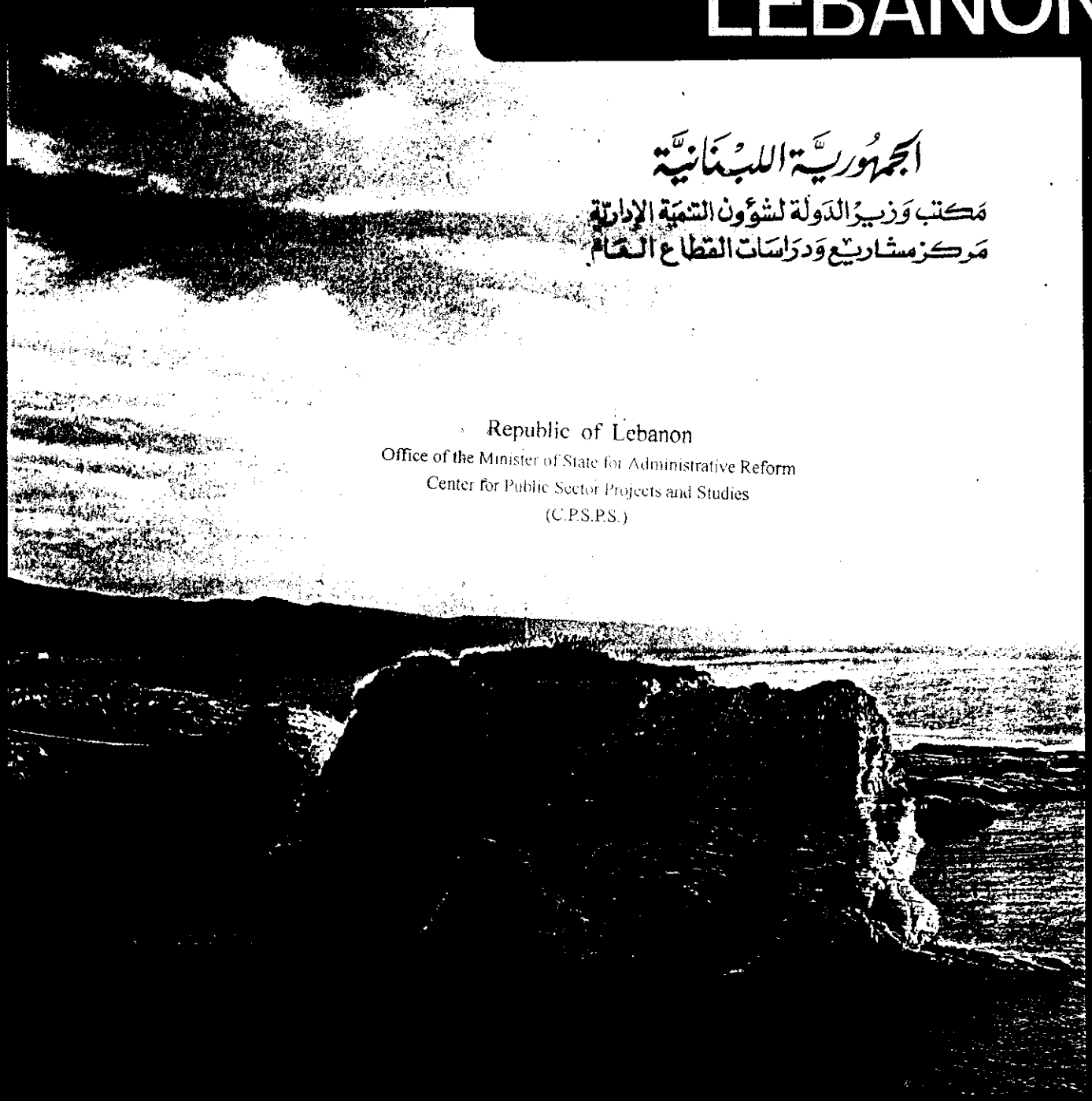
# LEBANON



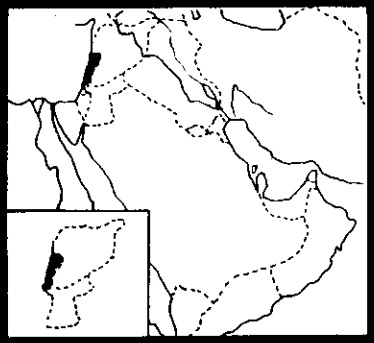
UNEP

UNITED NATIONS
ENVIRONMENT PROGRAMME

# STATE OF THE ENVIRONMENT REPORT – 1980

الجمهورية اللبنانية
مكتب وزير الدولة لشؤون التنمية الإدارية
مركز مشاريع ودراسات القطاع العام

Republic of Lebanon
Office of the Minister of State for Administrative Reform
Center for Public Sector Projects and Studies
(C.P.S.P.S.)



REGIONAL OFFICE FOR
WESTERN ASIA
BEIRUT _ LEBANON
P.O.Box 13/5240

# STATE OF THE ENVIRONMENT REPORT - 1980
# THE REPUBLIC OF LEBANON.

UNEP REGIONAL OFFICE FOR WESTERN ASIA
BEIRUT, LEBANON.

COUNTRY: LEBANON.

Contents

| 1 | COUNTRY : LEBANON |
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| GENERAL INFORMATION<br><br>Area, Physical features, Climate, Population income (GNP), Major income basis, Capital, Universities and research centres (national, regional and international). | Area :<br><br>10,000 $km^2$. Its length in a north-south direction is about 190 km, and its maximum width is about 75 km.<br><br>Physical Features:<br><br>Lebanon is characterized by two mountain ranges that run almost parallel to the coast, but coverge towards the south. On the west lies the Lebanon range, while the Anti-Lebanon range lies on the east forming the Lebanon-Syria fronter. Between these two ranges is the Bekaa Valley which is broad towards the north, and becomes increasingly, constricted south-wards. A narrow, discontinuous ciastal plain, that widens in the north and south, separates the Lebanon mountain range from the sea.<br><br>Climate:<br><br>Lebanon belongs climatically to the Mediterranean region, with winter rains and dry and hot summers. There is a large variety of climatic conditions due to the mountain ranges parallel to the coast. The annual rainfall varies from 1600 mm in the western coastal mountain till 250-300 mm. in the eastern plateau. Summers are always very dry. The higher mountains are normally covered by snow from December to April. The mean maximum temperatures of the hottest month varies from 24°C till 35°C and the mean minimum temperatures of the coldest month from +9°C (in the coast) till -2°C (in the high mountains).<br><br>The relative humidity decreases during summer from the coastal zone towards the eastern zone. |

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GENERAL INFORMATION

Population:

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| - Total population | 2,550,000 |
| - Urban population | 65% |
| - Population of capital agglomeration | 46% |
| - Population under 15 years | 41.6% |
| - Population 65 years and over | 4.9% |
| - Rate of growth | 2.4% |
| - Life expecting at birth | 64.2 years |
| - Illiteracy rate of the population aged 15 years and over Male: | 20% |
| Female: | 44% |
| - Economically active population | 245,000 |
| - Economically active population in per cent of the total population | 26.9% |

Source: (1)

GNP:

Per capita income $1,080. (1)

Major Income Basis:

Agriculture, services and tourism. Before 1974 tourism accounted for 19.4% of GDP.

University and Research Centres:

- American University of Beirut
- St. Joseph University
- Beirut University Colledge
- Lebanese University
- National Council for Scientific Research (NCSR)
- Agricultural Research Centre, Tell-Amara, Bekaa. Attached to the Ministry of Agriculture.

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ENVIRONMENTAL POLICIES

a) Problems: Air, fresh water, seas, soils, fauna, flora, forests vegetation, range-lands, desertification etc. Urban problems and environmental growth.

b) Policy Status:

i) an overall policy for environment;

ii) in relation to development planning;

iii) concerning major resource areas: land use, natural range, agriculture, forestry, water, minerals, fisheries, energy etc...;

iv) on area development: Human settlements, rural development, river basins, water-shed, management;

v) on science policy for environmental management.

Soils:

The soils of Lebanon are generally characterized by:

- High pH value. However, low ph is found in soils derived from standstone and situated in high altitudes.
- High content in calcium carbonate with the exception of soils derived from sandstone and Terra rossa, and particularly these in high altitudes.
- Low content of organic matter.

Shallowness of the soils in the hilly areas due to erosion. The deep soils are concentrated in depressions and river beds and terraces.

A considerable reduction in the fertility of the soils has resulted from erosion by rain and wind.

Forest Vegetation:

Lebanon used to be covered by different types of forest vegetation. The forests of cedrus libani are well known in the history. Even the semi-arid zone, presently denuded, were covered by a zerophile forest vegetation. In spite of the severe degradation which has affected the forests, remanants of the following forests can be seen disseminated in the country: Forests of Cedrus libani, Abies cilicica, Quercus cerris, Quercus infectoria, Quercus calliprinos, Pinus halepensis, Pinus brutia, Pinus pinea.

Aside those remanants, the forest vegetation is degraded and, in many places, replaced by shrubs, subshrubs and spiny species of very low economic value and low protection of soil from erosion by rain. The main causes are overgrazing and excessive cutting. In 1974, forests vegetation was covering 7% of the Lebanese surface. During 1974-78, 25% of the trees has been destroyed. Some has been burned, others were cut for firewood or for construction purposes.

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| ENVIRONMENTAL POLICIES<br><br>a) Problems | Air Pollution:<br><br>Air pollution problems are severe in Beirut, due to motor vehicle emissions, burning of solid wastes and due to its geographical location where the prevailing winds are unable to disperse the pollutants because of the Lebanon range (more than 1000 m high), on the eastern side of the City.<br><br>Potable Water:<br><br>The rationing of drinking water, especially during the dry season when the spring flows dwindle, obliged consumers to adjust their domestic activities accordingly, thus creating xocial discomfort. This induced many consumers to resort to illegitimate methods of trying to secure more drinking water than their subscriptions would permit in order to compensate for the shortage of water and the practice of rationing, thereby rendering the general situation even worse. Readjustment of the orifice gauges at house-connections, is but one example.<br><br>Many consumers have found it necessary to obtain supplementary domestic water from groundwater sources through wells drilled or bored in private property and, oftentimes, in such public property as sidestreets and sidewalks. This practice has been applied extensively in Beirut and its suburbs, particularly in the case of the modern tall buildings as the low pressure and intermittent flow tend to deprive the upper floors of water.<br><br>The occurrence of water-borne diseases has come to be generally accepted as a matter to fact that does not normally invite action by the authorities concerned.<br><br>For the year 1975, the overall losses of processed water incurred in the distribution system from all cuases has been estimated at about 35%. The annual mean cut-off period for rationing purposes was calculated to be 8.3 hours/day (hr/day). |

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ENVIRONMENTAL POLICIES

a) Problems

By taking into consideration the cut-off period and the water losses in the distribution system, the actual amount of water received and used by the consumers has been calculated to be 140 l/c/d for 1975. (2)

The Impact of the War:

Besides having impeded progress in the development of community water supplies throughout the country since 1975, the impact of the three years of warfare cannot be overlooked. In some cases old problems have simply accumulated, and in others new problems have emerged.

The damaging effects have literally covered all parts of the country, including the areas that have escaped actual fighting. The after-maths and underlying causes are highlighted hereunder.

The damage inflicted on the water supply facilities, and thefts involving equipment, supplies and tools had paralyzed many of the treatment plants and chlorination stations. Besides, the desertion of the plant operators and other personnel, in addition to the lack of energy for water treatment and conveyance have had their share in aggravating the problems.

The excessibe absenteeism among the personnel at the administrative and managerail levels led to such practical problems as lack of inspection and maintenance, with consequent deliterious effects on facilities, equipment and distribution systems.

The willful, or accidental, damage sustained by the water distribution systems led to untenable losses of water, and to deprivation of many commmunities of a vital commodity. (2)

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| ENVIRONMENTAL POLICIES<br><br>a) Problems | Beside these shortcomings, the high population densities in combination with the current practices in the disposal of community wastes in areas accommodating some of the important water sources, appears to enhance population of ground and surface waters. This applies especially in the case of the Muhafaza of Mount Lebanon, where the water-borne pollutants generated in the highlands can be transported over long distances down to the lowlands by surface runoff or via infiltration water flowing through the highly fissured rock formations, with consequent pollution of the water resources lying at lower elevations. It is logical to assume, then, that the water resources less prone to pollution generally lie at elevations exceeding +1000m where human habitations and agricultural practices are either totally absent or limited. (2)<br><br>Seas:<br><br>Marine resources in Lebanon are sugject to pollution by a variety of wastes generated through man's own activities, the prime sources being municipal and industrial wastewaters and solid wastes, as well as agricultural pesticide residues and irrigation return water.<br><br>Specifically, the coastal waters are known to be polluted in varying degrees. The major sources of pollution include the wastewaters discharged without treatment amounting to more than 50 million cubic meters per year, the solid wastes disposed on beaches or into the sea, and the oily wastes (ballast waters) discharged by oil tankers. Another sources of marine pollution are pesticides and other contaminents originated from terrestrial sources. (3)<br><br>Pollution by Sewage:<br><br>Sewage pollution is particularly offensive on the vicinity of Beirut, where all of sewage arising from a population of 900,000 persons is discharged into |

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| ENVIRONMENTAL POLICIES<br><br>a) Problems | the sea, unscreened and untreated, through nine short outfalls (most of which are situated at the water's edge in front of large hotels), as well as into the two small rivers "Nahr Beirut" and "Nahr el Ghadir" which drain the eastern and southern fringes of the city respectively.<br><br>It is noticeable that although there is a discoloration of the sea in the vicinity of these outfalls together with an unpleasant small and the presence of floating solids, the oxygen level of water is not lowered to a level at which fish can survive; indeed these outfalls provide anglers with their best catches.<br><br>Pollution by Refuse:<br><br>The effects of pollution by refuse are particularly noticeable around Beirut and are visible also at the similar twons of Tyre and Sidon; such pollution probably occurs at every seaside community.<br><br>Pollution by Oil:<br><br>The principal cuases of oil pollution are:<br>- discharge at sea of tank washings and residues from tanks.<br>- discharge at sea of oily bilge water.<br>- failure to separate all oil from surface water drained from refineries and tank farms.<br>- losses as the result of marine collisions and strandings, and from the breaking up of wrecks.<br>- losses from the operation of undersea oil-fields.<br>- discharge from gas stations and mechanic shops. |

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| ENVIRONMENTAL POLICIES<br><br>a) Problems | The loading of crude oil in Lebanon takes place at the Trans-Arabian Pipeline (Tapline) Company's terminal situated to the south of Sidon, capacity 22 million tons per annum, and at the Iraq Petroleum (IPC)Company's terminal to the north of Tripoli, capacity 23 million tons per annum. At Beirut there are several small installations in the Bay, to the eastwards of the Docks, used mainly for the importation of aviation fuels and L.P.G., but some lubricating oil is handled there as well as boiler oil which is both imported for storage and reloaded into a bunkering craft for supplying shipping in the Port.<br><br>Minor spillages during loading usually occur as the result of negligence on the part of a tankers crew, such as failing to plug scuppers before the start of operations, by leaving open a valve that should have been closed or by failing to take sufficient care when attaching hoses to the ship's mainfold. These spillages are seldom large in quantity and both of the Companies, who issue stern warnings to the masters of tankers to avoid pollution, provide launches equipped with spraying equipment and a supply of dispersant which can deal with any slick before it can cause pollution of the shore. The only major spillage which has occured in Lebanon was that at Sidon in 1961 when a sub-marine hose burst. 4000 tons of crude oil had been lost into the sea.<br><br>Since that incident Tapline has installed safety devices, designed to prevent any repetition of the valve arrangement on that occasion, and change-of-pressure indicators which give warning of any sudden drops of pressure such as would occur in the event of the rupture of a hose. |

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ENVIRONMENTAL POLICIES

a) Problems

The two refineries in Lebanon are those of Medrico sited immediately to the south of the Tapline Terminal at Sidon, and IPC sited alongside the IPC Terminal at Tripoli. Both have been inspected and the arrangement of ditches and separators is considered to meet normal requirements or the separation of oil from the effluent.

The tank farms at both Sidon and Tripoli are situated in the hills behind the terminals. At each site the tanks are fully bonded and in addition dams across the valley, into which the site drains, ensure that any escaping oil is trapped. (3)

Natural Disasters
Geological Hazards:

Geological hazards include avalanches, landslides, rockfalls, mudflows and derbis fans, unstable or potentially unstable slopes, seismic effects, radio-activity and ground subsidence. All of these could exist and some already expressed their destruction - in Lebanon.

In 1978 local newspapers and magazines have talked about various incidents in Baalshmei, Zahle, Bcharri, Khinshara, Broummana. They are all landslides.

Some officials said the causes were just "natural and geological", whereas other sources indicated that the landslides were direct results of the failure to impose strict environmental measures. They pointed out that the landslide in Broummana was due to the illegal extraction of large quantities of sand from the bottom of the hill, for construction puroposes. That of Tal-Chiha (Zahle) was said to be due to a ruptured water pipe. Experts believed that landslide of Baalshmey was caused by waste water which had been pouring there for a long time.

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ENVIRONMENTAL POLICIES

a) Problems

Urban Growth and Environmental Problems:

With an area of about 10,000 $km^2$ the density of population in Lebanon would be 260 per $km^2$.

