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Acronyms

BML	Beirut and Mount Lebanon
CCZED	Cost of Coastal Zone Environmental Degradation
CDM	Clean Development Mechanism
CDR	Council for Development and Reconstruction
CEA	Country Environmental Analysis
CIF	Climate Investment Fund
COED	Cost of Environmental Degradation
COH	Cost of Hostilities
COM	Council of Ministers
CPS	Country Partnership Strategy
EC	European Commission
EDL	Electricité du Liban
EDRAC	Environmental Degradation, Remedial and Averted costs
EIA	Environmental Impact Assessment
EIB	European Investment Bank
EMP	Environmental Management Plan
EP	Environmental Protection
ERS	Environment-related spending
ESCWA	United Nations Economic and Social Commission for Western Asia
GDP	Gross Domestic Product
GEF	Global Environmental Fund
GIZ	Gesellschaft für Internationale Zusammenarbeit (previously GTZ)
GOL	Government of Lebanon
IDAL	Investment Development Authority of Lebanon
IFC	International Finance Corporation (World Bank Group)
IEE	Initial Environment Examination
IMFU	Independent Municipal Fund
LRA	Litani River Authority
METAP	Mediterranean Environmental Technical Assistance Program
MOA	Ministry of Agriculture
MOE	Ministry of Environment
MOET	Ministry of Economy and Trade
MOEW	Ministry of Energy and Water
MOF	Ministry of Finance
MOI	Ministry of Industry
MOIM	Ministry of Interior and Municipalities
MOPH	Ministry of Public Health
MOPWT	Ministry of Public Works and Transport
MOSA	Ministry of Social Affairs
NA	Not available
NERP	National Emergency Reconstruction Program
NGO	Non-governmental organization
NCSR	National Center for Scientific Research
NL	North Lebanon

NSEQ	National Standards for Environmental Quality
O&M	Operations and Maintenance
OMSAR	Office of the Minister of State for Administrative Reform
PERE	Public Expenditure Review for the Environment
RUM	Resource Use and Management
RWE	Regional Water Establishment
SEEA	System of Integrated Environmental and Economic Accounting
SL	South Lebanon (includes the Mohafazat of Southern Lebanon and Nabatieh)
SME	Small and Medium Enterprise
SOER	State of the Environment Report
SW	Solid Waste
SWM	Solid Waste Management
TA	Technical Assistance
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
US$	United States Dollar
W	Water
WTE	Waste to Energy
WW	Wastewater

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Executive Summary

Environmental Overview

i. After the post-war reconstruction period that started in 1990-1992, Lebanon made spectacular improvements to repair the scars of the wars by investing heavily in public infrastructure, roads, highways, airports and harbors, communications, commercial estates, and high and middle-income housing. The strong recovery had its costs as rapid accumulation of public debt to unsustainable levels reached US$ 51.2 billion by end 2009 or 145% of GDP, excluding the debt of the Banque du Liban, payment arrears, and loans directly contracted by public entities. Growth slowed down after the initial boom of post-war reconstruction from 8% during 1987-1997 to zero in 2006, mainly due to the aftermath of the July 2006 hostilities, though it is projected to reach again 8% in 2010 and 4% on average during the 2011-2015 period.

ii. The environmental neglect had an impact on the economy and resulted in a degradation amounting to US$ 565 million in 2000 or 3.4% of GDP for local environment and US$ 655 million or 3.9% when global environment is included. Environment has remained a secondary priority, characterized by an uncompleted legal and institutional framework as well as by ineffective policies to address the challenges and political constraints to deliver reforms. These challenges are:

- **Regional disparities in poverty levels are significant** with most poor areas being rural and with poverty pockets found within and around cities. Poverty in these regions is related to the lack of public infrastructure and services, lack of employment opportunities, population density, school dropout, and child labor, particularly in the northern region of Lebanon (i.e. Hermel and Akkar).
- **There are still continued pressures on Lebanon's** natural resources, especially water, of which 64% is for agriculture and 26% is for domestic demand with 1-2 days a week limited access of potable water due to poor services.
- **Wastewater connections covered 66% of households in 2007, but wastewater treatment is lagging behind.** The wastewater network is only in major urban areas, and there are only 11 wastewater treatment plants. Of the 348 million of m^3 of raw wastewater in 2010, only 13.4 percent is treated with 7.3 percent of the BOD_5 removed, and the remaining wastewater is discharged into valleys, rivers, and the Mediterranean Sea.
- **Municipal solid waste collection seems to have been resolve, whereas disposal remains a persistent issue.** Lebanon generates a total of 1.4 million tons/year of which 53% (750,000 tons/year) is disposed in two sanitary landfills (Nahmeh and Zahle), and the remaining is disposed in a contained landfill (Tripoli) and 700 open dumps.
- **High urban pressure on the Lebanese coast line is witnessed** in most of its 225 km. It is manifested by progressive and tacit privatization of public domains, change of structures (such as polders), private marinas, accelerated erosion, and loss of agricultural land. Incidentally, Lebanon's per capita land availability is among one of the lowest in the world at 0.0024 km^2/capita.

