane would have made up its cost five times when compared to the value of the forests that went up in smoke" (*Daily Star*, 17 October 1998).

Ironically, in March 1998, the Ministries of Agriculture and Interior had proposed a LL 20 billion plan to fight forest fires by purchasing 3 helicopters, 15 fire-watch stations, 150 storage tanks, a number of fire engines, and communications equipment, primarily in the governorates of Mount Lebanon and the north (where fires are most common). In a joint statement issued in March, the ministries stated that they would present the plan to the Council of Ministries for funding approval before the summer (*Daily Star*, 24 March 1998). What happened to that plan?

## INFRASTRUCTURE DEVELOPMENT

### *Treating the Solid Waste or Letting It Stink?*

Approximately 1.6 million metric tons of solid waste is produced annually in Lebanon.<sup>4</sup> This quantity is expected to increase to more than 2 million metric tons by the year 2000. Facilities for solid waste collection,

treatment, and disposal are severely inadequate throughout Lebanon, especially in the rural areas (see Table 4). Most of the current waste disposal sites in Lebanon are simply uncontrolled dumps (METAP, 1995). Only a fraction (10 percent) of the collected solid waste is disposed of properly. Waste has usually been transferred, without any form of treatment, to uncontrolled discharge sites that pollute the air, sea and waters, spoil the scenery, and represent imminent risks to public health. Much of the industrial waste, which ranges from motor oil to animal carcasses, is dumped into rivers or onto open ground. The disposal routes of industrial wastes pose serious threats to ground and surface water, particularly in Matin, Alay, and Ba'abda, where industry is concentrated. In major city disposal sites, which are established without any environmental planning assistance, waste is piled up and then compacted with the help of bulldozers before being pushed toward the sea. In rural areas, solid waste is disposed of into stream beds and rivers, in valleys, and often by the side of the road, a few hundred meters outside the locality. These "trash piles" have regularly been set on fire, causing fire hazards and serious localized air pollution. Waste is also dumped along the coast in Tripoli, Beirut, Tyre, and Sidon, thereby seriously impacting the coastal water quality and marine ecosystem. Partly due to the accumulation of plastic and metallic waste on the sea bed, fish catches have plummeted from 6,000 tons a year in the early 1970s to just 2,500 tons a year in the early 1990s (Zurayk, 1995b). Marine pollution can also cause direct health hazards to humans through the biological concentration of certain contaminants, such as heavy metals and pesticides.

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**Table 4. Proportion of Population Served by  
Solid Waste Collection Operations (1994)**

<b>Governorate (<i>Mohafaza</i>)</b>	<b>Population Served (%)</b>
Beirut	100
North Lebanon	45
Mount Lebanon	57
South Lebanon	18
Biq'a	85
Average in Lebanon	57

Source: METAP (1995).

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In 1995, the Council for Development and Reconstruction<sup>5</sup> and the Ministry of the Environment formulated waste management plans relying primarily on incinerators and landfills to address Lebanon's growing waste



problem, while failing to mention waste prevention and reduction or clean production. Four new incinerators were proposed in Beirut, Tripoli, Zouk, and Sidon, although incinerators are scientifically proven to pollute the air, soil, and water.

Two incinerators, both built during the war, resumed operation from 1993 to 1997: a small incinerator in the Karantina area and a larger one in Amroussya in Beirut's southern suburbs. Hazardous hospital waste, hazardous plastic waste, household toxic waste (such as batteries and paints), and industrial toxic waste were incinerated. The incinerators were not operating to design specifications, due primarily to the high moisture content of the waste and its consequently low combustion temperature. Corrosive, and potentially carcinogenic atmospheric emissions, including dioxins and furans, were produced. The toxic ash from the incinerators was dumped in the Burj Hammoud landfill. Nearby residents protested about the polluting Amroussya plant. In spring 1997 the Minister of the Environment and the owner of the Sukkar Group (the private company dealing with waste generated in the greater Beirut area)<sup>6</sup> threatened to have the waste of the district remain in the streets if the protests were to continue. On 26 June 1997, the Minister said that the incinerator would resume operation despite the three-month protests. If the people continued to protest, he said, then the waste would remain on the street. Minutes later, hundreds of residents torched the incinerator. The second incinerator in Karantina was shut down by the Lebanese authorities in October 1997 after Greenpeace attempted to sample the ash of the plant.