"In November 1970, 58 per cent of the population of Lebanon lived in agglomerations of 10,000 persons or more (44 per cent in Beirut and suburbs alone) and it may be estimated that this population rose to more than 60 per cent by 1975".

"While the rate of population growth of Lebanon was estimated to be around 2.5 per cent a year in the early 1970's, the rate of population growth of Beirut itself was estimated at 4 per cent, and that of the suburbs was undoubtedly still higher".

"The pattern of migration of Lebanon's population may be summarized as follows:

a. A significant flow of relatively recent origin from Beirut towards its suburbs.

b. A substantial flow of migration from the rural areas of Mount Lebanon and more recently of South Lebanon into Beirut and its suburbs. In North Lebanon, Tripoli offered a moderate pole of attraction for the rural population of the region.

c. A flow, less significant but important nevertheless, from the rural areas of the Bekaa Valley to the suburbs of Beirut.

"Demographers have agreed that the rate of population increase in Beirut will remain at about 4 per cent until the end of the century, which means that almost the entire population increase, especially in the early eighties, will be concentrated in Beirut. This implies that the population outside Beirut and its suburbs will remain stable. However, if account is taken of population

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| ENVIRONMENTAL POLICIES<br><br>a) Problems | increases in Tripoli and possibly also Sidon and Zahle, the rural population will actually decline".<br><br>It is clear from these facts that there is a trend towards an increasing rate of growth in the urban areas and a decline in the rural areas.<br><br>The main imbalance in growth is not the one between rural and urban but rather between Beirut and its suburbs vis a vis the other districts.<br><br>"In Lebanon, this concentration is clearly evident in the city of Beirut and its suburbs. Approximately 78 per cent of total employment in the industrial sector and an equal percentage of employment in the services sector, that is 60 per cent of the country's total employment is concentrated in this area. This has given Beirut a very high degree of primacy, rarely observed in other countries. A simple index of primacy is obtained by dividing the population the largest city is equal in size to the pupulation of the next three cities. For Western countries, for example, this index is almost invariably below one.<br><br>The primacy index of Beirut, is over 2.5 and, except for a few countries like Kuwait is among the highest in the world. Furthermore, the primacy index of Beirut has been increasing steadily: from 1.8 to 2.3 between 1960 and 1970. In other words, Beirut dominates Lebanon much more than most capital cities dominate their respective countries and this domination is becoming progressively more pronounced".<br><br>It is obvious that "This unbrided migration has not only depleted the coutryside of its population and its agricultural manpower but has strained also the absorb- |

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ENVIRONMENTAL POLICIES

a) Problems

tive capacity of Beirut".

For quite a long time there has been an awareness in Lebanon that the tendency towards concentration in one metropolitan - Beirut - is creating a state of serious dislocation and causing harm to the political, sociological and economic structure. This tendency created a chaotic un-manageable city and drained the other regions humanly and economically.

The problems that result from the rapid expansion of Beirut may be classified under three headings: the structural; the managerial and the socio-political problems. (4)

The Structural Problems:

Since Beirut has gone a long way before any planning for its growth and expansion was thought of, the problems of this expansion have become enormous. It would be extremely difficult at this point to harmonize the expansion of the facilities that serve Beirut to keep pace with each other. Consequently, we find that the capacity of the different services in Beirut differ greatly resulting in constant shortages, of various degrees, in all services - water supply, electrical supply, sewage facilities, street cleaning facilities, side-streets capacity, car-parking capacities, and land to expand.

For a long time the Beirut authorities have been consequently trying to expand one service or the other creating great inconvenience to the Beirut inhabitants. As things stand, this process of readjusting and reexpanding must go on indefinitely unless by a miracle it becomes possible to enlarge all the services at one time and for a high new level of capacity, this amounts to remodelling Beirut in one stroke. It is obvious that this is an impossible job.

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| ENVIRONMENTAL POLICIES<br>a) Problems | The Managerial Problems:<br>The managerial fabric of Beirut is the continuation of that managerial set up that was barely adequate for small Beirut before it exploded in rapid growth. The management staff structure, the budgeting structure and the attitude that governs the functioning of this apparatus all date back to the pre-expansion period in the thirties when the population of Beirut was around 150,000 (it is now close to 1,000,000). Any one familiar with the actual process of development within the Lebanese administration realizes that the Municipality of Beirut would not have expanded its managerial facilities and its budget to keep up with this growth.<br>From reading the analysis of the problems of Beirut one reaches the following conclusions:<br>1. The rapid growth of Beirut is the least controlled growth in the world.<br>2. Those who profit most from the growth of Beirut pay very little for the running and renewal of their city.<br>This means that the administrative structure of Beirut needs revolutionary improvements to become adequate for controlling the growth of the city.<br>The Socio-political Disadvantages:<br>The rapid unplanned clustering of emigrating people would only accentuate the difference in the distribution of wealth and in the standard of living.<br>The disadvantages of draining the distant parts in the regions can also be divided into economic and socio-political. |

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ENVIRONMENTAL POLICIES

a) Problems

The Economic Disadvantages:

It is obvious that a densely populated country like Lebanon has to make the best of its scarce land. To benefit most from its special agricultural endowments Lebanon needs to modernize the agricultural sector. Modernizing the agricultural sector means to modernize the agricultural population. The present trend of affairs does not take care of this problem in this comprehensive fashion and, therefore, it causes people in the distant regions to desert the land and prevent the Lebanese economy from developing the potentials of the agricultural sector. (4)

The rural exodus to the city in view of a better life, decreased the labour force in agriculture, and increased astronomically the number of residents in cities and their suburbs. This led to social, moral and health problems which could not easily be overcome. (5)

As it has been noticed the main migration is from the village to the cities which lies on the coastal area of Lebanon. (Beirut, Tripoli, Sidon).

The increase of population in the coastal area is also a major cause of pollution. The increase of population, increases the quantity of waste and sewage dumped in the sea, which defines the marine environment and the beauty of the Lebanese coast, it also increased the number of vehicles circulating in the streets intensifying the problem of air pollution.

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| ENVIRONMENTAL POLICIES<br>b) Policy Status:<br>i) An overall policy for the environment;<br>ii) In relation to development planning.<br>iii) Concerning major resourceareas; land-use, natural range, agriculture, forestry, water, minerals, fisheries, energy etc...<br>iv) On area development: human settlements, rural development, river basins, watershed management.<br>v) On science policy for environmental management. | i) An overall policy of the environment does not exist, however at the Educational level the government is interested in introducing among students their natural environment through establishment of natural reserves serving as areas for practical work and research.<br><br>ii)<br><br>iii) Agriculture:<br>The Government fostered programmes to help modernizing agriculture which meant a cut down in the human force required for exploiting the agricultural resources. These modernizing programmes were not coupled with a similar efforts to provide job opportunities in the districts of non-agricultural nature. This formed another push factor from the rural to the urban areas. (4)<br><br>The "Action Plan for Agricultural Self-sustainment in Lebanon". The Plan calls for a survey of the nature of soil, manpower and economy, and the introduction of rural industries.<br><br>Water:<br>Apparently the policy adopted by the Ministry of Hydraulic and Electric Resources is to disinfect drinking water supplies by chlorination as the sole method of treatment in rural areas where the raw water obtained from springs and wells is not excessively turbid. This, of course, is an acceptable method for minimum treatment of water supplies for domestic use provided the raw water meets certain cuality criteria besides turbidity. (2) |

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| ENVIRONMENTAL POLICIES<br><br>b) Policy Status:<br><br>iv) On area development: human settlements, rural development, river basins, watershed management.<br><br>v) On science and education policy. | iv) There has not, to date, been an articulated housing and urban development policy in Lebanon. The private sector is dominant in the production of housing. (6)<br><br>After the war, the Housing Bank of Lebanon has prepared the regulations for its operations. The Bank will operate within the general housing policy of the Government. Its role will be to ensure appropriate housing through financing corporations, groups or individuals. It will provide medium and long term loans, over period of two to twenty years.<br><br>Lebanon, the only country in the Region with a national science policy and plan, the legistics of implementation is of utmost importance and should be constantly reviewed for the benefit of the whole Region. (7)<br><br>Lebanon's 1972-1977 six-year development plan contained a chapter on scientific research outlining policies and objectives and giving a breakdown according to expenditures. Its confinement to research, however, does not place this plan, in the category of national science and technology plans.<br><br>It is merely, a plan for the development of the activities of Lebanon's National Council for Scientific Research. (8)<br><br>Education:<br><br>The draft of the new educational policy consists of the following:<br><br>- To integrate modern courses such as technology, economics and business in the curriculum; |

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| ENVIRONMENTAL POLICIES<br><br>b) Policy Status:<br><br>v) | - to diversify the Baccalaureate programme into four major sections, namely: humanities, social sciences, practical sciences and mathematics;<br>- to emphasize the scientific and especially the social problems in order to create responsible and educated citizens who will be able to face vital problems more objectively and without violence.<br><br>In order to meet those aims, the Ministry of Education has decided to establish a well distributed network of modern primary and intermediate schools in urban and rural centres. (Hajjar).<br><br>The government tried to let education reach all regions, but this government education had the following short-comings: - It deprived the regions completely of higher education. - The whole educational programme is alliant to rural life.<br><br>This meant that the whole educational effort was chanelling the young generations in the rural areas towards urban life and towares higher education in Beirut. (4) |

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| IMPLEMENTATION STATUS<br><br>a) Legislation (acts, rules, regulations).<br><br>b) Administration structure.<br><br>c) Enforcement of laws. | a) In Lebanon there exist acts and regulations, forbidding the pollution of the environment by solid wastes, oil, and wastewater. Also there exists legislation forbidding the tree cutting and protection of natural sites.<br><br>Hereunder are listed the major acts.<br>Decree No. 8735: Decree as follows:<br>The Expedited Bill referred to the Chamber of Deputies by the decree No. 4682 dated 30/12/1972 that aims at keeping public cleanliness is hereby put into execution. Its text reads as follows:<br><br>- Public streets and squares and their environs, supplements, sides and canals - up until the legal demarcation limits - water streams and their banks, maritime public domains and village common land and private state and municipal property all of the above must not be used for the dumping of the debris of buildings, soils of excavations, rocks and other material, agricultural and industrial garbage and left-overs. It shall likewise be forbidden to dump either discarded vehicles and cars that have been erased from the Motor Vehicles Department or their remains, structures or parts.<br><br>The occupier of a shop or residence shall be held responsible for the presence of such objects in front of his shop or residence. (9)<br><br>- So far as the territorial waters of Lebanon are concerned there exists in the Panel Code a provision in Article 748 for the punishment by imprisonment of up to 2 years or a fine of up to L.L. 250 ($80) of any person who "allow to flow, spills or throws into the waters of the 'domain public' any liquid or substance likely to be harmful to the quality or use of those waters". |

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| IMPLEMENTATION STATUS<br><br>a) Legislation (acts, rules, regulations). | - Article 748 of the Penal Code could apply to the discharge of any oil into the waters within 100 miles from the Lebanon coast.<br><br>- The Government of the Republic of Lebanon accepted, on the 31st May 1967, the International Convention for the Prevention of Pollution of the Sea by Oil, 1954, with the Amendments adopted in 1962, and on the year 1971 the Government accepted the Amendments adopted by the Assembly of the Inter-Governmental Maritime Consultative Organization on 21st October 1969. (4)<br><br>- A new legislation (1977) in Lebanon has forbidden the cutting of pine trees. Very strict measures will be taken against those who continue cutting trees for firewood or other purposes.<br><br>- A Forestry Code. (January 7, 1949) there also exist:<br>- An Urbanism Law. (September 24, 1965)<br>- A protection of sceneries and natural site law.<br><br>- On the industrial level the Government formulated laws to discourage people from establishing industries in the Beirut area but did not take positive measures to provide for viable industrial centres (from a human and physical infrastructure point of view) in the districts.<br><br>- In 1974, on the 23 July, at Ehden, Ex-president Franjieh has decreed the following:<br><br>"The driver of a transportation device caught commiting the violation of dumping remnants, soil, leftovers, car junks and other such materials mentioned |

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| IMPLEMENTATION STATUS<br><br>a) Legislation (acts, rules, regulations). | in Article 1, shall be penalized by imprisonment from two weeks to one month any by a fine ranging from two hundred to five hundred Lebanese pounds and by the sequestration of the transportation device for one month at the expense of its owner. The owner shall be considered jointly liable with the driver, by the fine."<br><br>"A person commiting the violation of throwing garbage, paper, peels or empty cans and other such objects, or leaving them in front of his shop or house, shall be penalized by a fine amounting to twenty-five pounds. In case the violation has been done by a minor, then the adult from his relative who happen to be in his company when the violation occurs, shall be held responsible."<br><br>"In some sections of cities and in some other areas; in provincial (Muhafazat) headquarters, and in summer and winter resort centres, and the touristic centres specified in the decree No. 2362 dated 13 December, 1971, it may be deemed necessary to collect the fines in a direct (immediate) manner with the procedures for such collection to be determined by a decree made on the recommendation of the Ministry of Interior."<br><br>"Any person or persons caught commiting the offense (crime) of sticking or writing - as the case may be - placards, posters, pictures, statements or declarap tions and printed material and paper of any kind indicated in Article 4 of this law, shall be penalized by imprisonment for a period ranging between two weeks and one month. Likewise such offender, together with the person benefiting from the offense, shall also be penalized by a fine amounting to two thousand Lebanese pounds and the infraction shall be undone administratively at the expense of the violators." |

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| IMPLEMENTATION STATUS<br><br>a) Legislation (acts, rules, regulations). | "The provisions of this Article shall be forced on the violations of the provisions of the last paragraph of Article 5 in case the posters or placards involved are unlisenced or in the event of not being removed by the deadline of the expiration or the renewal of the license, as the case may be. Such posters (or placards) shall be removed administratively at the expense of the violators."<br><br>"Occupiers of houses and shops that do not bind themselves with the text of the Article 18 and 19 are penalized by fine amounting to twenty five pounds for each violation caught by the Municipal employee empowered to act in such cases."<br><br>"The penalty is raised to its maximum limits in case of the repetition of the violations indicated in this law."<br><br>"The expense incurred from the work supposed to be done at the expense of the violators shall be collected by the same procedure as that used in the collection of direct taxes."<br><br>"The violations indicated in the articles 1, 2, 3, 4, 5 and 6 shall be checked by traffic police detachments, security patrols and members of the Municipal police. In addition to the above mentioned forces, violations indicated in Article 6 shall be checked by sanitary detachements."<br><br>"In case garbage collectors and super-intendent show dereliction of duty in enforcing Article 7, they shall be penalized by their superiors, the inspectors, the sub-governors (Qa'im Maqamin) of the prefects (Muhafizin) as the case may demand by |

| 3 | COUNTRY : LEBANON |
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| IMPLEMENTATION STATUS<br><br>a) Legislation (acts, rules, regulations). | a salary deduction amounting to the salary of ten days as a maximum and by their discharge in case of the repetition of the violation three consecutive times."<br><br>"Prefects (Muhafizin) in some regions may, at times, appoint voluntary patrols under oath for the sake of checking violations indicated in Article 6 of this law."<br><br>"In case the Municipality or the Mayor fail to issue the regulations necessary for the performance of the sanitary requirements or the protection of the aspects of cleanliness indicated in this law, then the sub-Governor (Qa'im Maqam) can, within the jurisdiction of his district, replace the Municipality or the Mayor in performing such tasks of the Prefect (Muhafiz).<br><br>"The Prefect (Muhafiz) can within the jurisdiction of his province (Muhafaza) prosecute the Municipality. |
| b) Administration Structure. | In Lebanon, a High Environmental Council is not established yet. The Council for the Development and Reconstruction of Lebanon (Presidential Palace) intends to establish one, before the end of 1980. However, the following Government and Non-government Organizations are involved in activities that affect the environment:<br><br>Ministry of Agriculture<br><br>Directory of Forestry;<br>Diretory of Fisheries and Wildlife;<br>The Green Plan;<br>Agricultural Research Institute.<br><br>Ministry of Health<br><br>Department of Preventive Medicine. |

| 3 | COUNTRY : LEBANON |
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| IMPLEMENTATION STATUS<br><br>b) Administration Structure. | Ministry of Education<br>Lebanese University - Faculty of Science.<br><br>Ministry of Electricity and Water Resources<br>National Office of the Litani.<br><br>Ministry of Interior<br>Municipalities Section.<br><br>Ministry of Public Works<br>Directorate of Urban Planning.<br><br>Other Government Organizations<br>Council for Development and Reconstruction<br>National Council for Scientific Research<br>National Council of Tourism.<br><br>Non-Government Organizations<br>American University of Beirut<br>Lebanese Association for the Advancement of Science<br>National Association for the Protection of the Environment. |
| c) Enforcement of Laws. | Enforcement of Laws: Enforcement of the environmental laws have not been carried out effectively. |

| 4 | COUNTRY : LEBANON |
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ENVIRONMENTAL ACTIVITIES AND SITUATION.

a) Human Settlements and Environmental Health.

b) Dry Farming, Agriculture, Irrigated Agriculture, Forestry, Range Management, Combating Desertification.

c) Resource Status:

i) Agriculture - Soils, Forests, Range, Water, Crops, Reserves, Animal Husbandary.

ii) Fisheries - Inland Waters, Coastal Zones, Oceans, Reserves.

iii) Industry and Shipping.

iv) Labour Force.

c) Environment & Development.

i) Environmental Management.
ii) Environmental Law.
iii) ES & AT.
iv) Industry & Environment.
v) Oceans.
vi) Energy.

e) Socio-economic Problems

a) Housing:

Due to its small area, its natural population growth and the immigration, Lebanon has the highest density in the Middle East (300 per $km^2$). This has resulted in complex problems such as limitation of employment opportunities and major environmental problems such as housing, waste water and garbage disposal, air and water pollution, noise and urbanization problems. (11)

In 1970 it was revealed that the population (with the exception of the Palestenians living in the camps) reached approximately 2,126,000 inhabitants of whom 44.2 per cent lived in Beirut and its suburbs.

