Republic of Lebanon
Ministry of Environment

Biological Diversity
First National Report to Conference of Parties

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LEBANON AND BIOLOGICAL DIVERSITY

A. INTRODUCTION

Lebanon has adopted and signed most international conventions . To meet its obligations to the convention on Biological Diversity (CBD) and fulfil the requirements of Article 6 and 26 , the government of Lebanon has requested financial and technical assistance from United Nations Development Program (UNDP) / Global Environment Facility (GEF) . Article 6 calls for developing national strategies and action plans to conserve , study and sustainably use biological diversity . Article 26 , requires contracting parties (national governments) to present reports on measures taken to implement provisions of the convention and their effectiveness to meet its objectives , to the Conference of Parties (CoP) .

The government and non-governmental organizations have been actively involved in resolving and developing better understanding to environmental problems through awareness campaigns, international conventions and legal approaches.
The conservation and sustainable use of natural resources are major objectives of both public institutions and private societies on the international, regional and national levels.

The earth is facing serious environmental problems including pollution, soil erosion, climate change and ozone layer depletion. These gross changes in the environment and increased human pressures on natural resources have a global impact on the loss of biodiversity.
The Lebanese ecosystems are small and tight, and their biotypes are definitely struggling against a changing environment . The national ecosystem is very rich, 9119 species (identified 1996) of which 4633 are plants and 4486 belong to the animal kingdom. It is estimated that about 20% of the species are identified and this richness needs further identification.

Lebanon is an excellent host for the oldest civilisation and the Lebanese have found uses for natural resources since the discovery of red-dye in shellfish (Murex) and used cedarwood to build boats and ships . The silk industry once perfectioned in Kartaba has moved west to Cordoba in Spain and far west to Cordova in Argentina .Ancient activities coupled to population pressures and weak planning have resulted in the degradation of the environment and relatively worn out ecosystems .

Right after World War I , awareness on the value of genetic resources of plants was realised and some seed collections stared since 1930 . With the establishment of the Food and Agriculture

Organisation (FAO) , more focus was made on the productive values of commercial plants and animals Lebanon was a major participant in the United Nations programs and in FAO activities .

Lebanon has signed many conventions related to nature conservation and biodiversity protection as shown in table 1.

Table1. Recent Conventions Related to Environment and Biodiversity and Adopted by Government of Lebanon

YEAR	STATUS	CONVENTIONS	OBJECTIVE
1994	Ratified	Basle Convention	Transboundary of Hazardous wastes
1994	Ratified	Convention on Biodiversity	Conservation of Biodiversity
1993	Ratified	Montreal protocol on Ozone (Montreal 1987)	Reduce the rate of ozone depletion
1996	Ratified	Convention to combat Desertification	Reduction in land degradation
1995	Ratified	Climate change	Reduce greenhouse gases (GHG)
1982	Signed	Convention on Conservation of migratory species of wild animals	Habitat & animal conservation
1990	Ratified	Convention concerning the protection of the world cultural and natural heritage (Paris 1972)	Identify, conserve, and protect the natural heritage
	Signed	Convention on Wetlands of International Importance	Wetland & waterfowl conservation
1997	Ratified	Convention to Desertification Combat	

Internationally assisted programs and projects related to Biodiversity are :

Climate Change
Biodiversuty Enabling Activity
Sustainable Development Networking Program
Capacity 21
Protected Areas Project
in progress are two projects : Desertification , Agrobiodiversity

In a highly mountainous country (3090 m highest peak) with extreme variability in climatic conditions, soils, socio-economic status and a long coastal strip becoming urbanised, it is certain that natural and commercial vegetation are under over-exploitation. The largest area in Lebanon is that covered by mountains, sparse grassland and desert areas ~ 31%. Agricultural and annual crops area cover over one fifth of the country and it is reported that a high proportion of the population (30-50 %) is involved in agriculture or related activities.