In August 1998 Greenpeace revealed that the MoE and CDR were proposing to build a hospital waste incinerator,<sup>7</sup> probably in Silaata in the north (a region that is already highly polluted). The study, commissioned by the CDR, presented two alternatives: incineration (more expensive and polluting) or sterilization machines in the hospitals themselves. If built, would this incinerator burn at the hands of angry protestors, or would the Environment Minister threaten to let the hazardous hospital waste accumulate in the hospitals?

In addition to incinerators, the MoE and CDR planned to build five large landfills in Zahle, Shuf, Tyre, Baalbak, and Sidon, and 24 smaller landfills (one for each district or *caza*). The creation of these landfills in the mountains and in the Biq'a valley would threaten the country's groundwater reservoirs by allowing rapid percolation of leachate. This problem is exacerbated in dump sites situated on porous sandy soils, as in Naama and Jizzen. One example, among many, of an environmentally destructive landfill is the Naama landfill south of Beirut. The Lebanese authorities had vowed not to allow hazardous, toxic, and organic wastes into the Naama landfill. Nevertheless, large amounts of organic wastes continued to end up there. (The addition of organic waste in landfills creates methane gas, thereby leading to fires and further toxic fumes.) Hazardous hospital and toxic industrial wastes have also been deposited in the landfill, thus posing a serious danger of leaching into groundwater.<sup>8</sup> The Minister of the Environment responded simply that "mistakes" had been made, and that no one but the private company Sukleen (a sub-firm of the Sukkar

Group) was responsible. No attempts at resolving the problem were made (Greenpeace Mediterranean, 28 October 1998).

The Lebanese authorities have also neglected to address the industrial waste problem. Industrial toxic solid waste is expected to increase from approximately 18,000 metric tons per year in 1994 to 64,000 metric tons in 2020. According to scientific analyses conducted in 1997 by the Greenpeace International laboratory, several industries are dumping highly toxic wastes into the marine environment. Coastal water samples from the Naama coast have revealed high levels of toxic heavy metals, including mercury, chromium, and nickel.

Industrial waste has also been deposited inland. In October 1998 fuel oil contaminated the drinking water system in Zahle. For days people were unable to use tap water because an unknown industry had illegally pumped petrochemicals into the nearby source feeding the town where some 70,000 people live. Polluting drinking water is a crime. According to ministerial decision 144/925 and law 930/926, water is regarded as public property. Any activity that leads to the pollution of water is punishable by up to two years in jail (law 8735/974). If the water is polluted with toxic waste, the punishment can be raised to hard labor or death (law 64/988). The industrial factories were not investigated by the Lebanese authorities.

Of greater danger to human health are the remnants of the Italian toxic waste scandal. In 1987 a shipment of hazardous wastes was imported into the country and never treated or disposed of properly. Approximately 15,800 barrels of different sizes, 20 containers of highly toxic industrial waste, and some 30,000 tons of contaminated waste were illegally brought to Lebanon from Italy in exchange for cash payment to a local militia (Greenpeace Mediterranean, 1995; METAP, 1995). The waste was buried in both coastal and inland hilly areas throughout the country. In 1988, due to public pressure, 5,500 barrels were removed from Lebanon, yet approximately 2,500 tons of toxic waste are believed to have been dumped 40 to 50 kilometers east of Famagusta, in the waters between Lebanon and Cyprus. More than 10,000 barrels and the contents of several containers remain in Lebanon or have been dumped along its shores. Water supplies may be poisoned in years to come as the toxic contents of the drums leak into ground and surface water, thereby contaminating soils over a wide area and poisoning wildlife and human populations through bio-accumulation.

In September 1996 the Lebanese government officially closed this toxic waste file, despite the remaining presence of several thousand toxic waste containers. In September 1997 the Greenpeace Mediterranean Office published documents revealing that at least five sites in Lebanon were still contaminated by the toxic wastes (Shannir, Zilahmaya, Halat, Uyun al-Siman, and Tripoli). The Lebanese government did not clean up the suspected sites. Instead, the government allowed a cattle barn to be built on one site, covered another site with rocks, and, in April 1996, secretly shipped 12 containers (more than 77 tons) of toxic waste and contaminated land from Beirut to Marseilles for

incineration (UPI, 17 May 1996). Furthermore, in 1998 the Shannir quarry, believed to be the main dump for 2,411 tons of toxic waste, was reactivated (Greenpeace Mediterranean, 13 January 1998). (Operation of this quarry violated an official order banning the operation of quarries in mountains close to the coast.)