The total number of dwellings in Lebanon was estimated at 484,000 of which 396,000 were occupied primary dwellings, 37,000 were vacant and 51,000 were secondary dwellings.

- About 8,000 households lived in slums (shacks);
- About 9,500 households shared a dwelling with another family;
- 40 per cent of the households lived in dwellings composed of one or two main rooms only;
- Of these 60,000 households (with an average of more than 4 members each) lived in dwellings consisting of one main room; and
- 96,000 households )of an average of more than 5 members each) lived in dwellings composed of two main rooms;
- Thus, 42 per cent of all households (166,000) or 56 per cent of the population (1,190,000) lived in unacceptably crowded dwelling - that is, with more than two persons per room.

| 4 | COUNTRY : LEBANON |
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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br><br>f) Supporting Measures:<br><br>i) Earthwatch (IRS, GEMS, IRPTC).<br><br>ii) Environmental Education and Training, Public Information.<br><br>iii) Research Activities concerning Natural Resource Management and Environmental Protection. | During the years 1975 and 1976, radical changes resulting population movements and emigration from the country and because changes took place in the use of buildings in a number of regions. This date is also appropriate because of the impact of two legislative decrees - one regulating the relationship between landlord and tenant, the other authorizing the State to grant loans for repair and reconstruction work to the owners of buildings damaged during the events. By virtue of these decrees landlord are obliged to repair their buildings and to readmit their tenants on the same contractual terms as before, thus restoring the entire housing picture to the status quo ante. (12)<br><br>The number of dwellings constructed more than 50 years ago is around 50,000 of which 27,000 are located in rural areas.<br><br>The number of slum dwellings in 1970 reached approximately 8,000 in all of Lebanon's regions. During the recent troubles, whole agglomerations of slum dwellings were destroyed and their inhabitants are still living illegally in other buildings.<br><br>It was noted that 9,555 Lebanese families shared a dwelling with another family, thus doubling the size of the household and increasing the density of occupancy beyond acceptable limits. However, this figure was included in a precious calculation where normal room occupancy was being estimated. Thus it is possible to disregard this figure when determining housing needs. (12) |

| 4 | COUNTRY : LEBANON |
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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br><br>a) Human Settlements and Environmental Health. | Urban Settlements:<br><br>During 1975/76 civil strife, many quarters were severely damaged and the inhabitants were displaced.<br><br>Efforts at reconstruction are now underway, and for this purpos a Council for Development and Reconstruction (CDR) has been established.<br><br>The village settlement pattern: is a long establishment phenomenon in Lebanon with a large percentage of the population residing in clusters of villages. Standards of housing and related community facilities in these villages is high compared to other Middle Eastern Countries.<br><br>Current housing finance policy and related housing costs are beyond the reach of 80% of wage earners. The lack of housing for the low and middle income housing means that many commute from outlying villages, while others settle in the refugee camps. Although these are primarily for Palestinians, a great number of Lebanese without other means dwell in these surroundings.<br><br>The traditional building material for housing especially in rural areas was stone of which there is an abundant supply throughout the country. Stone cutting, dressing and construction is a well established art practiced by villagers everywhere. However, since stone construction has become more and more expensive, there is now more reliance on concrete blocks. (6)<br><br>At the construction level in the rural areas, the situation of the environment is as follows: |

| 4 | COUNTRY : LEBANON |
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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br><br>a) Human Settlements and Environmental Health. | - 5% of the construction has running hot water, 1.03 has central heating; 70.6 has a retreat of less than 5 meters relative to the neighbouring constructions. 77.5% from 5 to 9 meters and 18% from nine or less than 10 meters.<br><br>As to what related to the age of the construction, 43.4% of the construction are dated since the years 1950-1965 and 20.3% after that, this shows the gravity of the situation in the rural space recently reclaimed.<br><br>The housing situation, as it is presented, is good in 31.3% of the cases and fair in 58.3% with an average of room per house of about 4.75 and an average of persons per room of 1.48 for a space of 122 $m^2$ and a family size of 5,65 persons.<br><br>Equipment of housing are fair, but 37.3% of them suffer from noise. (13)<br><br>Water in Human Settlement:<br><br>Out of an estimated total population of about three million inhabitants residing in about 1954 towns, villages and clusters of farms, approximately 97% were supplied with drinking water by 1975 at the official estimated rate of consumption of 100 l/c/d for villages, and 200 l/c/d for towns. (2)<br><br>Actual consumption from municipal supplies, particularly in urban areas like Beirut is close to, 125 l/c/day. This amount is supplemented by private wells bringing consumption estimates to about 420 |

| 4 | COUNTRY : LEBANON |
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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br><br>a) Human Settlements and Environmental Health. | The proliferation of private wells is not considered sanitary, as they tend to be sources of pollution. (6)<br><br>In September 1975, there were 120 water chlorination stations in operation in addition to the eleven water treatment plants, out of which 96 stations utilized spring water, and 24 plants utilized water from wells. (2)<br><br>It has been estimated that about 98% of the urban population were served with drinking water through house connections, and about 85% of the rural population had reasonable access to piped water supplies. (2) The standard activities in this regard is much higher than WHO targets for 1980. (6)<br><br>At the Muhafaza level, it is evident that the greatest sufferers were North Lebanon and Bekaa, for in each of these two cases 10% and 4% of the respective populations were deprived of piped drinking water.<br><br>As to the 1476 sources of drinking water exploited, 1104 (or 74.8%) were springs, whereas 372 (or 25.2%) were wells. These figures support the fact that natural springs have served as the prime sources for community water supplies.<br><br>River waters, normally used for irrigation purposes in agricultural areas, were not utilized to any great extent in the drinking water industry, except for a new instances using insignificant amounts of river waters. In contrast, hydroelectric power generation had rapidly approached its maximum potential, pending further development of impounded surface water. (2) |

| 4 | COUNTRY : LEBANON |
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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br><br>a) Human Settlements and Environmental Health. | In Beirut, the Capital, the water obtained from the wells for utilization as a supplement during the dry period is highly mineralized and imparts a distinct salty taste. Since the levels of several of the constituents of these groundwaters exceed the acceptable limits, they are considered to be unfit for drinking and cooking purposes, besides being highly corrosive to metallic surfaces. Upon mixing with the waters of much better quality obtained from Jeeta spring and the other sources, the concentration of salts diminishes by dilution. However, as the proportion of the waters from the wells is increased of the hight of the dry period in November, the deterioration in quality of the mixed waters reaches its climax, hence the periodicity in quality of the drinking water.<br><br>Since the southern suburbs of Beirut obtain their waters from wells that are excessively contaminated with seawater, the salinity and objectionable taste occurs the year round, but is intensified during the dry season to a degree that compels consumers to limit its use for purposes other than drinking and cooking.<br><br>In Ras Beirut, where the distributed water is a mixture composed of water from Jeeta spring and other sources, the physio-chemical quality of the drinking water is intermediate between that of Jeeta srping and that distributed in Mreyjeh, one of the southern suburbs of Beirut. Obviously, the drinking water in Mreyjeh is inferior in quality because of the distinctly higher mineral content as demonstrated by the relative values of specific conductance and of total residue. That this is caused by seawater intrusion into the groundwater aquifers is clearly attested by the greater chloride to |

| 4 | COUNTRY : LEBANON |
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ENVIRONMENTAL ACTIVITIES AND SITUATION.

a) Human Settlements and Environmental Health.

floride ratios in the case of Mreyjeh and Ras Beirut, compared to that of Jeeta spring which is not affected by seawater intrusion. These facts serve as an indication that the drinking water provided by the 'Ain el Dilbeh Water Bureau' to the southern suburbs of Beirut has deteriorated in quality to a point beyond the provision of a continuously flowing water supply would nullify the justifications for installing them, thereby eliminating their costs, maintenance, and contamination of water used flushing and washing (including dishwashing). Besides, it would eliminate the need to have a dual plumbing system and the confusing issue of having to identify the potable water taps. (2)

In Tripoli (the second largest city), the number of premises served with water connections is 35,135. (houses, shops, offices, etc...), provided with 30,000 water metres.

The water system's network is relatively old (started in 1935). Many operational troubles happen every day causing a great percentage of water losses. (About 20% of the water is lost every day by the bad quality of pipes). There is not a planned programme for water supply in Tripoli for the future. (14)

At Zahlé, (the third largest city), the principal source of water supply of thetown Zahlé-Maalaka is the spring of Bardoni River in Kaa-Rim. Since ten years the Authority uses the spring of Gdita to feed the Haouch-Omara quarter.

There are in Zahlé about 15,000 houses. The actual water need for Zahlé and surroundings is

| 4 | COUNTRY : LEBANON |
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ENVIRONMENTAL ACTIVITIES AND SITUATION.

a) Human Settlements and Environmental Health.

about 15,000 $m^3$ daily. In summer the available quantity of water is about 8000 $m^3$, this means that the Bardoni river is not enough to supply the town in summer.

To solve the problem of water, the Municipality has suggested to drill new wells and pump more fresh water and collect it in the actual reservoirs. Actually there are three reservoirs situated at the heights of Zahlé, Haouch-Omara, and Maalaka.

Lately the Authority has constructed a settling basin and a filter of a capacity of 10,000 $m^3$ daily with a possible extension of another 10,000 $m^3$. (14)

The City of Sidon (the fourth largest city) depends for water sources on artesian well situated in the surrounding heights. Water reaches the city after passing through a pumping station. There is also another water source which comes from Kafroa Spring. The quantity of water secured to the city is considered adequate for its needs. No shortage takes place in domiciliary water supply which is of good quality and is purified regularly with chlorine, when this is available.

As regards the neighbouring suburbs particularly the surrounding heights, there is a dearth of water in summer due to a shortage in the water source namely Tassa Spring. The necessary action is being taken at present to meet the shortage by digging new increase the water supply in the areas concerned. (14)

The water supply for Jounieh and adjacent villages comes from poor sources of mountain springs which are part of the Ftouh Kosrouan Regional System,

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ENVIRONMENTAL ACTIVITIES AND SITUATION.

a) Human Settlements and Environmental Health.

namely Nab' el-Assal, Jeeta, Moudic and Afka (Adonis). The sources provide sufficient water in quality and quantity. All but one of the source is regularly chlorinated and bacteriological examinations is performed noutinely.

The capacity of all the sources ombined is of approximately 30,000 $m^3$/day. Some of the supplies also supplement the Beirut water system and Jubail (Byblos) in the North as well as several villages and towns in the Kosrouan region. (14)

Waste Management in Human Settlement

Liquid waste: Human settlements in Lebanon that are provided with sewerage systems and treatment facilities are rather limited. Accordingly, sewage disposal is one of the prime source of pollution especially of water sources.

Only 66 out of a total of 1950 communities throughout the country have been provided with sewage collection networks serving an estimated 1,600,000 inhabitants; or about 55% of the total population including Beirut.

Of the population served by sewerage systems, it is estimated that not less than 80% of them dispose of their untreated wastes either directly into the sea, or indirectly by yransportation via perennial strams. The communities involved are either located in the coastal plain from Tripoli to Tyre, or at the foothills facing the sea. Rough estimates indicate that altogether they discharge into the coastal waters not less than 50 x $10^6$ $m^3$ of wastewater annually, thus providing a minimum yearly load of some 270,000 $m^3$ of wastewater per kilometre of coastline, and even much more along the coast of

| 4 | COUNTRY : LEBANON |
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ENVIRONMENTAL ACTIVITIES AND SITUATION.

a) Human Settlements and Environmental Health.

Beirut. The remaining 20% of the inhabitants (about 300,000 people) discharge their domestic wastewaters into ravines or wadis. Otherwise, communities deprived of sewerage systems depend on the use of septic tanks or pit privies for the disposal of household sewage, which comprises the general practice in rural Lebanon. (2)

Fourteen communities in Bekaa with a total population exceeding 100,000, that are provided with sewerage systems, are reported to be discharging their untreated municipal sewage into the Litani River or its tributaries. Some of the more important ones are Zahlé and suburbs, Baalbek, Rayaq, Furzol, Ta'labaya, Jdita and Shtoura. (2)

Only two communities, Hammana and Marjyoun, have treatment plants, serving between them a population of 16,000 people.

In general the raw sewage is disposed into the sea, infiltrated to the ground through shallow wells or let into water ways and rivers. Collection and disposal of liquid waste is normally the responsibility of local municipalities, which are not usually equipped to install and operate technologies for waste treatment. (6)

In Tripoli there are two networks for sewerage: One for surface water. It is an old one constructed in ancient times (started in the year 1300 at the time of Mamlouk domination). This network was used up to 1967 when the new system was built only for sanitary sewerage. It still serves 20% of the population mostly in the old city.

The second system was built between 1962-1967 only for sanitary sewerage. It works more or less

| 4 | COUNTRY : LEBANON |
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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br><br>a) Human Settlements and Environmental Health. | and seems sufficient for the sectors of the city between Koubobe-Abou Sabra and El-Mina. But it can not be used for the northern nor for the surrounding areas of the city. Baddawi, Bahsass etc, due to topographic and technical reasons,<br><br>The percentage of sewerage coverage of the present city population is of 85%.<br><br>Baddawi, Bahsass, Camp Baddawi, Deir Omar, Majdlaya etc. do not have sewers as the system does not include the adjacent areas.<br><br>In theory the number of sewerage connection is 30,000. Technical characteristics of the system are outfalls.<br><br>The new system built in 1962-1967 has asbestos cement pipes. It is estimated that this material will deteriorate after 25 years and it should be changed by vitrified clay pipes.<br><br>The Agency in charge for construction, maintenance and repairs is the Department of Sanitary Engineering of the Municipality of Tripoli. (2)<br><br>- In Zahlé, the actual sewerage network covers 60% of the city. There are parts of Zahlé without a sewerage network at all, like Ksara, industrial town, Karak, and the new quarter at the heights of Zahlé. In fact the actual network serves the old town of Zahlé only.<br><br>The sewerage system discharges into the Litani River. |

| 4 | COUNTRY : LEBANON |
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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br><br>a) Human Settlements and Environmental Health. | As for Sidon an urgent study to be made for all the sewer system of the city on a new basis including the incorporation of laid down sewers and their future capacity. It may also be noted that some of the sewers of the neighbouring suburbs of the city, discharge in those of Sidon City. It is also essential to study the appropriate disposal of waste water into the sea either directly or by prior treatment preventing coastal pollution.<br><br>Solid Waste Management<br><br>1. Beirut<br><br>Refuse Collection: Little can be done at older premises to provide proper storage arrangements because of lack of space or access. At apartment blocks, which form the main domestic habitation in the city, refuse has to be carried down to ground level either by the refuse collectors, using sacks, or by porters or residents, when it is dumped at a collecting point in the street. Newer apartment blocks have refuse chutes. These chutes lead to chambers where the usual receptable is a metal drum; from which the refuse is transferred manually into the collection vehicle.<br><br>There is no regulation requiring property developers or owners to provide proper refuse storage arrangements in buildings. To achieve any significant improvements for the future it is essential that there should be some legal requirement for new buildings.<br><br>The pressing need in the refuse collection service is the acquisition of special-purpose refuse collection vehicles. Before the 1975-76 |

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a) Human Settlements and Environmental Health.

fighting, the municipality had fleet of 125 compaction-type vehicles of American origin. As a result of the fighting, only 33 of these vehicles survived, so the bulk of the collection work being carried out by hired open trucks, apart from being unsanitary in appearance and function, are uneconomic as they are only able to carry small loads.

Refuse Disposal: Before the fighting, it was planned to dispose of all the city's refuse at a new compost/incineration plant (capacity 1000 tons/day and produced 300 tons of compost per day) near the port area. This plant was provided and operated by a contractor (French) and the municipality paid the company on a combined fixed price and tonnage basis for a 10-year contract. The plant was put out of action as a result of the fighting and temporarily the city's refuse, amounting to an estimated 600 tons per cay, is disposed of at two landfill sites, one in east Beirut and the other in the vicinity of the International airport. It is hoped that the compost plant will re-operate in 1980. The landfill site in east Beirut is at Doura (Bourj Hammoud). Actually it is an open dump by the sea shore where 600 tons of refuse are piled up daily. During dry season the wastes are burned. The smoke of burning process is one of the main causes of air pollution in Beirut. The unburnt part of the refuse is carried out toward the north by the prevailing sea currents and then deposited on the shorelines.