Grazing areas having grassland and forbs add up to 15 % of the total area and barren rocks cover an area similar to forest land ~ 7%. Fruit trees are famous, popular and satisfy local needs with some export potential. The total area covered by these trees is over 5% and includes vineyards, deciduous fruit trees, citrus and bananas. Olives continue to constitute a major old, durable crop and are most abundant in North and Mount Lebanon areas. Vegetables are grown in winter and summer so they provide a continuous market supply. The Mount Lebanon area used for vegetable production is the largest, being close to city market facilities.

The soils of Lebanon are typically Mediterranean in character, exhibiting similarities related to climate, exposure, slope and vegetation. The lithology has contributed to the diversification of soil resources that are mainly evolved from the parent material. Most of the soils are calcareous except for the sandy soils formed on the basal cretaceous strata. The most widely represented soils are the Terra-Rossa and the Rendzinas. On the steep landscapes of Mount and Anti-Lebanon ranges, where water erosion can be extreme, the fersiallitic soils often develop into Lithosols.

The soils of Lebanon are young and fragile and prone to erosion specially in the mountain and hilly lands that form 73 % of the country. Relief, rainfall intensity and runoff quantity contribute to the intensification of water erosion specially that Lebanon is witnessed by the stratification of alluvial outwash terraces of the coastal rivers.

Meteorological observations indicated that there are large seasonal variations where, between 80-90% of the annual rainfall falling between November and March and less than 5% falling between May and September. In addition to the violent downpours that can result in serious flooding and erosion.Mean annual rainfall on the coast ranges between 700-1,000 mm, increasing along south-north direction. Mount-Lebanon forms a barrier to the movement of rains and precipitation can reach more than 1,400 mm per year, most of which is received as snow.

Rainfall declines rapidly on the eastern facing slopes of the Mount Lebanon range and reaches only 600 mm on the foothills. Precipitation in the bekaa plain ranges from 800 mm in the south Bekaa to below 200 in the extreme north-east of the plain. Precipitation on the Anti- Lebanon range is around 600 mm and peaks at over 1,000 mm in the Jabal Al-Sheikh.

The mean annual temperature on the coast varies between 19.5 ^{o}C and 21.5 ^{o}C and decreases approximately 3 ^{o}C for each vertical 500 m, reaching 15 ^{o}C at 1,000 m and 9 ^{o}C at 2,000 m. January is the coldest month with daily mean temperatures falling to -4 ^{o}C in the mountains and 7 ^{o}C at the coast, in Saida. The warmest months are July and August, when temperatures reach as high as 33 ^{o}C. Mild day and night variability in temperature is experienced along the coast, around

6-8 ^{o}C and an extreme up to 24 ^{o}C is observed in the Bekaa with the changing season (Spring and Autumn).

The geomorphological regions overwhelmed by the high variability in soil, rainfall and temperature have resulted in a variable and inclusive biodiversity richness and relatively small ecosystems. Ecologically, these regions are distributed according to the following levels:

a- **Lower Mediterranean zone or Thermomediterranean** (0-500 m altitude). It is characterised by the presence of endemic species such as *Ceratonia, Pistacia, Pinus*, and *Myrthus*.

b- **Euremediterranean zone** (500-1000 m altitude). The most abundant plant species are *Quercus, pinus*, and *Cupressus.*

c- **Supramediterranean zone** (1000-1600 m altitude). The most prevailing plant species are *Quercus, Ostryae, Fraxinus, Cystisus, Halimium,* and *Pinus.*

d- **Mediterranean mountain zone** (1500-1800 m altitude). At this high elevation, *Cedrus*, *Abies, Juniperus, Quercus,* and *Berberis* are most prominent and endemic species.

e- **Oromediterranean zone** (over 2000 m altitude). *Junipers, Rhamnus, Berberis, Pirus*, *Prunus, Daphne,* and *Cotoneaster* survive the harsh environment.

f- **Pre-steppe Mediterranean zone** (900-2400 m altitude). It is located at the east side of Mount-Lebanon and north side of Anti-Lebanon in the Northern part of the country.
degraded soils, drought and cold make it hard for phytosociological association to develop easily. The main species to be found are *Quercus* and *Junipers*.