In spring 1997 two Spanish construction companies and a Lebanese firm, under contract with the CDR to "rehabilitate" toxic and industrial waste, instead illegally transferred tons of contaminated toxic and industrial waste from the Beirut Port to Monteverde in the Lebanese mountains. Leachate and sediments from the Monteverde dump revealed high levels of toxic heavy metals. These toxic substances probably have contaminated the Beirut River and the Dayshunia well underneath the Monteverde dumpsite; approximately 600,000 people in Beirut depend on Dayshunia for drinking water. Although, in a precedent-setting move, the MoE forced the companies to pay the costs of rehabilitation,<sup>9</sup> estimated by the MoE at US\$ 35,000, it still failed to enforce the laws punishing polluters of drinking water supply with jail time.

### *Clean Drinking Water for All?*

During the war there was a 60 percent decrease in the quantity of water available from municipal sources (Kolars, 1992). Most areas in Lebanon still suffer from water shortages caused by major demographic changes that have been unaccompanied by the necessary infrastructural improvements.

Most ground and surface water, springs, wells, numerous rivers, and drinking water are bacterially contaminated (METAP, 1995; Khair et al., 1994; Jurdi, 1992). The areas most affected by water pollution are the Biq'a, the North, and the South (Jurdi, 1992). This situation is particularly severe in the rural areas, where a 1994 countrywide survey found evidence of contamination in 78 percent of the water resources of rural households (Al-Khalidi and Zurayk, 1994). The prevalent diseases in Lebanon believed to be transmitted by water are typhoid, hepatitis, and dysentery. The primary causes of water pollution are the poorly constructed domestic and industrial water-treatment systems, the general release of untreated effluents into the soil or water, and the excessive construction of private wells.<sup>10</sup>

The Lebanese government's recovery program intended to ensure clean drinking water to most of the urban population (METAP, 1995). However, it did not propose treatment plants outside the urban concentration of Beirut, thus ignoring the rural areas, the most affected regions in Lebanon.

As with access to reliable (although not necessarily clean) drinking water, a significant portion of the Lebanese population still has no access to wastewater services. While 50 percent of the population has access to some form of wastewater disposal services, only 8 percent of the rural population is served by a sewer collection system (Al-Khalidi and Zurayk, 1994). The rest of the population has developed rudimentary individual methods of wastewater disposal. In both cases, whether the community is afforded governmental

disposal services or adopts methods of its own, the existing conditions remain unsatisfactory (METAP, 1995).

There are effectively no operational wastewater treatment plants in Lebanon. Approximately 60 percent of the wastewater collected in the sewer networks is discharged in rivers and in the sea, while the remainder is disposed of on land, without any technical provisions (Jurdi, 1992). This uncontrolled collection and disposal of wastewater is a main cause of ground and spring water contamination, ultimately affecting populations away from the disposal site (Al-Khalidi and Zurayk, 1994). To protect the water, and to protect human health from illnesses caused by water contamination, construction and rehabilitation of adequate wastewater treatment facilities, in both the urban and rural areas, remain urgently needed.

#### *Asbestos—Use of a Carcinogen in Infrastructural Development*

Under the guise of infrastructural development and public welfare, the Lebanese authorities expanded and promoted the use of asbestos fiber in the production of cement pipes and roof tiles. The Lebanese authorities also planned to use asbestos cement pipes for drinking water systems in Tripoli, Akkar, Nabatiyya, Sidon, Tyre, and Ras al-Matin. (Asbestos pipes for drinking water had been planned for Batroun as part of the “Batroun Water Supply Project,” but local opposition forced the authorities to change their plan and use asbestos-free pipes.) The authorities likewise planned to use asbestos cement pipes for sewage systems in Tripoli, Tyre, Akkar, Jiyya south of Beirut, and the Kisrwan region. The Council for Development and Reconstruction (CDR), the Ministry of Public Works, and the Ministry for Water Resources and Electricity have been financing and overseeing these projects. In March 1997 the Ministry of the Environment signed a protocol with the Lebanese Eternit factory, allowing the company to use asbestos forever. (Ironically, in 1996 the Ministry issued three decrees regarding asbestos literally within days of each other. The first decree required licenses for the importation of asbestos; four days later, another decree subjected “the import of asbestos to prior approval from the MoE”; the very next day the importation of asbestos was prohibited.) The 1997 protocol not only encouraged the use of asbestos in infrastructure projects but also completely disregarded the safety of the workers at the Eternit factory and the residents of Shikka. This disregard is apparent in three items in the protocol. First, Eternit was required to measure the asbestos fiber content in the air inside the plant, but the permissible levels of asbestos fiber, and the methods through which the factory must conduct these measurements, were not stated in the protocol. Second, at the Eternit waste dump south of Shikka, Eternit was allowed to dump one fiber of asbestos per cubic centimeter of air, despite the lack of scientific accuracy in measuring asbestos fiber in the open air. Third, the factory was required to conduct yearly medical examinations for workers older than 35 years, while younger workers, also inhaling asbestos, would be tested only once every three years (Greenpeace Mediterranean, 5 June 1998).