Because of the higher standard of living in Beirut, there is a significant amount of non-biodegradable matter in the garbage. This causes

| 4 | COUNTRY : LEBANON |
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ENVIRONMENTAL ACTIVITIES AND SITUATION.

a) Human Settlements and Environmental Health.

additional problems of disposal.

Land is expensive in urban areas in Lebanon. Therefore, the question of disposing solid waste by sanitary landfill is not an attractive alternative. (6)

Cleaning of the Streets: The main problem in keeping the streets reasonably clean (in the City) is the uncontrolled parking of cars along-side kerbs and footways. It is almost impossible to clean the channels (gutters) where debris accumulates, and street gullies become choked. The municipality possesses two mechanical sweepers but they can be used only on arterial roads such as that leading to the airport. (15)

2. Tripoli

While in Tripoli, the Municipality has two new automatic operated trucks for collection. Also the following equipment is available.

4 ordinary trucks;
4 dumpers;
1 bulldozer (on rent);
75 wheel-barrows.

There is in Tripoli, a good service for the new residential zone (Rué el-Mitaine, Rue Ami). The service is bad and poor for the other zones of the city in which there is high density of population.

The estimated amount of refuse and garbage per day is 60-80 tons approximately.

There are avilable 30,000 sq. meters of land on the seashore beyond the city limits belonging to

| 4 | COUNTRY : LEBANON |
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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br><br>a) Human Settlements and Environmental Health. | the Municipality which can be used for garbage disposal. (14)<br><br>3. Zahlé<br><br>As for Zahlé, the Municipality garbage services collect daily by lorries solid wastes from the town and dumps it without any prior treatment in open dumps near Zahlé. There is a production of about 60 to 70 tons daily of solid wastes. The Municipality is the Agency in charge. (14)<br><br>4. Sidon<br><br>In Sidon, natural labour is used by the Municipality to sweep streets and collect garbage from houses by carriages driven by man or animal. This garbage is removed by open lorries from the points of collection or are taken directly from the hand carts and loaded the lorries directly as per the prevailing circumstances and place of the work.<br><br>The Municipality disposes of its garbage in a place that lies South West of the city right on the sea-shore and garbage is arranged or piled in various heaps until the sea tides and currents washes them away.<br><br>Most of the time, the collected garbage is incinerated at its final point of cllection. The incineration is partial and slow since full incineration provides dense smoke which is harmful to the nearby residences. Covering garbage with sand is not used due to the lack of adequate space and cover material.<br><br>The quantity of garbage collected in the city of Sidon amounts to 12 tons approximately per day. (14) |

| 4 | COUNTRY : LEBANON |
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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br><br>a) Human Settlements and Environmental Health. | 5. Jounieh<br><br>The responsible agency of solid wastes in Jounieh, is the Municipality. Garbage collection is done by the use of 4 ordinary trucks. The open disposal takes place at Bourj-Hammoud, 15 km, to the South. The garbage is spread by loaders near the sea. During storms, the sea washes it down and disperses it but the currents brings it back to Jounieh. (14)<br><br>Energy for Human Settlements: The main source of energy is electricity. Lebanon has the highest rate of rural electrification with 98% of the rural population having access to electricity.<br><br>Kerosine and butane gas are both used for domestic purposes.<br><br>Renewable sources of energy are not exploited to any great extent, although along the coast, wind mills are extensively used in connexion to salt harvesting.<br><br>Transportation in Human Settlement: Traffic in Beirut is noticed to be congested. Number of vehicles in the country in 1974 exceeded 220,000. (6)<br><br>Lack of adequate storm water sewer within the cities with the result that in times of heavy rain many of the streets resemble rivers, to the great discomfiture of pedestrians. (3)<br><br>The existing road system in Lebanon totals approximately 7,700 kms, of which 570 kms have been designated as international roads, and about 1,430 kms classified as internal principal roads. |

| 4 | COUNTRY : LEBANON |
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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br><br>a) Human Settlements and Environmental Health. | The remaining 5,700 kms of the highway network consist of secondary and local roads in rural areas, and minor urban roads. The overall density of the Lebanese highway network (at 0.68 kms/sq.km, of national territory is high compared to neighbouring states.<br><br>While about 80% of the highway network consists of paved roads, the level of serviceability of Lebanese roads is generally low. Only a very small part of the major raod network has been designed to motor-way standards, and even these roads have suffered from subsequent lack of control of access. Elsewhere, the network consists almost entirely of single-carriageway roads, often with a low standard of alignment, with only isolated portions of dual carriageway on the Beirut-Tripoli road, on the Beirut-Damascus road, and in some urban areas.<br><br>A further factor influencing the overall of serviceability is the lack of maintenance of the highway network, and particularly of road surfaces. The situation has, of course, been aggrevated by the events of 1975-78, though inadequate highway maintenance had already been recognized in the past to be a problem requiring urgent attention. An additional problem with respect to mountain roads is winter snow, which can close some roads for long periods, even the main Beirut-Damascus road may sometimes be blocked for several days at a time.<br><br>Road Traffic: The rapid increase in recent years of road traffic volumes in Lebanon is indicated by the dramatic rise in total vehicles in use over |

| 4 | COUNTRY : LEBANON |
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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br><br>a) Human Settlements and Environmental Health. | The coastal highway from Beirut north to Jounieh carried the heaviest volume of traffic, though sizeable volumes were also recorded from Beirut east to Bhamdoun, and south towards Damour.<br><br>- Institutions dealing with building technology:<br>National Coucil for Scientific Research (NCSR) Beirut.<br><br>- Activities:<br>- Aggregates for road construction<br>- Earthquake engineering<br>- Development of uniform codes for Arabic countries.<br><br>Present Situation and Needs: Although Lebanon shows to the visitor a greater urban and economic development as compared to the other countries of the Middle East area, this progress is misleading since the sanitary conditions of the country not only have shown no progress at all rather they have deteriorated during the last few years.<br><br>Because of past events, those problems have become more urgent and the need for their solution is very much pressing so as to project the health and well being of its population. (14) |
| b) Dry farming Agriculture, Irrigated Agriculture, Forestry, Range Management, Combating Desertification. | Dry farming depends on the availability of rain, at least 400 mm per year. The northern region of Bekaa Valley, where dry farming is practiced extensively, on an average receives only 200 mm of rain per year and the soil loses its moisture, hence the crop productivity is lowered. Instead, the land plots should have been followed every other year, meanwhile needs should have been controlled and deep ploughing practice should have been abandoned in order to conserve |

| 4 | COUNTRY : LEBANON |
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ENVIRONMENTAL ACTIVITIES AND SITUATION.

b)

the moisture of the soil.

In dry farming areas, also soil erosion problems arise especially when mountain slopes are cultivated.

As concerning afforestation, the natural balance between areas (water, land, forest land) requires 18% of forest land. Forests now cover only 7% of the Lebanon's total area following the decrease in the area of forest land from 105,000 ha. to 70,000 ha. (20)

In addition to its shortage in animal production, Lebanon suffers from an increasing number of goats threatening the national forest endowments. The number of goats should be cut by 2 thirds. However, if this is done, the meat shortage will be rendered even more acute. (5)

Also we should not forget to mention that Lebanon is rich in flora, it has probably well over 2500 species. (17)

Reafforestation activities are carried out by the Green Plan (Ministry of Agriculture). Seedlings distributed to farmers by the Green Plan during 1965/1970 amounted to:

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| - fruit seedlings | 2,099,632 |
| - Forest and ornamental seedlings | 4,871,300 |
| Total | 6,970,932 |

With a total cost of 1,404,701 LL.

The administration set out to reach a target of 10 $m^2$ of green land per capita (the existing ratio is 0.5 $m^2$ per capita) in order to purify the air and provide a healthy environment. (18)

| 4 | COUNTRY : LEBANON |
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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br><br>c) Resource Status:<br><br>i) Agriculture - soils, Forests, Range, Water, Crops, Reserves, Animal husbandary | c) Resource Status:<br><br>The area of Lebanon amounts to 1,071,000 ha. Cultivated land amounted to 260,000 ha. in 1965 and the area that could be reclaimed was around 27,000 ha. Out of these, 70,000 ha. were formerly cultivated but had been abandoned because they were unable to support their owners.<br><br>In 1965, the area of cultivated land per agricultural labourer did not exceed 0.13 ha.<br><br>The absence of regional planning in Lebanon led to the maldistribution of national income among the regions. This caused many of the inhabitants of economically underdeveloped regions and these are mainly agricultural in nature - to leave their holdings of land and either move to the cities of amigrate in quest for work. Agricultural production decreased following the neglect of many land holdings; so, had regional planning existed, economic activities would have increased in agricultural areas, thus offering additional work opportunities for those farmers who do not earn sufficient income from their agricultural work.<br><br>As we have mentioned earlier, cultivated land per capita does not exceed 0.13 ha. in Lebanon and this average falls to 0.025 ha. for irrigated land.<br><br>Some agricultural regions (e.g. the southern Beka'a and the Akkar Plain) suffer from severe losses arising from the lack of water discharge networks; when such networks are built by indivicuals, the fact that they often do not meet technical specifications causes neighbouring holdings to be flooded, and thus increases the damage. |

| 4 | COUNTRY : LEBANON |
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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br><br>c) Resource Status:<br><br>i) Agriculture - Soils, Forests, Range, Water, Crops, Reserves, Animal Husbandary. | The Lebanese territory is exposed to strong south-west and north-east winds that blow several times a year, thus greatly damaging tree and vegetable plantations, and drying the soil to a large extent. (5)<br><br>Basically an agricultural country, Lebanon's Bekaa Valley has been the bread basket of the region, with an agricultural labour productivity surpassing all the countries in the ECWA region, in spite of a somewhat less favourable land area/workder ratio as compared to the other countries of the region. The difference in productivity is largely explained by a superior human Capital. (6)<br><br>Agricultural population in 1960 was 710,000 while in 1970 it was 484,000. The share of agricultural population to that of total population in 1960 was 38% while in 1970 it was 20%, indicating a drop of 18%. (19)<br><br>Forestry:<br><br>Forest land, principally because of uncontrolled grazing by goats and the manufacturing of charcoal and other practices, had shrunk from an estimated 670,000 acres (roughly 25 per cent of the country's surface) to 180,000 acres (about 7 per cent). (20)<br><br>Crops:<br><br>Lebanese agriculture is based very largely on the cultivation of fruits and vegetables. Citrus fruits and bananas are grown along the coastal plain, apples on Mount Lebanon, while grapes, |

| 4 | COUNTRY : LEBANON |
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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br><br>c) Resource Status:<br><br>i) Agriculture - Soils Forestry, Range, Water, Crops, Reserves, Animal Husbandary. | potatoes,onions and tomatoes are grown in the Bekaa. Around Hermel, irrigation has made possible the cultivation of apricots and figs. (21)<br><br>In the northern region, the cultivation of olives is dominated. The major creals grown in Lebanon are: Wheat barely, corn and beets. Beans, peas, chick peas are the main legumes. (16)<br><br>The Bekaa Valley is the largest agricultural zone and, in addition to vegetable crops, produces the major proportion of Lebanon's sugar beet. (21)<br><br>Fertilizers:<br><br>Local consumption of organic fertilizers amounts to 750,000 tons while that of chemical fertilizers stands at 100,000 tons; optimal fertilizer requirements for Lebanon, however, are estimated at 1.5 million tons of the former and at 220,000 tons of the latter. (16)<br><br>Pesticides:<br><br>Individual farmers use excessive quantities of pesticides, sometimes they spray their plots as 12 times per season. Insects develop immunity and most of their predators die. The rate should be cut down to 6 and only applied doing the peak period of biological cycle of the pests. (16)<br><br>Water:<br><br>With a few exceptions, fresh waters from all sources are generally characterized by moderate salinity and mineral content. As to the level of mineralization, the decreasing order of magnitude is wells, springs and streams. (2) |

| 4 | COUNTRY: LEBANON |
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ENVIRONMENTAL ACTIVITIES AND SITUATION.

c) Resource Status:

i) Agriculture

Surface Waters:

Surface waters, which in their majority are still primitively exploited, constitute the main source of water in Lebanon.

Of the total precipitation 44% goes to surface run off; 36% to evapotranspiration; 20% infiltration.

On the whole, there is ample water for exploitation and in this regard Lebanon is better endowed than most of the surrounding countries of the region. (6)

The surface waters, with a total of 4025$mm^3$ , include the three international rivers : El-'Assi (Orontes); El-Kabeer; and El-Hasbani, with mean annual discharge of 415 $mm^3$, 95 $mm^3$ and 140 $mm^3$ respectively. These rivers yield a total of 650 $mm^3$ of unxploited fresh water, except for the negligible usage by individual farmers on a private basis. An equitable distribution through bilateral agreements with the Syrian Arab Republic may possibly make available for use in Lebanon as much as 170 $mm^3$ of water from El'Assi and El-Kabir rivers.

The waters of the truly national rivers and streams amount to a total of 3375 $mm^3$ , of which only 665 $mm^3$ are being utilized for irrigation , 550 $mm^3$ for industry, and 10 $mm^3$ for domestic purposes. The remaining unexploited waters (2710 $mm^3$) are lost to the sea.

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COUNTRY: LEBANON

ENVIRONMENTAL ACTIVITIES AND SITUATION.

c) Resource Status:

i) Agriculture

The following table summarizes the availability of water resources:

| | Groundwater | | Surface water | | Total | |
|---|---|---|---|---|---|---|
| | $Mm^3$ | % | $Mm^3$ | % | $Mm^3$ | % |
| Exploited | 160 | 20.5 | 665 | 16.5 | 825 | 17.2 |
| Unexploited (available) | 420 | 53.5 | 2925 | 72.7 | 3345 | 69.6 |
| Unexploitable | 200 | 25.6 | 435 | 10.8 | 635 | 13.2 |
| Total | 780 | 100 | 4025 | 100 | 4805 | 100 |

Of all the terristrial water resources comprising both surface and groundwater, only 825 $mm^3$ have been developed for beneficial uses as follows:

| Present Usage | Ground water ($Mm^3$) | Surface water ($Mm^3$) | Total ($Mm^3$) |
|---|---|---|---|
| Domestic | 40 (25.0%) | 105 (15.8%) | 145 (17.6%) |
| Industrial | 30 (18.8%) | 10 ( 1.5%) | 40 ( 4.8%) |
| Agricultural | 90 (56.2%) | 550 (82.7%) | 640 (77.6%) |
| Total | 160 (100 %) | 665 (100 %) | 825 (100 %) |

It is also apparent that 3345 $Mm^3$ of terrestrial waters

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ENVIRONMENTAL ACTIVITIES AND SITUATION.

c) Resource Status:

i) Agriculture.

are available for potential exploitation in future, with the understanding that an appreciable fraction of these waters cannot be exploited for practical, technilogical or financial reason. (2), & (22).

It can be stated that the quality of the river waters in this country is generally satisfacoty for domestic, industrial and agricultural purposes, provided that strict measures supported by proper legislation and law-enforcement aimed at abating pollution are applied as soon as possible. Such an opinion would hold true untill further investigations prove the contrary. (2)

Unless effective measures are taken to curb pollution of the Litani headwaters and its tributaries at an early stage, the problem that can be created would become increasingly difficult to control.

There are no indications as yet of eutrophication of the Qaroun Lake water leading to the excessive growth of algae by virtue of pollution with nitrates and phosphates originating from disposed domestic and industrial waters, or from fertilizers, But, since the source of such pollutants are already established, the problem can emerge at any time in the future, once the suitable conditions are approached. The fish-kill in 1970 involving many hundreds of trout fish could be the herald for danger ahead.