- **Lebanon's natural heritage is being impacted** by uncontrolled urban sprawl, quarries, and solid waste dumps, resulting in a progressive pressure on major outstanding natural sites such as the Karst heritage of Lebanon in the Caza of Kesrouan and the natural bridge of Fakra and Nabaa el Laban.
- **The Governance system is based on a special interest group approach**. Governance in terms of access to environmental information, community/stakeholders participation in the design and implementation of environmental services; efficiency and transparency of public expenditures of environment-related expenditures is weak. The political economy predominates when it comes to the ownership or management of natural assets and resources (water, coastal areas, and land).

iii. In order for Lebanon to meet its environmental challenges, changes are needed in the way it manages its social and economic development as well as in the way it makes choices among competing issues and priorities. So far, these choices and priorities were based on an engineering /technical approach underpinned by politics, subsidies, and low accountability. The Government of Lebanon (GOL), represented by the Ministries of Finance and the Environment, requested World Bank assistance in proposing a different approach, in which investments in specific sectors could lead to maximize environmental benefits, so that environment become an asset to improve socio-economic development.

iv. In this context, the CEA has assessed policies, public expenditures, and institutional capacity in managing key environmental resources, particularly in the wastewater and solid waste sectors and as requested by the GOL. In particular, the CEA has attempted to answer a limited number of key questions: Has the environmental landscape changed over the past 20 years? And if so, where does Lebanon stand in terms of environmental sustainability? How can Lebanon optimize its investments in wastewater and solid waste sectors in conjunction with its environmental benefits and what are the key policies and institutional measures required from the MOE to optimize these environmental benefits in the short and medium term?

Environmental Sustainability

v. Despite considerable progress in shaping its legal and institutional framework and providing substantial public funds for financing its infrastructure after the war, Lebanon is still at an early stage of its **transition to environmental sustainability**. Lebanon's economic growth is not accompanied with an improvement in environmental sustainability which remains low. Five indicators were used to measure environmental sustainability:

a) The Millennium Development Goals (MDG);

b) The Environment Performance Index (EPI);

c) The Adjusted Net Savings (ANS);

d) The Cost of Environmental Degradation; and

e) The Environment-related spending (ERS).

vi. Lebanon has made some progress towards achieving its **Millennium Development Goals** targets, and the United Nations Development Program (UNDP) has suggested in 2008 that Lebanon will achieve most of the MDGs by 2015, except for three major ones: (a) halving

extreme poverty; (b) reducing child mortality; and (c) reversing environmental degradation**.** However, Lebanon will most likely not achieve the Ensure Environmental Sustainability (MDG #7) targets. The reduction in forest coverage (13 percent in 2003), and by extension the biodiversity loss, have increased since the 2006 war, and are also being affected by forest fires over last summers. As for safe access to water, Lebanon has achieved more than 95 percent (connection) coverage; access to wastewater networks continues to grow steadily, with 67 percent coverage in 2007. Solid waste continues to be a major environmental problem with more than 700 open dumps used by the municipalities and where some of the waste is still burned. This causes major underground water pollution and air pollution, respectively.

vii. **The EPI** was developed to benchmark the environmental performance of a country relative to other countries. The index has two major environmental objectives: (a) reducing environmental stresses on human health; and (b) promoting ecosystem vitality and sound natural resource management. The higher the score the higher is the environment performance of the country in achieving environment sustainability. A review of the trend of the EPI in Lebanon from 2008-2010 shows that Lebanon is still ranked 90th among 163 countries and its score decreased from 70.3 in 2008 to 57.9 in 2010, indicating a lower performance with regard to environmental sustainability. The EPI for Lebanon shows weak scores in environmental health and economic vitality in 2010, with Lebanon ranking 8th in comparison with the MNA countries.

viii. **The ANS or Genuine Savings** measures the net savings of a country at a macroeconomic scale, taking into consideration the investments in human resources, depreciation of physical assets, and decrease in natural resources**.** The adjusted net savings indicate the prospects for future welfare. During the last five years, Lebanon has been displaying a negative ANS trend, indicating that physical and natural assets are declining over time.

ix. **The COED** is a measurement of environment sustainability and is related to the present welfare of the society. It is a tool that would enable monetizing the environmental damage and remedial interventions. The results, which should be considered as preliminary order of magnitudes, would compare damage costs as a percentage of GDP for six environmental categories: water; air; coastal zones and cultural heritage; soil and forest; global environment; and solid waste.