The health concern is both for the workers at Eternit and the residents of Shikka, where asbestos is produced, and for the people in the areas where asbestos will be used. The people most at risk are workers in the Eternit factory in Shikka, where asbestos cement pipes and roof panels are produced, and construction workers dealing with these products. Numerous people in Shikka and Koura have died due to asbestos during the past years. The Eternit company usually pays victims' families compensation of US\$ 5,000, thereby officially recognizing responsibility for their death. The residents of Tripoli, Akkar, Nabatiyya, Sidon, Tyre, and Ras al-Matin, where asbestos cement pipes will be used in the drinking water systems, also face a risk to their health. There is considerable concern in the scientific literature about the harmful effects of asbestos fibers in drinking water and the extent of health risks from ingestion of fibers (AWWA, 1986). Asbestos may become airborne when released into the air during a shower, and, according to the U. S. Environmental Protection Agency, *there is no safe threshold of exposure for airborne asbestos*. Inhalation of asbestos dust could cause asbestosis, lung cancer, and malignant mesothelioma. In addition, although the risk may be small, there may be a direct association between asbestos in drinking water and gastrointestinal cancer (Toft, 1984). Furthermore, people may be exposed to inhalation to airborne asbestos fibers released from the disruption of concrete asbestos pipe (Landrigan and Wise, 1996).

Since a serious risk to human health from the production and use of asbestos was known, an alternative should have been used. Eternit claimed that the alternative to asbestos pipes would be too expensive and would lead to the factory's closure. Even if cost were a serious concern for the Eternit company owners, the cost of the alternative definitely could not be more than the "cost" of the continued production of asbestos on human health.

Numerous countries worldwide have recognized the danger of asbestos and have banned its use. The United States, the European Union, and Saudi Arabia ban the use of asbestos in almost all applications. Saudi Arabia recently banned import of asbestos and all asbestos-containing products; three years earlier Saudi Arabia had stopped using asbestos in almost all applications. Syria prohibits the use of asbestos pipes in drinking water systems, and only allows its use in sewage pipes. In addition, the British Health and Safety Commission recently proposed further restrictions on the importation, supply, and use of chrysotile asbestos; chrysotile asbestos has been officially promoted by the Canadian Embassy in Lebanon, with the active support of Eternit.

Through their support of the Eternit company and their continued promotion and use of asbestos, the Lebanese authorities revealed a callous disregard for human health. The authorities also displayed a double standard in their implementation of this infrastructural development. "Why," asked Fouad Hamdan, then Lebanon's Greenpeace coordinator, "did the CDR insist on using asbestos cement pipes in sewage projects in al-Minya in Akkar, in Jiyya south of Beirut, and in the 'Dam Wa-Farz' district in Tripoli, while they have opted for safer alternatives in other areas?"

## CONCLUSION

Rebuilding a country after a devastating war is a difficult task, no doubt. Perhaps one should forgive environmentally detrimental activities that have occurred in this rebuilding process, and then hope to rectify the situation at a later date, when Lebanon is more "stable." However, environmental health cannot be relegated to a more convenient date in the distant future, just as concern for the health of an individual cannot be postponed without having to contend with ensuing illnesses. Neither is the protection of the environment such a burdensome task that it could not have been undertaken alongside the rebuilding of Lebanon.

Instead of incorporating the environment into their policies, the Lebanese authorities attempted to rectify environmental problems after the fact. In their attempts to confront environmental problems, the Lebanese authorities at times exacerbated the situation, failed to enforce their own laws, and deliberately attempted to silence opposition to their plans. This approach may be a route to *rebuilding* Lebanon, but it was not a path toward Lebanon's *rebirth*.

Vitally needed is a holistic perspective to development, a firm understanding that the environment has to be considered in the rebuilding process or else the health of the land and the people will be threatened. Government institutions delegated with environmental responsibilities need to coordinate their activities and strive toward the equal and full enforcement of their laws and regulations. Furthermore, since environmental policy issues directly affect the lives and health of the people, free and public hearings should be held and the concerns of the people should be addressed.