Another important matter of significance to public health relates to the infestation of the lower stretches of the river with Bulinus snails, which was reported by some to have also reached as far upstream as some of the tribunates of the Litani.

| 4 | COUNTRY: LEBANON |
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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br><br>c) Resource Status:<br><br>i) Agriculture. | This type of snail which serves as the intermediate host for the parasites that cause bilharzia (Schistosomiasis) has helped in spreading the disease among some of the inhabitants in Sarafand and its surrounding area. (2) , (22)<br><br>Groundwater:<br><br>The total annual precipitation upon the land surface of Lebanon, generally in the form of rain or snow is estimated at 9,700 $Mm^3$ (34%) fall on the Bekaa area. The irricoverable losses due to evapotransporation amount to about 4895 $Mm^3$ (50.5%), thus leaving (8%) to enter the ground, and the rest run off as surface waters (4025 $Mm^3$, or 41,5%).<br><br>Of the total amount of groundwater (780 $Mm^3$) , about 180 $Mm^3$ of water flow through underground passages towards the Mediterranean, where it reappears close to the shore in the form of brackish sub-marine. No serious attempts using modern technology have been made to trace and to tap these valuable resources.<br><br>The net amount of fresh and saline water stored underground amounts to about 600 $Mm^3$ , which constitutes only 6.2% of the total annual precipitation. Of this amount, some 200 $Mm^3$ cannot be abstracted for technological reasons, thus leaving only 400 $Mm^3$ available for development and use. But, after deducting the amount of groundwater already put into use (160 $Mm^3$). (22) |

| 4 | COUNTRY: LEBANON |
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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br><br>c) Resource Status:<br><br>i) Agriculture | As a rule, shallow groundwaters at depths not exceeding 10m are more highly mineralized than the deeper waters, probably because the waters associated with the top-soils are exposed to contamination from surface drainage created by domestic, industrial and agricultural activities, in addition to the minerals accumulated in the uppermost layers of soil through biological decomposition of organic matter and evaporation of moisture, The consequences are that the mineral content of the deeper groundwater is increased by virtue of the infiltrating surface waters from precipitation, surface waters, and agricultural drainage that carry down the soluble minerals contained in the top layers of soil . However, natural recharge from precipitated and surface waters, being appreciably less mineralized, tends to ameliorate the level of minerals in both the shallow and deeper groundwaters. Since the tendency in some rural areas is to depend to a certain extent on privately-owned shallow wells for irrigation purposes by the poorer class of farmers. Crop production may be hampered and at the same time, the mineral content of the irrigation drainage would be considerably higher; and it would be much preferred, and more advantageous to resort to artificial recharge of groundwater through deep feeding boreholes rather than surface feeding if the effect of the greater salinity of the shallow-waters is to be avoided. (2)<br><br>Water demand projections for Lebanon for the year 2000 is estimated as follows:<br><br>- Idustrial 154 U.S. gallons per capita per day.<br>- Agricultural 84 " " " " " " "<br>- Municipal 41 " " " " " " "<br>Total 279 " " " " " " "<br>or approximately 1,100 litres per capita per day.<br>Source: (23) |

| 4 | COUNTRY: LEBANON |
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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br>c) Resource Status:<br>i) Agriculture_ Soils, Forests, Range, Water, Crops, Reserves, Animal Husbandary. | Animal Husbandry<br>Milk producing livestock: 35,000 cows, 120,000 sheep and 280,000 goats produce 110,000 tons of milk annually which is not enough to meet the local needs.<br>Meat producing livestock: 25,000 cows, 100,000 sheep 85,000 goats, and around 15,000,000 of poultry constitute the meat producing capacity of the country.<br>Since local meat consumption stands at 70,000 tons, the annual shortage reaches 45,500 tons.<br>Lebanon's requirements for 1980 stands at 450,000 tons of milk and 125,000 tons of meat.<br>Egg production stood at 500 - 600 million eggs in 1970 valued around LL. 24 million. The total value of poultry and derived products amounted to LL.91 million in 1970. with poultry exports amounting to LL. 24.3 million. (18)<br>Agriculture in its different sectors has much hard hit during the recent events. One of the sectors that have suffered the most is aviculture.<br>Presently the important of eggs and chickens is still a necessity to meet the needs of the people, but it is hoped by the end of the summer (1978) enough can be produced to meet internal needs. The Arab World to whom most of these products were being exported are now importing from Bulgarian and Roumanis, (24)<br>Overgrazing is a serious threat in the long term, in addition to the changes already wrought by centuries of over-exploitation. The country above 1500m. is almost exclusively used for grazing goats and sheeps. Goats are the most destructive of the two, and rules, have been made to avoid excessive environmental demage. The regulations are however, extremely difficult to enforce. (17) |

| 4 | COUNTRY: LEBANON |
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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br>c) Resource Status:<br>i) Agriculture - Soils, Forests, Range, Water , Crops, Reserves, Animal Husbandry.<br><br>ii) Fisheries - Inland Waters. Coastal Zones, Oceans, Reserves. | Health problems that are associated with irrigated agriculture: Only in Damour area, there occurs incidents of trachoma due to abundance of water snails which are the hosts of the disease.<br><br>Other agricultural activities which are carried on are : Agriculture in Green houses and under plastic tunnels are well developed, specially on the coastal areas. These are efficient, but not specialized. The main crops that grown in this media are cucumbers, tomatoes and squash. (46)<br><br>ii) Fisheries<br><br>Inland Waters: In Akkar, and in Bekka regions there are fish-farming practices. The lake Qaroun is a fish farming site.<br><br>Many private fish farms exist in these two regions.<br><br>Coastal Zones: Edible shrimp seems to be one food commodity which is available but has been exploited to any extent in this part of the Mediterranean.<br><br>In the coastal waters of Lebanon, the dynamiting which is frequently done by people to increase their fish catches is probably a chief contributor to shrimp morality, particularly to the larvae which abound in coastal waters. This type of "environmental shock" also has a delaterious effect on all forms of sea life; plants, animals and even swimming Homo-sapiens. Both economic and aesthetic rewards can be reaped from proper conservation of sea life here if adequate controls are established and strictly enforced by Lebanon and all the countries that "hug" the lovely shores of the Mediterranean". |

| 4 | COUNTRY: LEBANON |
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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br><br>c) Resource Status:<br><br>ii) Fisheries - Inland Waters, Coastal Zones, Oceans, Reserves. | Numerous small fishing ports exist along the coast and these are used by local fishermen, whose catches are sold for immediate local consumption. There is no established fishing industry and the greater part of home consumption is imported.<br><br>Most of the fishing ports have little or no equipment and navigational aids are normally restricted to lights at the port entrance.<br><br>For example, Jbeil, formerly known as Byblos, is one of the oldest ports in the world that has been in continuous use. It is now a small fishing port serving the local inhabitants and tourists. In view of its historical interest, It is considered that this very attractive port should be retained in its present setting and should not be extended.<br><br>Another fishing port, is Sarafand, which is situated 20 kilometres north of Sour. No plans are available of the existing installations or for any development. (21)<br><br>Due to lack of equipment, deep sea or ocean fishing has not developed yet. The nominal catch of fish in 1973 amounted to 2,400 metric tons. (25)<br><br>Reserves: Many small islands ituated in the coast, west of El-Mina (Tripoli) constitutes an ideal place, for the establishment of a natural park, suitable for:<br><br>- the study of birds migration;<br>- a marine reserve adapted particularly to the production and the grow of marine species with a great economical importance;<br>- for the protection and the study of coastal indigenous Mediterranean and oriental, flora. |

| 4 | COUNTRY: LEBANON |
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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br>c) Resource Status:<br>ii) Fisheries - Inland Waters, Coastal Zones, Oceans, Reserves.<br>iii) Industry, Mining and Shipping. | Many kinds of flora are disappearing. It is therefore urgent to do "something" before it is too late. The main purpose of such reserve is to protect marine birds, marine and coastal worlds from disappearing. (26)<br>iii) Industry, Mining and Shipping: The first industry in Lebanon used to be the silk industry; the silk industry is a mixed agricultural and industrial activity. It provided work for the agricultural farmers; at the same time it provided seasonal work for most of the village women in the firms that used to dissolve the cocoons into silk threads. This provided more concentrated work for the villagers and consequently higher overall utilization of the labour force.<br>The second characteristic is that the mulberry tree, on which this industry depended, is suitable for Lebanese terrain and climate, i.e. for dry agriculture and for any altitude. This helped in sustaining the people in villages spread over a great range of altitudes and in areas where water for irrigation is very scarce.<br>The third characteristic is that the silk production depended on the leaves of the mulberry tree and not on its fruits. This meant that the farmer was much less at the mercy of weather conditions, as the leaves are less vulnerable to the destructive affect of frost and hail than fruits. This meant more stability for the farmers.<br>The last characteristic is that the end product was semi-finished, durable and had a foreign market. This gave more worth to the efforts and production |

| 4 | COUNTRY: LEBANON |
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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br><br>c) Resource Status:<br>iii) Industry, Mining and Shipping. | of the farmers. It also helped the balance of trade for the Lebanese economy.<br><br>Thus the decline of the silk industry undermined the whole structure of human settlements and caused the population in most rainfed villages to emigrate. This means that the process of emigration from the rural areas did not start as a result of the attraction of better opportunities outside the was rather, in most cases, a result of push over from the inside. The Lebanese village communities became physically up-rooted even before any serious change had taken place in their cultural and spiritual set-up. (4)<br><br>Lately, the industrial sector has rapidly expanded, the main industrial activities concentrate on light industries such as food processing and textiles. (11)<br><br>The future development of industry in Lebanon can be exposed to exert a major influence on the country's external trade flows. This influence will be felt in two ways; firstly, by the requirements for raw material imports - Lebanon being relatively deficient in this respect - and, secondly, by the export of manufactured goods.<br><br>Lebanon, in relation to most other Middle Eastern countries, is already well developed industrially. It has cement plants (at Chekka), iron and steel plants (10,000 tons/year at Tripoli and Aamchit), a fertilizer plant (at Selata) and sugar refineries (at Tripoli, Chekka, Beirut and in the Bekka) as its industrial base. Most of these plants are in the north and import their raw materials and export their products via either own port facilities or Tripoli. |

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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br><br>c) Resource Status:<br><br>iii) Industry, Mining and Shipping. | Apart from these large semi-finished manufacturing industries, most Lebanese manufacturing enterprises are on a very small scale.<br><br>Beirut, and to a lesser extent Tripoli, have developed as the main centres of light and medium scale industries particularly textiles, food processing, furniture, paper and leather goods, It was estimated that approximately 75% of indutrial establishments were concentrated in Beirut in 1972. A further 11% were located in Tripoli, 4% in Zahlé, and 2% in Saida.<br><br>In the future, it is probable that industry will be encouraged to develop away from these traditional centres. The destruction of factories in Beirut which occurred during the events, together with the movement of population to the rural areas, had made it both desirable and practicable for industry to be established in the provinces. (21)<br><br>Here is a description of the activities of some of the existing plants in Lebanon :<br><br>- The Arabian Pipeline Company refinery is situated 5 kilometers south of Saida and has under-water pipelines which carry the crude and refined products from the storage tamks to loading plat-forms, which are sited in 15 meters of water at distances of between 1,200 and 2,000 meters from the shoreline. The alignments of the pipeline are on the British Admiralty Chart No. 2794 , but the southermost line has been abandoned, although the pipes were still in position. This line had to be abandoned, due to the fact that the layer of sand covering the rock in the vicinity of the loading plat-form had moved, and tankers could not secure their anchors. |

| 4 | COUNTRY: LEBANON |
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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br><br>c) Resource Status:<br>iii) Industry, Mining and Shipping. | - The Lebanese Chemicals Company's factory is sited at Selata and it possesses its own wharf for the import and export of goods. The wharf is 90 meters long. The wharg is completely exposed to the elements and cannot be used during adverse weather conditions.<br><br>- The cement Factory of the Societie des Cements Libanais is situated at Chekka on the eastern shore of Il-Huri Bay and the factory has its own jetty for the export of the finished products. Such as-Portland cement and cement-asbestos products (Eternit).<br><br>- The Lebanese Chemicals Company's Cement Factory is situated at Enfa, some two kilometers north of the factory of the Society des Ciments Libanais. This installation also has a jetty which is of blockwork construction and approximately 190 meters long, and is used for handling both imports and exports. (21)<br>Cement production is 1,744 tons/year (1074). Asbestos cement 20,000 pipes/year. (6)<br><br>- The Iraq Pipeline Company's Refinery is situated about 5 kilometers north of Tripoli . The four underwater pipelines connecting the storage tanks to the loading platforms are located at the sites down on the British admirately Chart No. 2903 and are still in use.<br><br>The pipeline from Iraq has been closed for 18 months (1976-77) and crude oil was obtained from Saida for refining. (21)<br><br>The industrialists association President Mr. George Essaily declared on June 4th, 1977 that industry as a whole is not producing more than |

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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br>c) Resource Status:<br>iii) Industry, Mining and Shipping. | 40% of its pre 1976 capacity, and the failure to recover at a faster rate is due to :<br>- Shortage of workers in some Lebanese regions;<br>- The emigration of technical elements;<br>- The financial difficulties which industrial institutions are facing;<br>- The shrinking of the local market;<br>- The instability of the international situation. (24)<br><br>Shipping: Numerous ports and marine facilities, of varying sizes, exist along the Lebanese coast and these can be divided into the following five categories:<br><br>1. Major ports that can accept ocean-going vessels.<br>2. Private marine installations that can accept ocean-going vessels.<br>3. Fishing ports.<br>4. Marine and tourist installations.<br>5. Military installations.<br><br>Major ports: Of all the ports along the Lebanese coast only two, Beirut and Tripoli, have the necessary facilities to enable ocean-vessels of any size to enter the berth alongside. Although other ports, such as Sour (Tyre), Saida (Sidon) and Junieh, have been used by ocean-going vessels to discharge cargoes, particularly during the recent events, they do not have sufficient depth of water to permit any but the smallest vessels to enter. The larger ships were compelled to anchor outside the ports in deepwater and off-loaded cargo to lighters which, in turn, were takeninto the ports for final off-loading. |

| 4 | COUNTRY: LEBANON |
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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br><br>c) Resource Status:<br><br>iii) Industry, Mining and Shipping. | Beirut is an international port which can accept vessels drawing up to 13 meters of water , and is potentially one of the larger ports in the eastern Mediterranean. Prior to the events of 1975-76 the tonnage handled at this port was approximately 3,600,000 tons per annum.<br><br>The port is protected to the north by a continuous breakwater 2,250 meters long, of which the centre portion of 450 meters is of blockwork construction; to which vessels may moor. The harbour consists of three basins: the area of the western Basin, No.1, is 12.5 hectares; the centre Basin, No.2, is 20 hectares and the eastern, No, 3, is 34 hectares. The total length of the quays thus formed, and including the new Quays Nos. 12 and 13, is 3,780 meters, all of which except for Quay No. 1, 250 meters long, can be used for the discharge and loading of goods.<br><br>The are now available for covered storage is 19,000 square meters, A contract for the supply and erection of a further seven transit sheds has been awarded recently and it is anticipated that all these new sheds will be available for use during the last quarter of 1978.<br><br>All the buildings in both Free Zone were either destroyed or very badly damaged and the Free Zone trade om the port area has been suspended until a decision is reached on the future of the Free Zone. (21)<br><br>Tripoli: The Port of Tripoli is situated 80 kilometers to the north of Beirut and is the second largest in Lebanon. |

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| ENVIRONMENTAL ACTIVITIES AND SITUATION .<br><br>c) Resource Status:<br>iii) Industry, Mining and Shipping. | The port protected to the north by a continuous breakwater of rubble construction, 1,400 meters long. A mole is situated within the shelter of the breakwater and provides berthing facilities along its northern and western sides. The eastern side of the mole is unprotected and is of rubble construction. The quay walls on the northern and western sides of the mole are of blockwork construction and are 110 meters and 604 meters long respectively. At the root of the mole, extending westwards, is a further quay, 110 meters in length, also of blockwork construction. The westerly 30 meters of this quay is used for mooring the port's floating craft and therefore only 80 meters of this quay are available for mooring ocean-going vessels.<br><br>The depth of water available in the approach, channel is 9 meters, but the depth alongside all the quays is 8 meters only, although the northern 304 meters of the quay were designed for a depth of 10 meters. Under the present conditions only ships with a draught of 7.3 meters or less can be accepted alongside and those with a greater draught have to unload part of their cargo of lighters, while at anchor outside the harbour, before they may enter.<br><br>The Port of Sour: is the southernmost port in Lebanon and is situated some 80 kilometers south of Beirut. It is primarily a fishing port and is officially designated as a Class B or Internal Secondary Port and, as such, ocean-going vessels are not permitted to call, although a considerable tonnage of goods was landed there during the events. |

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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br><br>c) Resource Status<br><br>iii) Industry, Mining and Shipping. | Other existing ports and private installations include:<br><br>Saida, Jounieh, Chekka, Enfe, Selata. (21)<br><br>Port Equipment: Both Beirut and Tripoli are seriously short of equipment of all categories. It is essential that modern handling equipment is obtained for both these ports coupled with adequate maintenance facilities.<br><br>Existing Rail Network: The existing Lebanese railway system was largely developed prior to the creation of the independent state of Lebanon, and hence in part reflects transport priorities which have become outdated by modern political realities. The narrow gauge line (rack-andpinion on the steeper sections) was opened in 1895 to link Beirut to Damascus and Amman (and in time linking with Hedjaz Railway to Medina in Saudi Arabian). The first standard gauge line to be opened in (1902) linked Homs to Rayak, as part of projected Europe to Africa rail connection. In 1905, Tripoli was connected to Homs by a standard gauge line. During World War II, Allied forces constructed the coastal standard gauge line between Naqoura and Tripoli.<br><br>Road System: Though little or no data on traffic levels has been obtained since 1974, and past traffic projections require updating in the light of the 1975-1978 events, the basic approach to future highway provision has remained unchanged. For the three major routes linking Beirut to the north, east and south of the country, the intention is to duplicate the existing highways with roads designed to motorway standards (of at least two-lane dual carriageways with limited access, and intersections |

| 4 | COUNTRY: LEBANON |
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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br><br>c) Resource Status:<br><br>iii) Industry, Mining and Shipping. | restricted to 5 - 8 km spacings with grade separation as far as possible ). Motorway - standard roads would then link the major areas of existing and proposed urban and industrial development in the country.<br><br>First priority is clearly attached to completion of the Beirut-Tripoli link and, except for the Beirut-Tabarja section, this proposal is well in hand and could be completed by the early 1980's. Second priority is presently given to the Beirut-Damascus link. The feasibility study for this route envisaged a road construction rpogramme over 5 years for a dual two-lane motorway between Beirut and Chtaura, with subsequent increase in capacity planned over a 15-year period in line with traffic growth. The new coastal route to the south from Beirut has been studied as far as Zahrani, but further work on this route is unlikely at the present time due to the uncertain security conditions in the area.<br><br>The general level of road construction coasts has risen about 80-100% above 1974 levels, and average cost per km (excluding land acquisition) is now L.L. 4 - 6 million for construction to motorway standards.<br><br>In addition to these motorway proposals, some consideration has been given to upgrading the international road from near Saida to the Syrian border, but no firm porposals for this route exist at the present time. Remaining highway development resources are presently devoted to restoring the network of primary markedly from a near total lack of maintenance during the 1975-78 events ( In addition to sustaining damage from military action). Though some minor alignment improvements are intended to restoration of existing routes. |