B- PARTICIPATORY PLANNING

Under the authority of The Ministry of Environment , a National Steering Committee was established . This committee represented a large number of institutions with direct or indirect interest in biological diversity . The education system is represented by four faculties of agriculture and four faculties of science. The Non- Government Organisations (NGO's) are represented by two umbrella unions . Representation from public institutions included the National center for Scientific Research (CNRS) , The Agricultural Research Institute (ARI) , The Green Plan, Council of Development and Reconstruction and Urban Office . The Ministries of : Information , Municipalities , Commerce , Transport , Hydro-Electric Resources, Agriculture are also represented . The participatory approach adopted and exploited by the project involved contacts with over thousand individuals , members of clubs , schools , teachers , NGO's , public and private institutions , scientists , administrators and international organisations . Contracts

were made with IUCN (International Union for Conservation of Nature) to provide technical backstopping , and fourteen national consultants to draft reports on biodiversity in terrestrial, marine , fresh water and agricultural habitats . Legal advise and socio-economic inputs were also contracted .

Public awareness activities were numerous and continuous . A project website was established within The Ministry of Environment net: http // www. moe .gov . lb / biod., and background information on Biodiversity planning was prepared by IUCN. A T. V. spot expressing the importance of plants and animals was (is) shown on T. V. stations in Lebanon, and a poster representing the cycle of life was prepared with Arabic and English sub-titles (2000 copies).

A pamphlet covering information on three plants and three animals was distributed to over 800 individuals who participated in various activities . Caps , pads , folders carrying biodiversity identifications were distributed to participants in workshops .

The workshops were held as follows :
First National workshop : Feb , 19 , 1998 - Marriott Hotel , 72 participants .
North Lebanon workshop : June,19 ,1998 - Balamand University, 74 participants.
Bekaa' workshop : July , 8 , 1998 - Chtaura Park Hotel , 77 participants .
South Lebanon workshop : July , 31 ,1998 - Chamber of Industry , Commerce and Agriculture , Saida , 85 participants .
Mount Lebanon workshop : August 20 , 1998 - Kasr El-Mir Amin , Beit Eddine , 110 participants .
Proceedings of the First National Workshop (110 copies -English) and Provincial Workshops (400 copies - Arabic) were disseminated to participants and interested individuals and institutions.

The major outcome of the process is the national strategy which aims at satisfying the identified objectives . The objectives and action plan focus on conservation, sustainable use and benefit sharing .(refer to Strategy and Action Plan)

C- STATUS AND TRENDS

Lebanon which is a small country is a favourite area for the study and conservation of various flora and fauna. For each geographical region which is characterised by its sociological features, there is a group of special plants and animals that reflect certain particular ecological conditions. However this variability and the favourable climatic conditions are the direct cause for human overpopulation which exercises severe destructive pressures in the environment endangering the biodiversity state.

Regarding the terrestrial flora in Lebanon, half of the wild species of fodder plants are endangered due to uncontrolled urban development, over-grazing and land reclamation which constitute a great threat to the habitat. Other types of plants are estimated to have a higher endemism and are not at a great risk of extinction.

As a result of the destruction of the vegetation cover by various factors, disturbances to the overall terrestrial fauna is encountered. There is a wide variety of vertebrates, of which birds are the most abundant and are nowadays at a lower risk of extinction-specially after the decision of the Ministry of Agriculture and Ministry of Environment to organise hunting activities. Invertebrates, in particular insects form the most abundant and widespread group of land fauna.