In the words of Jean Rostand, "The obligation to endure gives us the right to know." The Lebanese people must be aware of the environmental consequences of the actions of their government as well as their own individual actions. Free and public hearings should be held and the concerns of the people should be addressed. Together, then, with the increased environmental awareness of the Lebanese public, and a leadership[ dedicated to rehabilitating and protecting Lebanon, the health of Lebanon's land, air, and water can be restored.

## NOTES

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1. Because of the increased availability of other combustibles, the use of forests for firewood has declined by a factor of more than 1,000 over the past thirty years. In 1963 firewood consumption was estimated at 377 million cubic meters, all produced locally by logging oak coppices (METAP, 1995). In 1988

the figure dropped to 482,000 cubic meters, and in 1991 to 300,000 cubic meters (MoE, 1991).

2. Fires also pose the danger of detonating land mines. One such victim in 1998 was a resident of Binya in the Shuf, who sustained slight burns as the flames detonated a number of land mines. Lebanon is strewn with an estimated 200,000 mines, a legacy of the 1975-1980 civil war and Israel's 1982 invasion. Approximately 4,000 people have been maimed in Lebanon during the past two decades; the number killed is unknown. The Lebanese army is the sole force clearing mines, using dangerous traditional methods. Between 1990 and 1997, 12 men were killed and 85 maimed while clearing mines with the Lebanese army. The work of de-mining needs years to be completed (Reuters, 1998).

3. Preventive measures are feasible through proper silvicultural management. However, such management is not always possible in the occupied south of Lebanon, where numerous fires have been deliberately sparked by Israel. For example, in October 1998 Israeli artillery batteries targeted the forested areas with phosphorous rounds, and consequently destroyed thousands of hectares and the livelihoods of many farmers (*Daily Star*, 15 October 1998).

4. The composition of solid waste is 60 percent domestic waste, 20 percent commercial waste, 19 percent industrial waste, and 1 percent waste oils, vehicle tires, and other wastes. More than half of the domestic waste is of vegetable and decayable constituents (50-65 percent); paper and cardboard, and plastic constituents comprise the remaining large proportions of this waste (METAP, 1995). This high proportion of vegetable and putrescible material (much higher than that commonly found in northern Europe or the U.S.) makes the waste very suitable for composting.

5. The CDR was established in 1977, partially in replacement of the Ministry of Planning, to be the governmental unit responsible for reconstruction and development. The CDR was granted unprecedented powers to bypass any administrative checks that could, in the CDR's own words, "slow down the reconstruction process, especially in the financial field." Since 1991, the CDR has become increasingly active in development projects. Projects for more than US \$3 billion have been awarded, mostly in the sectors of Power, Health, Education, Water and Waste Water, Telecommunications, Transportation, and Roads and Highways.

6. In 1993 the CDR signed a contract with the private company Sukkar Group to deal with the waste. Sukkar Group thus inherited the two incinerators. Sukleen, Sukkar Group's sub-firm, has been collecting the 1,700 tons of waste generated daily in greater Beirut and dumping most of it in the Burj Hammoud landfill. The landfill was shut down in July 1997 after an environmental campaign led by Greenpeace.

7. Currently, hospital waste is collected and disposed of by the municipalities without removing or separating pathogenic wastes, thus creating a serious risk of epidemic and infection (METAP, 1995).

8. Fairhurst International, the British company that built the Naama landfill, has admitted to Greenpeace that the plastic linings underneath the dump will not last more than 10 years.

9. The removal of 20,000 tons of waste and 10,000 tons of contaminated soil from Monteverde to the port was completed by January 1998 (Greenpeace Mediterranean, 21 January 1998).

10. Faced with a decrease in water supply and an inadequate infrastructure, individuals drilled private wells to meet their needs. The increase in private wells has resulted in increased ground water salinization and a drop in the water-table level.

## REFERENCES

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Abi-Antoun, M. 1998. "Assessment of the Current Status of Biodiversity in Lebanon." First National Workshop on Biodiversity. Beirut, 19 February.

Abu-Izzedin, F. 1998. "Progress Report of the Protected Areas Project." First National Workshop on Biodiversity. Beirut, 19 February.

Al-Khalidi, M. and R. Zurayk. 1994. "The Sustainability of Internationally Funded Community Based Sanitation Projects in Lebanon." Water Environment Federation, 67th Annual Conference and Exposition. Chicago, Illinois, 15-19 October.