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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br><br>c) Resource Status:<br><br>iii) Industry, Mining and Shipping. | Within the urban areas of Lebanon, current expenditure on road improvement is largely devoted to restoration and maintenance work, or completion of road construction abandoned during the 1975-78 events. As part of the motorway network discussed above, feasibility studies are presently being undertaken for a "beltway" by-passing Beirut to the east, with links to the port and the city centre. Elsewhere within Beirut Municipality, several short road links are under study, to ease congestion at specific location. (6)<br><br>Nevertheless, it is likely that even without major new road construction, substantial improvements in travel times in urban areas (particularly Beirut) could be achieved by the wider use of traffic management and control techniques. Moreover, it would appear desirable. (21) The total length of Lebanese roads amount to 7,700 km. In 1974, there were 220,100 passenger cars in Lebanon. (6) Also see section 4.a. "Transportation in Human Settlements". |
| iv) Labour Force | iv) Labour Force :<br><br>According to the 1970 Manpower Sample Survey of Lebanon, the total size of its labour force was estimated at 538,410 persons. More than 80% of this total were engaged in activities such as agriculture (19%), manufacturing (18%), commerce and hotels (17%) and services(28%).<br><br>The total number of work permits given to non-Lebanese in the same year was 18,230, of which 13,528 permits were issued to Arabs. The number of work permits issued to Arab nationals every year represents no less than 70% of the total permits issued. (27)<br><br>During 1975-1980 the size and nature of labour force changed drastically. Many skilled workers left the country, some of them temporarily and others permanantly. |

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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br><br>d) Environment and Development<br><br>i) Environmental Management;<br>ii) Environmental Law;<br>iii) ES & AT;<br>iv) Industry and Environment;<br>v) Oceans;<br>vi) Energy. | d) Environment and Development<br><br>i) Environmental Management:<br><br>Water conservation from rain is a traditional practice in the mountain areas of Lebanon where people gather the rainwater in ponds. By a recent practice, they put a plastic covering (made of clocks) on the surface of the water and that greatly reduces the rate of evaporation, if the plastic covering iseopaque, it hinders the suns' rays from pentrating in the water, as a result the algal growth in the ponds are controlled. And also it hinders the proliferations of mosquitos, because the larvae have the chance to breath at the surface.<br><br>The minister of water and electricity has signed (1978) a contract with the Itablian Company Lutieh, for the constructing of 6 mountainous ponds for the conservation of water from winter rain. The Company has promised to make studies in various Lebanese regions in order to construct the ponds. (15)<br><br>3617 umbrella pine trees in the suburbs of Beirut were cut down during the recent years. The Jarrah Scout Association has started a reafforestation campaign and called for appropriate measure for the conservation of forests.<br><br>A variety of industries, excluding the oil industry, discharge their wastes into water courses, particularly in the neighbourhood of Beirut. The volume and strength of these wastes has not been investigated but it seems desirable that a full survey should be made in order to assess their effect upon the community at large.<br><br>The Oil Terminals and Oil Refineries in Lebanon are well conducted in repect of measures taken to avoid the pollution of the sea by oil. (3) |

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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br><br>d) Environment and Development:<br><br>ii) Environmental Law<br><br>iii) ES & AT<br><br>iv) Industry & Environment | ii) Environmental Law:<br>No adequate information is gathered on this topic.<br><br>iii) ES & AT (Environtaly Sound and Appropriate Technology)<br>- Agro-industrial wastes are recycled.<br>- So far a little research has been done for tapping the solar energy.<br>- Some coastal regions, specially Batroun area in the north, utilize wind and solar energy for salt harvesting.<br><br>iv) Industry and Environment:<br>Industries located in sewered areas discharge their untreated wastes along with municipal sewage, but those found in suburban and rural areas tend to practice direct disposal of untreated effluents into terrestrial or marine waters, and in some instances, on land.<br><br>Compliance by industrial polluters with the official requirements, often voluntarily, has been observed in some exceptional cases, whereby predisposal treatment of the industrial wastewater has been practiced. But the initial and running cost of the treatment facilities, not incurred by rival industries has been a source of dissatisfaction and complaint.<br><br>In many instances law-enforcement has been curtailed by the wide rift between the official requirements and capabilities in offering guidance on the |

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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br><br>d) Environment and Development:<br><br>iv) Industry & Environment | one hand, and the helplessness of the small municipalities and industries common in Lebanon on the other hand. Revision and amendment of the current laws pertaining to environmental pollution control are highly desirable actions, if credibility is to be attained.<br><br>The major sources of pollution of the Litani River and its tributaries, including the Qaroun Lake including the wastes from such industries as (a) the sugar factory near Enjar ; (b) the numerous poultry farms scattered along the water courses; (c) the wineries largely concentrated between Shtoura and Zahlé; (d) the cluster of tanneries located in Mashghara; and (e) the assortment of small industries situated mainly in the suburban area of Zahlé. (2)<br><br>Industrial Emanations and Effluents:<br><br>For the purpose of assessingthe characteristics of industrial wastewaters produced and disposed in an untreated state, thus creating important environmental pollution problems, samples for chemical analysis were collected on various occasions from the following industries: (a) olive oil; (b) tanneries; (c) pressed leather boards ; and (d) textiles. Emphasis was placed on olive oil plants and tanneries, both of which are typical Lebanese industries and yield highly polluting trade-wastes that have been known to create major environmental problems associated with their indiscriminate disposal.<br><br>The ultimate aim of the investigation is to find feasible and efficient methods of treatment utilizing local materials where-ever possible. Some |

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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br><br>d) Environment and Development:<br><br>iv) Industry & Environment | preliminary work in this respect has been accomplished on a laboratory scale. (24).<br><br>Utilization of Agro-Industrial Residues:<br><br>- Bran from flour mills are utilized as animal fe they comprise 17-20% of the input and amount to 47,000 tons/year<br><br>- Sugar beet residues (pulp) from the sugar refining factory of Bekka are utilized as animal feed. 400 tons per year are produced.<br><br>- Residues from fruit and vegetable processing plants amount to 2000 tons per year. These are under or un-utilized.<br><br>- The reisdues of the two breweries are utilized as organic fertilizers. These amount to 700 tons/year.<br><br>- Dairy residues are utilized as poultry feed material.<br><br>- Residues from live oil pressing factories are utilized as animal feed or soil conditioner.<br><br>- Residues of biscuit manufacturing plants amount to 40 tons/year and these are utilized as animal feed.<br><br>- Animal by products from the slaughter houses are underutilized, e.g. blood, which has the potential of being used as animal feed, is discharged into the sea.<br><br>- Tannery residues, such as wool of sheeps and hair of goats are exported for carpet and tent weaving. Hair of cows are utilized as fertilizers.<br><br>- Residues of cocoa mills amount to 50 tons/year, which are utilized as soil conditioner. |

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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br><br>d) Environment and Development:<br><br>iv) Industry and Environment | - Poultry wastes, such as feathers, egg shells, and dead of male chickens have the potential of being utilized as animal feed: rich in protein. (28)<br><br>- Three paper manufacturing plants utilize waste paper, mainly collected from printing and binding houses.<br><br>The Association of Lebanese Industrialists called for a new legislation in connection to industrial zoning. The Association claimed that, limiting industries to definit zones had resulted in a drastic rise in price of land in those areas, in addition to the concentration of workers in slums surrounding the industrial zones. A report prepared by the Association proposed an alternative solution, which "allocates several industrial zones scattered all over the country, thus solving both the social and economic problems". The report added that industrial zones had to be chosen in such a way to ensure the protection of the environment. |
| v) Oceans | v) Oceans:<br><br>The coast line of Lebanon is about 200 km in length and occupies the central position in the 600 km of the eastern seaboard of the Levant Basin of the Mediterranean Sea. The sea currents in the Basin circulate in an anti-clockwise direction with the result that there is generally a current from south to north along the whole of the Lebanese coast line; this current tends to follow the shore and there are no pronounced offshore eddies. It follows that any material floating on the surface of the sea will be carried along the coast and put ashore by the on-shore winds, and that there is very little likelihood of any of the material being carried away from |

ENVIRONMENTAL ACTIVITIES AND SITUATION.

d) Environment and Development:

v) Oceans

Republic of Lebanon
Office of the Minister of State for Administrative Reform
Center for Public Sector Projects and Studies
(C.P.S.P.S.)

the coast. Many of the beaches have been found to be polluted by sewage, refuse and oily wastes.

Refuse from domestic premises and dommercial areas are dumped in the sea from the major towns of the Lebanese coastal areas.

It seems that the putrescible matter does not travel very far and that on account of its presence and decomposition in static areas of waters as in the fishermen's harbour, are anaerobic and very foul. The heavier inorganic matter, such as old tins and other metallic objects, collect upon the neighbouring foreshores where beachcombers, mainly children, make a useful income from their finds. Old motot tyres, being semi-buoyant exhibit a curious phenomena at Antelias about 5 km. to the north-east of Beirut, but plastic material, being both light and almost indestructible, travels far great distances and is spread over most of the beaches in the country. The only beach that appears to be free from this rubbish is that at Chekka, 50 km. north of Beirut, ehich is protected from the action of the prevailling winds by an extensive headland. (3)

The discharge of dirty ballasts and residues from tankers is usually made at a heavy rate and over a short period of time. The only mass loses the volatile fractions by evaporation and the remaining heavier components tend to form soft balls, resembling tar or wax.

These tar-balls, which are chemically stable and relatively impervious to bacterial degradation, vary in size from 3 mm. to 150 mm. diameter and drift on the surface of the sea and finally are deposited on

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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br>d) Environment and Development:<br>v) | the beaches, usually found to be concentrated at the line of highes water attained by the sea under the action of strong on-shore winds.<br><br>The problems is getting progressively worse each year.<br><br>The Oil Terminals and Oil Refineries in Lebanon are well conducted in request of measures taken to avoid the pollution of the sea by oil. These measures are effective only in case of minor discharges : up to 20 tons. (3)<br><br>Barring the deplorable conditions in restricted coastal areas, the degree of marine pollution cannot be described as critical, but the situation certainly demands vigilance and urgent action aimed at curbing pollution generated through human activities. This is indicated by the levels of some of the parameters measured for the coastal waters in Lebanon: oil, 9-85 mg/litre; and mercury in fish, 0.05 mg/kg. The content of heavy metals in sea water (e.g. Hg, Cr. and Pb) are only moderately high, but might increase in future, unless effective measures are taken.<br><br>Lebanon is participating in the Mediterranean Action Plan for the protection of the Mediterranean sea and it has signed the Barcelona protocol and the agreements that followed it. |
| vi) Energy | vi) Energy<br>Oil Gas:<br><br>The main sources of energy in Lebanon are petroleum and natural gas, which are both imported.<br><br>Nuclear Energy:<br><br>"Electricité du Liban" seems to have plans for nuclear power in the future, but no indication is |

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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br><br>d) Environment and Development<br><br>vi) Energy | available concerning the possible size of the projected plant nor the date of operation. (29)<br><br>Solar Energy:<br><br>Dr. Abdallah Sfeir (Professor of Mechanical Engineering-AUB) has been involved in research on Solar Energy applications for heating since October 1974. The project, was supported by the National Council for Scientific Research (NCSR), and a number of students participated in this work. The early phase of the work, concentrated on assessment of the meteorological records of solar intensity in different areas of the country. This was used later on a number of experiments of solar heating systems in order to predict long term efficiency and the effects of different design parameters on this efficiency. After an interruption during the war, the work continued, emphasizing the experimental aspects.<br><br>Some Lebanes engineering firms have started manufacturing and installing solar water heaters which lately turned out to be attractive to the residents because of recent price hikes of fossil fuels. The performance of these units were not satisfactory, the solar technology needs development.<br><br>NCSR's solar projects aim at determining the feasibility of photo-voltaic collection and applied thermal collection particularly for domestic use. (8)<br><br>Hydro Power:<br><br>Lebanon utilizes most of its hydropower potential. The biggest hydropower installations are found at Qaraoun on Litani river. The total capacity of hydropower Stations in 1976 was 246,000 Kw. (30) |

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ENVIRONMENTAL ACTIVITIES AND SITUATION.

d) Environment and Development.

vi) Energy

Electricity:

Installed capacity of industrial and public electric generating plants, by type in "000" of KW - 1976

| Industrial and Public | | | Industrial | | | Public | | |
|---|---|---|---|---|---|---|---|---|
| Total | Thermal | Hydro | Total | Ther. | Hyd. | Tot. | Ther. | Hyd. |
| 608 | 362 | 246 | 80 | 53 | 27 | 528 | 309 | 219 |

Source: (30)

Bio-gas Systems:

Bio-gas systems are not introduced in Lebanon, even few people have heared of them.

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ENVIRONMENTAL ACTIVITIES AND SITUATION.

e) Socio-economic Problems

e) Socio-Economic Problems

The major socio-economic problems is the problems that the rapid economical development in Beirut is relating to other cities and towns and of other cities in relation to towns which has caused migration from rural to urban areas. Beirut used to be the most-developed city in Western Asia. It was the centre of trade, commerce and banks. Many foreign companies opened branches in this City which had attracted many people from towns and other cities for employment purposes, and due to this migration many environmental problems discussed above took place. We shall recall back some which are due mainly to the economical development.

It is generally recognized that migration from rural to urban areas brings with in an increased demand for housing in the cities and leaves vacant demand. Such housing is usually transformed into secondary dwellings which the owners occupy during the summer months. This accounts for the high proportion of unoccupied houses in the countryside as compared to the city.

Unoccupied Dwellings in Proportion to Primary Dwellings:

| | Urban | Rural |
|---|---|---|
| Mount Lebanon | 5.68% | 13.66% |
| North Lebanon | 8.43% | 14.15% |
| South Lebanon | 8.44% | 12.65% |
| Beqa' | 7.46% | 10.87% |

This creates a need for securing 2,000 additional dwelling per year.

Rural-urban migration is known to be influenced by numerous economic factors (the concentration in Beirut of over two-thirds of Lebanon's economic activity),

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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br><br>e) Socio-economic Problems | educational factors (high education is limited to Beirut), and , sometimes security factors (the problems of the South).<br><br>The urban population tends to increase faster than the population as a whole. The growth of the cities is not only related to increases in the population; it is also related, and in a signficant manner, to the growing demand of the individual for urnan living. The improvement of living standards and socio-economic, cultural and technological progress as well as improvements in the standard of education, services and recreation - all these factors intensify the population drift towards the cities.<br><br>The city of Beirut typifies demographic and economic inbalance in Lebanon. The city and its suburbs pack into less than one per cent of the area of Lebanon more than 40 per cent of the population of the country, which gives Beirut a high primary ratio since 70 per cent or more of all economic, financial and industrial activity is concentrated therein. This istuation places a load upon the city's infrastructure that it cannot support or which it was not intended to handle (such as the traffic and communications problems, the drinking water problems, the sewage network and sometimes even the electricity ... ) This situation results in the waste and loss of time and the consequent dissipation of productive capacities, not to mention the pressure and the strain to which the individual living in this city is subjected. One example of this phenomenon, and not the wrost, is the fact that about 20 per cent of the families in Beirut live in a dwelling composed of only one main room. (12) |

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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br><br>e) Socio-economic Problems | As a result of topographical, morphological and hydrographical features of the country and owing to the population density, especially in urban centres, the cycle from waste water to drinking water is very short and continues shortening rapidly. House and industrial refuse add to the problems of sanitation. They create serious health hazards such as pollution of drinking water, and adversely affect the national economy in a variety of ways; e.g. loss for tourism due to pollution of beaches and absences from work and schools due to parasitic diseases. Sanitation problems are more acute in urban centres such as Beirut. (14)<br><br>There is a severe imbalance in growth not only between urban and rural areas but between Beirut and the other districts as well.<br><br>Development of the situation of rural areas; on the level of socio-economic utilities (hospitals, electricity, telephone, roads) all that was done just helped to give to the rural people the taste for urban life and to attract them more swiftly to the urban centres. |

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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br><br>f) Supporting Measures:<br><br>i) Earthwatch (INFOTERRA, GEMS, IRPTC);<br><br>ii) Environmental education and training, public information;<br><br>iii) Research activities concerning natural resources, management and environmental protection. | Earthwatch (INFOTERRA, GEMS, IRPTC):<br><br>- Council of Development and Reconstruction (CDR) has been designated as INFOTERRA International Referral System) National Focal Point.<br><br>- The National Correspondant for IRPTC is not nominated yet.<br><br>Environmental Education and Training, Public Information:<br><br>Concerning environmental education (at schools), environmental dimensions are dissemnated in all courses namely: Science, history, geography and reading books in both Arabic and English or French. The information disseminated in these books show a clear attempt to relate the information disseminated to the local environment of the child. Nevertheless, the dissemination of information is not as purposeful as in the intermediate level books. Modern presentation of information in these books through many of illustrations and drawings chosen from the child's own environment is to be noted.<br><br>At this level a new programme has been established since 1971.<br><br>The main aspect of the new programme consists in introducing sciences in an integrated approach. A new "Natural Science" book for the second intermediate year has been introduced besides a book on "Man and His Environment" for the third intermediate year.<br><br>The local environment of the student is diffused in a purposeful way. |