There is a wide variety of wild animals from which some were already extinct by the beginning of the 20th century like the Syrian brown bear, the Asian leopard, the Persian lynx, the deer, the Arabian gazelle and the golden hamster in addition to the lion which disappeared in the 16th century. The other species which are close to extinction include the wolf, the wild cat, the mongoose and the squirrel, whereas the rare species include three shrews, eleven bats, the weasel and spiny mouse. Still exist a variety of species which are vulnerable like the four species of bats, the wild boar, and the common field mouse.

The marine and coastal flora and fauna in Lebanon are considered to be Mediterranean with some sub-tropical elements. Phytoplankton which includes all microphytic algae, constitute the basis of the food chain in the sea through their primary productivity, the micro and macrophytic benthic algae are highly affected by the coastal pollution.

In addition macro-zooplanktons are highly abundant in the Lebanese water and of various types, including crustaceans which are prevalent as well as fish species which are disturbed by early fishing and unsafe fishing methods. Among the marine fauna species, which are highly at risk and on their way to extinction, are the four marine turtles due to heavy solid waste disposal into the sea. From the mammalian category only dolphins are commonly recognised as Mediterranean animals.

For the fresh water biodiversity, many disturbances affecting sources and rivers weaken fresh water communities and this result in the elimination of the ecologically weak species specially those sensitive to pollution and increase in the number of taxa with high ecological valence. Drainage, pollution and human interference have drastically changed the fresh water ecosystem and resulted in a high proportion of endangered species.

D- CAUSES OF LOSS

The main threats to biodiversity vary between social, economical, agricultural and cultural factors. However the major threats encountered to the terrestrial flora and fauna could be either of natural origin or man-made. Occasional floods are common, thus destroying the natural habitat of many wild plants where fertile soils are dragged into the sea. In addition, air pollution which has a direct effect on the global warming leads to disturbances of the whole species and their surrounding. On the other hand, forest fires were very common specially during the war, as well as those caused by human intervention.

Urbanisation is another major threat to biodiversity, whereby expansion of cities and suburbs towards the rural areas due to the population growth, is destroying the coastal and agricultural areas, in addition to the threat to forestry particularly along the western slope of Mount Lebanon. Quarries and sand removal activities had for a long time a major impact on both the flora and fauna and the surrounding environment, however decisions to plan these activities are relatively helping in conserving the remaining areas .

Excessive use of pesticides has a contamination effect along the food chain. Atmospheric pollution from industrial emission in addition to over-grazing prohibit the generation of the natural plant cover and lead to the disappearance of biotypes thus endangering them to final loss. Newly introduced species are invading the natural habitat and threatening the existence of the natives especially among agricultural crops as well as animals and in the field of ornamentals. All the above mentioned factors, in addition to some unsafe agricultural practices related to intensive production, green-houses, etc.. are a real threat to both terrestrial flora and fauna and contribute indirectly to increased pressure on marine and fresh water habitats.

On the other hand, coastal development has wiped out the coral reef and near shore communities. Different sources had increased the degradation of both marine flora and fauna including solid waste disposal which winds up in the sea, and industrial and wastewater discharges, in addition , practising some kind of activities such as diving and fishing using explosives. Moreover, introduction of native species and over-harvesting lead to extreme losses and threat to the whole ecosystem.

Regarding fresh water ecosystem, it is seriously threatened today due to chemical and thermal pollution, over-harvesting and habitat modification due to the construction of dams, drainage canals and over-pumping which are major factors contributing to the decline in fresh water ecosystem.

Extreme losses to land resources are encountered due to excessive overgrazing and the excessive use of chemical fertilisers. In addition, soil erosion by wind and water due to poor agricultural practices and sporadic excavation for the production of construction material also contribute to a more aggravated situation.

Among the most important factors leading to land degradation is pollution from various sources. It includes industrial discharges, uncontrolled dumping of solid and toxic wastes. These factors together exert a direct effect on natural habitat which is under high risk of becoming poorer with time.