Andreos, L. 1998. "The Green Plan and Its Role in Development." First National Workshop on Biodiversity. Beirut, 19 February.

AWWA. 1986. "Are Asbestos Fibers in Drinking Water Harmful?" Roundtable.

Brown, John Pairman. 1969. *The Lebanon and Phoenicia*. Vol. 1, *The Physical Setting and the Forest*. Beirut: Centennial Publications.

*Daily Star*. 24 March 1998. "Ministers Join Forces to Raise LL 20 Billion to Fight Forest Fires."

*Daily Star*. 15 October 1998. "Firefighters Wage War on Dozens of Blazes."

*Daily Star*. 17 October 1998. "Plane Could Have Saved Forests."

Dean, F. A. 1994. "Wildlife Conservation for Sustainable Development in Arab Countries." Economic and Social Commission for Western Asia (ESCWA). December.



Doueiri, D. 1996. "Towards a Comprehensive Understanding of the Agricultural Policy in Lebanon." Ph.D. dissertation, Department of Islamic Studies, University of California at Los Angeles.

Dregne, Harold E. 1992. "Erosion and Soil Productivity in Asia." *Journal of Soil and Water Conservation* 47: 8-13.

Environment Resources Management/World Bank. 1995. *Assessment of the State of the Environment*. Report prepared for the Ministry of Environment.

Greenpeace Mediterranean. 1995. "Waste Trade in the Mediterranean. Toxic Attack Against Lebanon. Case One: Toxins from Italy." Malta, August.

Greenpeace Mediterranean. 13 January 1998. "Lebanese Quarry Contaminated by Toxic Waste Reactivated."

Greenpeace Mediterranean. 21 January 1998. "Monteverde Waste Dump Returned to Sender in Beirut."

Greenpeace Mediterranean. 5 June 1998. "Greenpeace Asks Advisors, Scientists to Cancel Asbestos Protocol."

Greenpeace Mediterranean. 19 August 1998. "Britain Moves Closer to Asbestos Ban; Lebanon Must Follow Suit."

Greenpeace Mediterranean. 28 October 1998. "Planned Beqaa 'Sanitary Landfill' to Receive Organic Waste."

Jurdi, M. 1992. "National Survey on Drinking Water Quality in Lebanon." First Seminar on Water in Lebanon. AUB, UNICEF. Beirut, Lebanon, November. (In Arabic)

Khair, K., N. Aker, F. Haddad, M. Jurdi, and A. Hachach. 1994. "The Environmental Impact of Humans on Groundwater in Lebanon." *Water, Air, and Soil Pollution* 78: 37-49.

Kolars, John F. 1992. "Water Resources of the Middle East." *Canadian Journal of Development Studies*: 103-19.

Landrigan, Philip J. and E. Wise. 1996. "Child Health and the Environment." *World Ecology Report* special issue 8, no. 2 (Summer).

Masri, Rania. "Environmental Challenges in Lebanon," *Journal of Developing Societies* (1997).

Masri, T. 1996. "An Integrated, Holistic Approach Towards the Protection of the *Pinus pinea* Forests." Geographic Information Systems Department, Lebanese National Council of Scientific Research.

Mediterranean Environmental Technical Assistance Program (METAP). 1995. *Lebanon: Assessment of the State of the Environment*. Financed by the Commission of the European Communities, United Nations Development Programme, European Investment Bank, and World Bank. Beirut: World Bank-METAP.

Ministry of State for the Environment (MoE). 1991. *National Report on the Environment and Development in Lebanon*. Beirut.

Reuters. 1998. "Lebanese Die from Land Mines, Old and New." 21 October.

Toft, P., M. E. Meek, D. T. Wigle, and J. C. Meranger. 1984. "Asbestos in Drinking Water." CRC Critical Review. *Environmental Control* 14, no. 2: 151-97.

UPI. 1996. "Greenpeace Halts Lebanon Waste Pact." Beirut, 17 May.

Zurayk, R. 1994. "The Role of the Local Community in the Prevention and Mitigation of Forest Fires: Case Studies from Lebanon." *International Civil Defense Journal* 7: 31-34.

Zurayk, R. 1995a. "The Natural Environment of Lebanon." State of the Environment Report. Beirut: World Bank-METAP and Ministry of the Environment.

Zurayk, R. 1995b. "The Environment of Women and Children in Lebanon." UNICEF country analysis document. Beirut: UNICEF.