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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br><br>f) Supporting Measures:<br><br>ii) Environmental education and training, public information; | The textbook "Man and His Environment" which is taught three hours weekly at the third intermediate reflects also the effort to promote the student's interest in his surroundings.<br><br>Besides, there are certain private schools which have written their own book in this field and an example to that is the book "Better Health" written for the Health Education course taught one hour weekly at the International College. The environment-related unit in this book is entitled community health. It defines and discusses the local community health problems such as : food; communicable diseases; air and water pollution; housing and sanitation. The information diffused place a high priority on the problem-solving approachand on the role of the student as a responsible citizen in this process.<br><br>It has been reported by the Centre for Educational Research and Development that after 1976, ecology would have been introduced within biology courses. In other science courses. such as chemistry and physics, examples should have been drawn from the local environment without excluding the global scope.<br><br>At this level the awareness, of the educational planners, of the impact of environmental education promoting the quality of life, has led to the introduction of courses dealing with local social matters including population and environmental education components. Such an integrated course would have been taught three hours weekly. (11)<br><br>Dar Al-Fata Al-Arabi, a Lebanese publishing house specialized in children books, launched a series of illustrated books about environmental topics. The first two books of the series which had been already distributed were entitled "Our Environment" and "the Desert and the Ocean". |

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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br><br>f) Supporting Measures:<br><br>ii) Environmental education and training, public information; | - University students participated in a 3-day leadership training course for community development, organized by the Young Men Christian Association aiming at developing their skills for planning and executing developmental projects. The sessions included a group discussion on methods for integrating environmental aspects with community development project organized by youth. At the end of the session, the participants designed future pilot projects to be implemented by them, including the launching of an environmental education programme for 250 children in an under-developed sector of Beirut, and the designing of a treatment plant for recycling waste water.<br><br>- About the "Marine Science Institute" in Batroun, North Lebanon, a school was planned to be opened in October 1978, in cooperation with experts from Germany. The Institute is attached to the Ministry of Education's Department of Vocational Training.<br><br>Concerning Public Information and Environment Day Activities:<br><br>"Industry, Development and the Environment" has been the subject of a lecture delivered by Dr. Harold E. Hoalscher, President of the American University of Beirut, during Environment Week at AUB (May 15 - 19, 1978), the Week was organized in cooperation between UNEP/ROWA and the AUB's Fight Pollution Club on the occasion of World Environment Day (WED).<br>Professor Aftim Acra on that occasion has delivered a lecture about "Pollution along the Lebanese Coast." Dr. George Tohmé. Director of the Faculty of Science of the Lebanese University has lectured on afforestation problems of Lebanon. Professor Nasri Kawar has lectured on "Integrated Pest Management". Mr. Faisal Abu-Izzeddin, then the Regional Advisor of UNEP/ROWA, has lectured about the "Conservation of Nature." |

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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br><br>f) Supporting Measures:<br><br>i)<br><br>ii) Environmental education and training, public information; | During the World Environment Day campaign of 1979 similar activities have been organized.<br><br>Articles of the WED Media Pack has been translated and published in most of the dailies and weeklies of the Country. |

| 4 | COUNTRY: LEBANON |
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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br><br>f) Supporting Measures:<br><br>iii) Research activities concerning natural resources, management and environmental protection | iii) Research Activities Concerning Natural Resources, Management and Environmental Protection:<br><br>1. AMERICAN UNIVERSITY OF BEIRUT:<br><br>The American University of Beirut (AUB) is a private, non-sectarian institution of higher learning, founded in 1866, which functions under a charter from the State of New York. It is administered by a private, autonomous Board of Trustees.<br><br>The University has found faculties: The Faculty of Arts and Sciences; the Faculties of Medical Sciences; the Faculty of Agricultural Sciences. Degrees are granted under authority of the Board of Regents of the State University of New York. The institution is coeducational and women are admitted tc all Faculties. The language of instruction is English.<br><br>The programme of AUB is adapted to the particular needs and educational demands of the Middle East.<br><br>Academic Services includes:<br><br>- The University Library System.<br>- The University Museum.<br>- The University Observatory.<br>- The University Computer Centre.<br>- The University Hospital.<br><br>The School of Public Health was established in 1954 to train persons capable of participating efficiently in solving the public health problems of the region. The programmes of the School have been structured carefully around the immediate and often critical needs of the countries of the region. A Bachelor of Science in Environmental Health is offered as well as the Degree of Master of Public Health. |

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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br><br>f) Supporting Measures:<br><br>iii) Research activities concerning natural resources, management and environmental protection. | The BS in Environmental Health is the only such degree offered in the Middle East. A joint programme between the Faculty of Engineering and School of Public Health Environmental Engineering.<br><br>A number of research projects in line with UNEP's priorities are being carried out presently at the School.<br><br>The Faculty of Agricuture Science was established in 1952 in recognition of the need for a modern institution to train leaders for agricultural development in the Middle East. The Department of Crop Production and Protection is concerned with the environmental consequences of pesticides, whereas the Department of Soils and Irrigation is concerned with conservation of both soil and water.<br><br>Faculty of Engineering and Architecture: The Department of Civil Engineering offers courses in Environmental Engineering as it relates to waste water management and man and his urban environment.<br><br>Fight Pollution Club: Established at AUB in 1974 as the result of an increasing awareness of Lebanon's pollution problems.<br><br>Most of the Club's activities are to information, both in the AUB campus and in cooperation with other schools in the Beirut area. Scientific research into sources of pollution were also carried out by the Club.<br><br>2. NATIONAL COUNCIL FOR SCIENTIFIC RESEARCH (NCSR):<br><br>The National Council for Scientific Research (POB 8281 Beirut, Lebanon). Established in 1962 for the development of Scientific Research. It is entrusted, |

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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br><br>f) Supporting Measures:<br><br>i)<br><br>ii)<br><br>iii) Research activities concerning natural resources, management and environmental protection. | as per its bill of establishment, with two principal functions, The first is an advisory function whereby the Council shall:<br><br>- draw general outline of the national science policy for the development of sci tific research and the optimum utilization of the country's scientific resources for the public good;<br><br>- implement said policy by elaborating and submitting for the Government's approval work programmes the first of which shall be a five-year programme embodying this policy and taking into account the economic and social objectives proposed by the Ministry of Planning. (31)<br><br>The Second function is one whereby the Council, in its executive capacity, shall:<br><br>- foster and encourage research in fundamental and applied science, taking into consideration the general themes of the science policy adopted by the Government;<br><br>- co-ordinate, orient and organize scientific research of importance to country's economic and social development.<br><br>The research projects undertaken are classified in six main fields:<br><br>- Agricultural Science.<br>- Marine Science.<br>- Biomedical Science and Public Health.<br>- Engineering Science and Technology.<br>- Chemistry, physics and mathematics.<br>- Environmental. (31) |

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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br>f) Supporting Measures:<br>iii) Research activities concerning natural resources, management and environmental protection. | A multidisciplinary study on Lebanes ecosystems has been financed by NCSR and supervised by Prof. Ibrahim Nahal. The study started in 1973; but because of the war, the activities have greatly decreased.<br><br>Though a small research group on solar energy, NCSR has been collecting data measuring incidence of solar energy. The projects aim at determining the feasibility of photo-voltaic collection and applied thermal collection particularly for domestic use. (8)<br><br>National Council for Scientific Research (NCSR) operates a marine research centre in Jounieh.<br><br>Current Activities of the Marine Research Centre include:<br>- Institution of a pilot project for hydrographic study and monitoring of Lebanese coastal waters, with particular emphasis on pollution problems;<br>- Participation in UNEP-organized Mediterranean pollution monitoring and research pilot projects;<br>- Fisheries studies: Taxonomy, stock assessment, physiology, parasiology;<br>- Research on plankton.<br><br>3. LEBANESE UNIVERSITY:<br>At the Lebanese University, environmental studies and research are conducted at the Faculty of Science with Professor George Tohmé (Previously Chairman of the Department of Natural Science) as one of the major researchers in the field. |

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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br><br>f) Supporting Measures:<br><br>iii) Research activities concerning natural resources, management and environmental protection. | From the educational point of view, the department of Natural Science offers a compulsory course in General Ecology for the first year students, and an elective course in Applied Ecology is given to the second year student.<br><br>COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION:<br><br>Established in March 1977 and presided by Dr. Mohammed Atallah, is attached to the Council of Ministers and located in the Presidential Palace. It has authority to:<br><br>- Initiate studies related to the re-construction and development of the City of Beirut and of all destroyed agglomerations, ports, airports and highways, transport and telecommunications. It is expected to give high priority to the problem of safe water supply for the city of Beirut.<br>- It has the main responsibility for the elaboration of a comprehensive national development plan.<br>- It is authorized to negotiate all multilateral and bilateral financial and technical assistance to Lebanon.<br>- It is authorized to contract state quaranteed loans for up to LL. 300 millions for the first three years and after this period for up to 15% of the National Budget.<br><br>5. THE LEBANESE ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE ; with headquarters in Beirut, Lebanon. Gounded in 1968. (P.O.Box 7142, Beirut), Tel. 314098 Granada Bldg. Sakiet Janzier.<br><br>The Association aims to promote the cause of science in Lebanon; to encourage and develop scientific research; and to creat a climate favourable for the advancement of science. |

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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br><br>f) Supporting Measures:<br><br>iii) Research activities concerning natural resources, management and environmental protection. | It also aims to:<br><br>- Conduct necessary studies and utilize available mass media for the dissemination of pertinent information;<br>- Organize lectures, symposia and other scientific meetings.<br>- Provide moral and material support to scientists where possible.<br>- Cooperate with other organizations to further cause of science.<br><br>6. NATIONAL ASSOCIATION FOR THE PROTECTION OF THE ENVIRONMENT:<br><br>It's purpose is to establish a balance between technological progress and a pollution free environment.<br><br>The main activities cover ivestigation of:<br><br>- Preventive environmental health<br>- Modern garbage collection and disposal<br>- Anti-smog devices in factories and purification of waste water<br>- Insect control through safe insecticides<br>- Emission controls on cars<br>- Sewage treatment<br>- Launching a public awareness campaign.<br><br>Creation of a "Nationa Environment Council" bringing together experts from the public andprivate sectors. Specialized committees will be formed in the different fields of environmental pollution. The recommendations of these committees will be presented to the National Council for Scientific Research which will forward it to the authorities with the necessary follow-up.<br><br>President of the Association: Dr. Abullah Racy. |

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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br><br>f) Supporting Meaures:<br><br>iii) Research activities concerning natural resources, management and environmental protection. | 7. NATIONAL COUNCIL OF TOURISM IN THE LEBANON YOUTH CENTRE:<br><br>P.O.Bos 5344 - Beirut, Lebanon - Tel : 340940-2.<br>Director: Mr. Lionel Ghorra.<br><br>It has a programme for the Conservation of Nature. The activities for 1977-78 were as follows :<br><br>- Production of Decree 8735 (Pertainin to Cleanliness of Public Places) in a language and style easily understood by children.<br><br>- Organization of piectorial contest based on the above law.<br><br>- Strengthen cooperation between the various organizations dealing with the environment.<br><br>- Creation of environment clubs in schools.<br><br>- Preparation of an audio-visual programme for training sessions.<br><br>- Rosters for publicity.<br><br>Activities for summer 1978:<br><br>- Organization of volunteer groups for the conservation of nature.<br><br>Research Activities:<br><br>1. At AUB:<br><br>The faculty of Public Health Department of Environmental Health had launched study of drinking water, used water and industrial pollution with the principal researchers: Mr. A. Accra. G. Ayoub; N. Shmmaa; R. Melki starting date 1973.<br><br>This research project involved a preliminary investigation of the actual state of the most pressing |

ENVIRONMENTAL ACTIVITIES AND SITUATION.

f) Supporting Measures:

iii) Research activities concerning natural resources, management and environmental protection.

environmental problems in Lebanon, their causes and evolutionary tendencies. The aim was to utilize the information thus obtained for the purpose of identifying the appropriate measures for immediate and long-term implementation programmes.

Waste Water Hydroponics: A research project with a novel approach to problems associated with waste waters in Lebanon was underway at the Faculties of Medical Sciences of the American University of Beirut. The project was sponsored by the National Council for Scientific Research who have delegated their science Advisor Dr. Mustapha Soufi to be the principal investigator.

Human Settlements: Fifth-year students of Architecture at the American University of Beirut worked on study projects for the reconstruction of the Town Centre of Beirut, as part of their academic programme. The students proposed alternative solutions, taking into consideration the economic, social, political, psychological and environmental aspects. The environmental aspect was given a special concern, "to minimize sound and air pollution, and provide green areas in the Town Centre".

Marine Pollution: In 1977 the Department of Environmental Health commenced a series of observations at 35 places along the coastline, and determined the concentration of various pollutants in these locations. (3)

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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br><br>f) Supporting Measures:<br><br>iii) Research activities concerning natural resources, management and environmental protection. | - The Department of Biology has undertaken a pollution survey of the coastal waters of Lebanon comprising chemical (oxygen and nutrients concentrations) and biological parameters (plankton and maro-algae ecology), in relation to various types of pollution). (Laboratory studies are also conducted on the effects of PCBs on phytoplankton production and growth. Levels of pesticides in fish are also measured. A mari-culture study is underway on the growth of fish (Mugil ap.) using recycled sewage waste). (32)<br><br>- The Department of Geology has worked, inter alia, on surface currents and on bottom sediments pollution in relation to solid wastes.<br><br>2. At the NCSR:<br><br>Members of the NCSR are mainly professors from the Universities mentioned above. Many activities resemble to the activities of these universities or are in collaboration with them. Therefore we are hereby to mention the activities that are taking place mainly under the supervision of the Council as are entirely regardless wether they are mentioned before.<br><br>Research activities by NCSR: Dated September 27, 1972, the National Council Scientific Research in Lebanon and the Ford Foundation come to an agreement for the carrying out of a scientific investigation concerning the situation of environment and pollution in Lebanon. The research work include:<br><br>a) Pollution of the Atmosphere: Should have been implemented by the Department of Environmental Health-AUB, starting date , December 1973. |

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ENVIRONMENTAL ACTIVITIES AND SITUATION.

f) Supporting Measures:

iii) Research activities concerning natural resources, management and environmental protection.

- Principal Researchers: Dr. R. Hanna, Lebanese University.
  Dr. Jack Ibrahim, AUB.

So far two monitoring apparatuses for gas detection; and two others for dust detection have been ordered. (31)

b) Pollution of Drinking Water, Used Water, and Industrial Pollution: Should have been implemented by the Department of Civil Engineering - AUB; starting date, December 1973.

- Principal Researchers: Dr. Aftim Acra - AUB
  Mr. George Ayoub - AUB
  Mr. Nazih Shammas - AUB
  Mr. Raif Melki - AUB.

This project comprises three aspects of environmental pollution; drinking water, urban domestic effluents, and industrial emanations and effluents.

The project should have lead to a better evaluation of the impact of industrial pollution on the environment and of the dangers facing the people as a result of industrialization.