Concerning Agro-biodiversity, construction of touristic resorts or other different projects had lead to the destruction of large sensitive zones where biodiversity is strongly endangered. Introduction of a variety of crops which are replacing the traditional ones because this system is more profitable, since it requires high production inputs, is exerting a pressure on land races and wildlife in the area.

However, the protection of a small coastal zone north of Lebanon, lead to the reappearance of the green turtles and the Palm island reserve has provided opportunities for some birds to show up

again. The provision of drinking water for grazing animals, kept the herds from entering the Arz-El-Chouf reserve and provided the chance to re-establish a balanced ecosystem.

One shouldn't ignore the effect of overgrazing and natural hazards in destroying the natural habitat of many wild plants and animals.

Livestock biodiversity includes the wild types and local breeds which are quickly disappearing from the rural areas, in addition to other domesticated species since they are no more economically significant. Furthermore, wild relatives are threatened by extinction due to excessive hunting or change in habitat and the local breeds are gradually being replaced as a result of their poor competence. Farmers who still have interest in land races and local breeds are becoming fewer with time as they all belong to the elder generation.

E- ACTIONS TO ACHIEVE THE OBJECTIVES OF CBD

1)- Biodiversity Evaluation

Nature has provided humans with food and shelter. Urbanisation and modernisation intensified food production and expanded urban centers to put more pressure on natural resources. Rural communities depend more on direct use of plant and animal resources, than urban centres. The processed natural products reach the cosmopolitan market and make estimates of direct plant-animal contributions to social welfare highly approximated values. Lebanon is a net importer of food, feed, industrial products and raw materials and biodiversity issues are relatively new in the socio-political sense. The economical assessment for different threatened species and natural resources is needed to set priorities and establish what are the steps that should be considered first. The distinction between commercial and natural can not be a strict phenomenon.

Natural resources direct utilisation contributes to the Lebanese economy, a very sizeable share, and may be considered as underestimate of the actual situation.

Table 2 - Biodiversity In -Situ Conservation, Protected Areas: Lebanon

ORGANIZATION	TARGET	REFERENCE	YEAR
Reserves classed by law			
Ministry of Agriculture	The park of Palm Islands	121	1992
	The nature reserve of Horsh Ehden	121	1992
	The reserve of Arz-El-Chouf	127	1991
Areas whose protection has been decreed by ministerial orders			
Ministry of Agriculture	The fir forest of Qammouaa	558	1996
Ministry of Agriculture	The nature reserve of Saissouk	1/166	1991
	The protected zone of Arz Bcharre	434/443	1939
	The Valley of Qannoubine		1939
National Council for Scientific Research	The Batroun maritime reserve	129	1991
Ministry of Agriculture	The reserve of Hbeline	1/152	1992
	The reserve of Jabal Turbol		
Ministry of agriculture	The reserve of Kfar Zabad	1/71	1992
	The reserve in the region of Bass in Tyre	166	1933
Ministry of Agriculture	The coastal reserve of Sour		1998
Ministry of Agriculture	The reserve of Kherbet Silm	1/21	1992
Private initiatives to conserve natural areas	The park of Bentael		1980
	The mixed forest of Baabda		
	Animal Encounter, Aley		
	Khallet Kazem		
New areas that should be protected	The Quercus cerris forest in Fneidek		
	The cedar of Souaissi		
	Reserve of Assi		
	The plateau of Sir Dinnyeh		
	Reserve of Qornet El Saouda		
	The cedar groves of Tannourine &		
	Hadath El Jobbe		
	Reserves of Ras El Chaqaa-Hannouch		
	Houjoula & Haqel		
	The high plateaux of Aqoura		
	The valley of Nahr Ibrahim		
	The valley of Nahr El Kalb		
	The Pigeon Rocks		
	Reserve of Yahfoufa		
	The marches of Aammiq		
	The region of Balou Ayha		
	Reserve of Jabal El Cheikh		
	The mixed forest of Dalhoun		
	The valley of Nahr El Dammour		
	The valley of Qasmieh		