An Atomic Spectrophotometer with accessories, (the most importantpiece of equipment), has been ordered from Pye Unicam Ltd., for the amount of £6550 and has been delivered in November 1973. (31)

| 4 | COUNTRY: LEBANON |
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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br><br>f) Supporting Measures:<br><br>iii) Research activities concerning natural resources, management and environmental protection. | c) Sea and Shore Pollution:<br><br>- Principal Researchers: Professors Bason; Dib; Goedicke; Hardy; Lakkis; Mackemson; Le Cavelier; Hulings; all of whom, with the exception of Mr. Le Cavelier were from AUB.<br><br>The main fields of study included:<br><br>- Effects of Marine Pollution on Phytoplankton Productivity and Community Structure; Starting date, October 1973.<br><br>- Study of the Distribution of Surface Currents and Bottom Sediments as related to Pollution and the Central Continental Shelf of Lebanon; Starting date, March, 1973.<br><br>- Effects of Pollution on marine algae of Lebanon; Starting date, March 1973. (31)<br><br>d) Research on Fauna, Flora and Pesticides:<br><br>These research projects have been the subject of three contracts with three groups of researchers.<br><br>- Principal Researchers : Fauna Prof. G. Tohmé (Lebanese University).<br>Flora Prof. Abu Chacra and Ghaudary (AUB). |

| 4 | COUNTRY: LEBANON |
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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br><br>f) Supporting Measures:<br><br>iii) Research activities concerning natural resources, management and environmental protection. | Pesticides Dr. N. Kawar (AUB).<br><br>- Survey related to the Fauna and Flora of the Lebanese Environment.<br><br>- Survey of the condition of the Terrestrial Fauna and Study of Aviary Fauna in Lebanon. Starting date, January 1973.<br><br>The task undertaken is two-fold: to study the systematics and the distribution of the aviary species, their biomass, and the effects of their presence or absence on the biotopes; as well as to study the consequences of pollution, hunting and man-made transformations of the natural environment on these species and their migratory movements.<br><br>The project on pesticides involved the purchase of a gaschromatograph which was ordered from Varian Aerograph . (31)<br><br>Note: In addition to the joint Ford Foundation/NCSR projects, NCSR has signed two research contracts on food pollution.<br><br>e) Urbanism and Antropo-Socio-Economic Research:<br><br>This project has beentrusted to a team consisting of three peincipal researchers, namely Messrs. Shucair; Mallat; and Edde (Urbanist; Sociologist and Engineer). |

| 4 | COUNTRY: LEBANON |
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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br>f) Supporting Measures:<br>iii) Research activities concerning natural resources, management and environmental protection. | - Survey of the Anthropo-socio-economic Aspects of Pollution and Dilapidation of the Environment. Starting date, December 1972.<br><br>The project aims, at studying the natural milieu in the Lebanese agglomerations, its present degree of conservation, modification, or deterioration, then at examining the present artificial urban environment, its positive, negative, or even noxious aspects, and finally at analyzing the interactions, within the urban context, between man and his environment.<br><br>The research involves notably compilation of legislations and regulations on urbanism, study and evaluation of the conditions and results of their application, research on human and natural factor that explain the situation in which the urban environment in Lebanon finds itself.<br><br>In obtaining the conclusions of such inquiry, it will be possible to prescribe the remedies to the situation, in both the domain of legislation and those of administrative organization and educative actions.<br><br>It will also be possible to undertake a quantitative evaluation of the quality of urabn environment with the view of placing this new notion within the economic context. (31) |

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ENVIRONMENTAL ACTIVITIES AND SITUATION.

f) Supporting Measures:

iii) Research activities concerning natural resources, management and environmental protection.

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f) Research in the Field of Social Insects in Lebanon :

Starting date, December 1972.

The general nature of this project was the study of many problems related to ants; geographical distribution in Lebanon and Syria, biology and ecology of principal local species.

g) A Survey of the Incidence, Severity and Distribution of Plant Diseases in Lebanon:

Starting date, November 1973.

The aim of this project was to carry out a survey, as exhaustive as possible, on diseases that occur on cultivated plants in Lebanon, in order to determine their distribution in relation to the climate characteristics, to estimate their severity and to evaluate their economic impact.

h) Phytogeographical, Ecological and Biosystematic Research Work on the Mountains of Lebanon:

Principal Researcher : Dr. Ibrahim Nahal.
Starting date, November 1973.

This research programme groups about ten distinct projects under the supervision of Dr. Ibrahim Nahal, Professor of Ecology and Forestry at the Faculty of Agriculture of the University of Aleppo, it is one of the concerted action projects envisaged in the Council's Six Year Plan.

| 4 | COUNTRY: LEBANON |
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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br><br>f) Supporting Measures:<br><br>iii) Research activities concerning natural resources, management and environmental protection. | Its objectives was to conduct research work in phytogeography, phytosociology, ecology and biosystematics of the Lebanese mountains, the results of which will help to establish a policy for ecology in Lebanon in order to preserve, prepare and exploit rationally its natural resources (waters, soils, forests, pastures). (31)<br><br>i) Research in Surface Hydrology:<br><br>Starting date, November 1972.<br><br>The Council's programme, pursued in 1973, included the continuation of observations, the regrouping of all data presently available, and their systematic analysis, in order to attain rational forecastings of surface flows, as well as an evaluation of the total hydric statement and available underground reserves.<br><br>A research group conducted by Mr. Bocquillon, Professor at the School of Engineering of Beirut (ESIB), started this task and the work was expected to continue for three to four years.<br><br>Such research work should have laid down a rational basis to the utilization of programmes of hydraulic resources in Lebanon, and at the same time permit to form and train a team specialized in hydrology which would have rendered services in a field where vital needs are being already felt. |

| 4 | COUNTRY: LEBANON |
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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br><br>f) Supporting Measures:<br><br>iii) Research activities concerning natural resources, management and environmental protection. | The team involved in the study of rainfalls in Lebanon, in their uni-variate or multivariate analysis, in the analysis of flows of Lebanese streams and in the development of a model of rain flow transfer. (31)<br><br>j) Erosion and Weathering of Rocks and Soils in South Lebanon:<br><br>Starting date, October 1974.<br><br>The project dealt with the lithological and stratigraphical study of rock profiles of Bint-Jbeil and Naqoura area in South-Lebanon, and the chemical and mineralogical compositiin of soils of alluvial plains and terraces situated at different altitudes.<br><br>k) Minerological and Sedimentological Study of Clay Minerals of Tertiary Formations in the Bekaa:<br><br>Expected date, February 1974.<br><br>The objective of this research was to reconstitute the ancient geography or paleogeography of the Bekaa by the sedimentological analysis of clay minerals, in tracing back the limits of emerged surfaces and sedimentation basins where water-courses and streams would pour in their flow of argillaceous substances. (31)<br><br>f) Census of Aggregate Quarries (gravel and sand) in Lebanon and Study of the Physical Properties of these Aggregates:<br><br>Starting date, January 1974.<br><br>One of the most urgent problems which has arisen during last years, results from the exhaustion of sand and gravel resources on marine beached and water courses. (31) |

| 4 | COUNTRY: LEBANON |
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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br><br>f) Supporting Measures:<br><br>iii) Research activities concerning natural resources, management and environmental protection. | These practices caused landslides in the mountainous regions and distortions in coastal areas.<br><br>3) Lebanese University:<br><br>At the AUB, many research projects on the study of the environment of Lebanon have been reported.<br><br>The outcome of the various environmental studies on the fauna and flora of Lebanon led the specialists at the Lebanese University, to identify certain strategies to overcome the deteriorated environmental situation in the country, as follows:<br><br>- the establishement of wildlife reserves in different areas of Lebanon to be utilized for environmental education;<br>- the observance of the law against shooting of certain kinds of birds during specific season;<br>- the transformation of the Palms Islands (small islands on the northern coastal line) into laboratories for:<br><br>1. Botanical purposes: Aiming at the conservation of coastal plants species;<br><br>2. Zoological purposes: Aiming at transforming the islands into a resting-place for the birds;<br><br>3. Oceanographic purposes: Aiming at conducting research for the conservation of certain sea animals. |

| 4 | COUNTRY: LEBANON |
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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br><br>f) Supporting Measures:<br><br>iii) Research activities concerning natural resources, management and environmental protection. | Dr. Nasri Kawar, conducted research on one of the major factors of food and water pollution in Lebanon namely: Pesticides, His research dealt mostly with pesticides residues in biological materials and soil and water related to food production. The drifts of pesticides in soil were considered by him as a major problemd in Lebanon ; hence the urgent need for abandoning certain pesticides, and the need for new legislations to this effect was considered. (11)<br><br>Institution having Activities in Agricultural Research and in Combating Desertification:<br><br>- Ministry of Agriculture:<br>a) Agricultural Research Insitute, Tal Amara, Rayak.<br>b) Directory of Forestry, Ministry of Agriculture, Beirut.<br>c) The Green Plan, Ramlet El Baida, Beirut.<br><br>Agricultural Research Insitute started its activities in 1952. In 1964 became an independent organization with five main departments horticulture, crop production, soils , irrigation and breeding.<br><br>The Insitute has affiliated stations: El Fanar, Terbel, El Abdah, Kofrdan, Nabaah, Sour and Zghortah. Research activities include soil surveying, soil chemistry, fertilizer trials, water requirements, methods of irrigation, soil management, dry farming, crop and fruit trees varieties, entomology, plant pathology, animal and dairy production, biochemistry and vaccines production. (33) |

| 4 | COUNTRY: LEBANON |
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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br><br>f) Supproting Measures:<br><br>iii) Research activities concerning natural resources, management and environmental protection. | - Universities:<br><br>Research activities were related to soil mineralogy soil nutrients, dairy production and processing, development of new crops and varieties, plant pest control, economic and sociological aspects of agriculture and food processing. (33)<br><br>Faculty of Sciences, Lebanese University, Choueifat.<br><br>Faculty of Agriculture, AUB - Agricultural Research and Education Centre (AREC) in Beqa'a.<br><br>- National Council for Scientific Research:<br><br>Bir Hassan, Beirut.<br><br>- Litani River Authority, Ministry of Power and Hydro-Electric Resources.<br><br>- Marine Research Centres:<br><br>The following laboratories are dealing with marine science research in Lebanon:<br><br>- The National Council for Scientific Research (NCSR)<br>- The American University of Beirut (AUB)<br>- The Lebanese University of Beirut (LUB)<br>- The Ministry of Agriculture.<br><br>The NCSR is supporting projects within marine science carried at varicus laboratories. In addition the NCSR is directly financing two laboratories within marine science research.<br><br>A laboratory located at the custom house in Jounieh where the main objective is taxonomy on fish samples.<br><br>Another laboratory is established in a rented flat of approximately 100 $m^2$ in an appartment house in |

| 4 | COUNTRY: LEBANON |
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| ENVIRONMENTAL ACTIVITIES AND SITUATION.<br><br>f) Supporting Measures:<br><br>iii) Research activities concerning natural resources, management and environmental protection. | Jounieh. This laboratory is planned for a staff of 3-4 scientists with 3-4 assistants. The topics to be dealt with are physical and chemical oceanography and marine biology. (34)<br><br>Other Research Activities:<br><br>- A number of studies have been carried out on the various ports on the Lebanese coast over the past ten years.<br><br>It is known that consideration has been given to the overall coastal requirements for search and rescue operations and for anti-pollution requirements. The degree of detail to which the studies were carried out is not known but recommendations were put forward by the department of the Director General of Transport for the purchase of anti-pollution equipment and materials and for establishing search and rescue units at Saida, Beirut, Batroun and Tripoli. The anti-pollution equipment and materials have been ordered. (21)<br><br>A number of isolated preliminary investigations aimed at the assessment of the quality of the Litani River water have been carried out in the past decade the last and most comprehensive being in 1975. (2)<br><br>The Association of Lebanese Indistrialists will conduct a survey on the environmental impact of industries, to serve in adopting appropriate zoning measures. Mr. Marwan, Secretary General of the Association, was quoted as saying: "The Association will seek the advice of UNEP in the preparation of this survey". |

| 5 | COUNTRY: LEBANON |
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| UN BILATERAL PROJECTS.<br>(Global, regional and country level) - UNEP Fund. | Agriculture:<br><br>- Project Lebanon 438: Integrated Development of Lebanese Mountain Areas:<br><br>On behalf of Lebanese Government the authority for this project was the Green Plan and the WFP was the main supporting agency. One of the main activities was the production and distribution fruit trees.<br><br>In order to help promote the Lebanese agriculture to FAO has donated 1900 tons of potatoes that were sold to the Lebanese farmers at US $ 50 per ton while the market price is US $ 100 per ton and 10,500 MTN of Ammonium Nitrate to be sold at US $ 120 per ton, the market price being US $185. (24)<br><br>Waste Management:<br><br>"The National Waste Management Plan". (LEB/77/033/A/01). The Executin Agency: World Health Organization (WHO, and the Government Cooperating Agency: Council for Development and Reconstruction (CDR), Sector: Health and Sanitation; Sub-sector: Sewerage, Drainage and Solid Wastes.<br><br>The project was planned to start in June 1978, for a duration of three years. (14) Unfortunately, due to the events in the Country, |

UN BILATERAL PROJECTS.

(Global, Regional and country level) - UNEP Fund.

the project activities were delayed and it started in the second half of 1980.

- The United States has given $ 6.5 million to the UN Children's Fund (UNICEF) to repair water distribution systems in south Lebanon and elsewhere . The grant was made at the Government's request.

| 6 | COUNTRY: LEBANON |
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| REGIONAL OFFICE SUPPORT TO GOVERNMENT AND TO UN AGENCIES. | - The United Nations Environment Programme's Regional Office for Western Asia is located in Beirut.<br><br>- The Lebanese Government asked for the contribution of UNEP to the Green Plan Project which had been initiated in 1975. And stopped because of the Lebabese civil war.<br><br>- UNEP in cooperation with ECWA have identified priority programme areas as subject for particular cooperation such as Human Settlemtns of Technology, Arid lands and the National Management of Water Resources, Industrial Pollution and the Introduction of Environmental Dimensions in all Development Plans and Programmes.<br><br>- During June and July of 1980 the Director and the Deputy Director of UNEP/ROWA held several meetings with the President and members of Council of Development and Reconstruction (CDR) for Lebanon, as well as with the representatives of non-governmental organizations, that have activities in the field of environment, and urged them to establish a High Council for the environment. It was hoped that before the end of 1980 the establishment of the Council would have been announced. |

| 7 | COUNTRY: LEBANON |
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| AGENCY PROGRAMMES OF ENVIRONMENTAL RELEVANCE. | Regional Food Programme:<br><br>The Arid Lands Agricultural Development (ALAD) Programme of the Ford Foundation began in 1968.<br><br>Funds and foreign specialists were provided by the Foundation while the Agricultural Research Insitute (ARI) of the Government of Lebanon agreed to make available the staff and certain physical facilities of three agricultural experiment stations in Lebanon's Bekaa Valley and two in the Coastal Plain.<br><br>The objectives of the programme can be briefly stated as:<br><br>(1) To increase the productivity of agriculture in the region.<br><br>(2) To increase the capacity of national insitutions to sustain increasing agricultural productivity, and<br><br>(3) To strengthen the professional linkages among national scientists in the region and between them and centres of agricultural excellence located elsewhere. (35) |

| 8 | COUNTRY: LEBANON |
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| AVAILABLE BACKGROUND INFORMATION ON ENVIRONMENTAL SOURCES<br><br>a) Survey, reports, reserves and their availability;<br><br>b) Personnel and expertise. | a) Surveys, reports, reserves and their availability.<br><br>Refer to chapter 9: References.<br><br>b) List of Personnel and Expertise.<br><br>American University of Beirut<br>P.O.Bod 23611.<br><br>1. School of Public Health:<br>a- Dr. Aftim Acra (Water Pollution);<br>b- Dr. H. Armenain (Health);<br>c- Dr. J.Ibrahim (Air Pollution).<br><br>2. The Faculty of Agricultural Science<br>a- Dr.N.Kawar (Pesticides);<br>b- Prof. Abu Chacra (Flora);<br>c- Dr.N.Daghir (Animal by Products);<br>d- Dr.A.Saghir (Weed Control).<br><br>3. Faculty of Engineering and Architecture:<br>a- Mr.G.Ayoub (Water Pollution);<br>b- Mr. N.Shamas ( " " );<br>c- Mr. R. Melki ( " " );<br>d- Mr.H.Hoelscher - President of AUB (Industry and Environment);<br>e- Mr.K.Kano - Dean.<br><br>4. Medical Sciences:<br>a- Dr.M.Soufi (Hydrophonics).<br><br>5. Faculty of Arts and Sciences:<br>a- Dr.Monab Jeha (education) |

| 8 | COUNTRY: LEBANON | |
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| AVAILABLE BACKGROUND INFORMATION ON ENVIRONMENTAL SOURCES.<br><br>b) Personnel and expertise. | NCSR P.O.Box 8281. | a- Dr.J.Naffah (Secretary General);<br>b- Mr.J.Naggear - President;<br>c- Dr.H. Kouyoumdijian- Director Marine Research Centre, Jounieh,<br>d- Dr. George Ruwaiheb- Deputy President. |
| | Lebanese University. | a- Prof.G.Tohmé (Fauna);<br>b- Dr.R.Hanna (Air Pollution). |
| | Council of Development and Reconstruction (CDR) Presidential Palace. | a- Dr.M. Atallah-Chairman;<br>b- Dr.Sabbah Al-Hajj - Deputy Chairman;<br>c- Mr.H.Demifjian (Waste Management Plan)<br>d- Dr. Antoine Rabat - Member. |
| | Lebanese Association for the advancement of Science-LAAS.<br>P.O.Box 7142.<br>Tel: 314098. | |
| | National Association for the Protection of the Environment. | a- Dr. Abdullah Racy president |

| 8 | COUNTRY: LEBANON |
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| AVAILABLE BACKGROUND INFORMATION ON ENVIRONMENTAL SOURCES:<br><br>b) Personnel and expertise. | Council of Tourism in Lebanon - Youth Centre, P.O.Box 5344. — a- Mr. Lionel Ghorra Director.<br><br>Lebanese Association of Industrialists - Chambre of Commerce. — a- Mr. Fouad Abi-Saleh - President.<br><br>Lebanese Federation for the Protection of the Environment. — a- Dr.Kamal Medawar - President.<br><br>Various Ministries<br><br>1. Green Plan (Ministry of Agriculture):<br>a- Mr. Malek Basbous.<br><br>2. Directorate General for Urbanism:<br>a- Mr.M.Fawaz - Director General;<br>b- Mr.M.Nammar.<br><br>3. Ministry of Planning:<br>a- Mr.Abi-Zeid (Industry);<br>b- Mr.R.Chami (Industry);<br>c- Mr.Kasparian (Statistics);<br>d- Mr.A.Salam (Council).<br><br>4. Ministry of Industry:<br>a- Mr. Alfred Debs (Director). |

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