2)- Conservation

Major legislative and implementation steps were taken by the government to conserve nature. The project on protected areas assists in management and legislation of the reserves of palm island , Horsh Ehden and Arz-El-Chouf. The Protected Areas system for in-situ conservation of Biodiversity is becoming more extensive with better understanding of the Biodiversity value as shown in the following table (edited from Country Study on Biodiversity)

3) Implementation

Conservation of natural resources is a new venture to the Lebanese public institutions . There was formal awareness about environmental management and conservation long ago .The summary of activities in terms of legislation and biodiversity value to the decision makers, shows that in the past few years a sizable number of habitats was declared and legalised as protected areas . The Ministry of Agriculture and the Ministry of Environment are joining hands to encourage the political system to take decisions for the benefit of biodiversity conservation and richness in Lebanon . The development plan stared in 1993 for ten years and did not include any direct budget allocation to biodiversity conservation . However , health and environment received 7% of the total and waste water projects received 13 % . Irrigation and agriculture received $ 360 M from the plan . These have direct and indirect relationships with the status of biodiversity . Bilateral and international support are directly related to biodiversity issues and the first three protected areas shown in table 2, are temporarily managed and operated via international resources (GEF / UNDP / IUCN) . All other protected areas decreed by law and statutory orders receive formal support in either administrative , legal or financial forms . The new areas listed in table 2, to be protected , are those mentioned by various scientists and summarised in the country study on biodiversity .

4) - Legislation

Legislation covering human rights regarding man living in a healthy environment has started long ago since the Ottomans . Nevertheless , fragmentation of the continuity in legislative matters continues to be a drawback within the Lebanese society . The difficulties in applying and / or implementing existing laws is a distinctive phenomenon in Lebanon . Many decisions regarding Environmental issues were taken by the government in the past few decades (reviewed in first national workshop on Biodiversity , Beirut , 1998) (refer to Strategy and Action Plan).

F- CURRENT CAPACITIES

The free economical system and the democratic regime allow for a multi-organizational system to exist in terms of higher education, agricultural research, environmental science and related training. Biodiversity education is still at infant age, though environmental awareness is expanding at a rapid rate. University education is trying to satisfy socio-economic requirements.

Faculties are being developed to cater for the applied sciences and technological subjects.
There are surpluses of graduates in many fields and a definite shortage of specialists in Biodiversity. Instruction courses are being added to curricula in some faculties and germplasm research started few years ago with international and bilateral support.

Many institutions are young and depend on part-time specialists, specially the faculty of Agriculture at Saint-Joseph and Saint-Esprit universities. It is evident that the institutional analysis carried out in 1997 indicated some kind of specialised interest in each involved institution. Saint-Joseph University has recently started a program on eco-tourism which sounds attractive in the Lebanese Society.

Interdepartmental programs are being implemented to cover sustainable development and conserve nature. These programs help in the establishment of centres of excellence for research and training in specified fields.

Various reports have indicated the need for taxonomists up to the extent that extremists consider that taxonomists are not only endangered but are on the way of becoming extinct. In Lebanon, over 9119 species of plants and animals were identified (20% estimate) and a higher number (43500) remains to be identified. Non- governmental organisations are expanding in size, number, and efficiency in raising environmental issues to top priorities of mass media resulting in involvement of the public and its contribution to more practical decisions. A sizeable number of NGO's focuses on Biodiversity with evident interest in the plant kingdom, notably, trees. Many NGOs are young and consequently need to build their own capacities.

Research to identify , study, conserve and use these species is needed. Institutions have to be strengthened to carry out these activities. Training is badly needed in the fields of Taxonomy, genetic resources, conservation (In-situ, Ex-situ), ecology, resource management, forestry, planning and data processing.