x. **The COED for Lebanon in 2005 was updated in the CEA and reached US$ 800 million (or US$ 969 million in 2008 prices) equivalent to 3.7 percent of GDP including the global environment** with the following damage costs namely: water pollution (1.08% of GDP), air pollution (0.7% of GDP), coastal zones and cultural heritage (0.69% of GDP), soil pollution and wildlife (0.61%), Global environment (0.53%) and solid waste (0.09%). When compared to the COED of 2000, the updated COED 2005 shows a slight reduction in relative terms when compared to the GDP, a growth in absolute terms and the same ranking by category. The reduction is due to two factors: the 2002 ban of leaded gasoline has produced important environmental benefits in urban areas with a reduction of the cost of environmental degradation from 1.02% of GDP 0.7% of GDP to in terms of less cardio-pulmonary cases and loss of IQ; and the GDP (+20.7 percent) grew at a faster pace than environmental degradation (+13.2 percent) over the period in constant terms. However, water pollution remains the most prevailing cause of environmental damage and all the other criteria air pollutants (PMx, SOx, NOx, O3 and VOC) increased in absolute terms over the period, which makes urban air pollution a growing urban problem.

xi. **The ERS**, which is an alternative to the public expenditure review for the environment (PERE), is another indicator for ensuring financial sustainability of environmental expenditures. It systematically assesses the equity, efficiency, and effectiveness of fiscal resources that the GOL has invested during the last ten years. In the CEA, the ERS particularly focused on the water, wastewater, and solid waste sectors, among others, and evaluated the appropriateness of budgetary allocations (from national and international sources) relative to pressing environment issues and environmental policy priorities. The ERS hence attempted to: (a) estimate the investments made in the field of environment protection; (b) assess whether these investments were compatible with the GOL's development and environmental priorities; and (c) ascertain the sustainability of financial resources.

xii. The public expenditure analysis showed that water, wastewater, and solid waste capital and O&M spending reached an average of US$ 203 million and US$ 210 million per year, respectively, over the 1999-2008 period, or 1.2% and 1.3% of GDP, respectively. **Water and wastewater** investments represented 0.6% of GDP. This is similar to the PERE performed in Jordan (0.8 percent of GDP) but less than the PEREs in Egypt (1-1.3 percent of GDP) and Tunisia (1.2 percent of GDP), though it is expected that the Lebanon ERS should have been higher, as the GDP per capita of Lebanon (US$ 5,800) is almost twice as high as Tunisia's (US$ 3,200) and Jordan's (US$ 2,840) and four times as high as Egypt's (US$ 1,550). Nevertheless, the computation methods and expenditure categories between the four countries may have differed.

xiii. Most of the investments and operation and maintenance (O&M) costs were in the water and solid waste sectors (0.3% and 0.5% of GDP, respectively). The average yearly expenditures of capital investments in the water sector (US$ 126 million), though potable water is still irregularly available, are equal to the average yearly expenditures in O&M for solid waste.

xiv. The bulk of the environment-related expenditures is managed by the Council of Development and Reconstruction (CDR). Finalized projects implemented by CDR account for US$ 6.5 billion over the 1992-2008 period, whereas projects under implementation as of end 2008 amount to US$ 2.45 billion**.** Over the 1992-2008 period, the transportation sector remained the largest recipient of signed contracts with 25 percent, followed by electricity with 17 percent, water supply and wastewater treatment with 15 percent, solid waste with 14 percent, education with 11 percent, post and telecommunications with 9 percent, and public health with 4 percent, while other sectors accounted for the remaining 6 percent.

xv. Also, financing by CDR of solid waste management operations is made through the appropriation of a growing share of the Independent Municipal Fund (IMFU -- a proportion of the tax levied by the Central Government are meant to replenish the fund but transfers are made with a time-lag), whose revenues are collected by the MOF on behalf of municipalities, and are distributed according to a complicated formula to supplement the narrow base of municipal fiscal resources. The IMFU was increasingly being used to fund SWM operations to the tune of US$ 119.5 million on average per year with a 2.5 percent growth over the 1999-2008 period, representing about 47.5 percent of total IMFU allocations over the 2006-2008 period.

xvi. While most of the investments are carried out by CDR, the Ministry of Energy and Water (MOEW) transfers some of its appropriations to cover the O&M of certain Regional Water

Establishments (RWE). Investment spending includes environment-related investments such as water supply, irrigation, and runoff management as well as wastewater treatment plants. Collectively, these sectors amount to an average of US$ 35.2 million per year over the 1999-2008 periods in 2008 prices.

xvii. The Ministry of Environment (MOE) has one of the smallest budget allocations among line ministries, with an average of US$ 2 million per year over the 1999-2008 period, of which up to 97 percent is allocated towards administrative expenses. Its investment budget depends primarily on grants on average of US$ 2.4 million/year from development partners and is leveraged to the tune of 121 percent over the 1999-2008 period.

xviii. There are regional disparities in the expenditures of environment-related investments. Water, wastewater, and solid waste spending are not equitably distributed by region**.** The ERS favors Beirut and Mount Lebanon (BML) and South Lebanon and is still skewed against secondary cities and rural areas. Spending in North Lebanon and Akkar (NL) and the Bekaa-Hermel is lagging behind and water and wastewater coverage is the lowest. Investment and O&M spending varies largely by sector and by region. For instance, solid waste spending per capita in BML reached US$ 77.3 per capita per year on average over the 1999-2008 period, while in other regions it was relatively low (range US$ 9.9 to 13.4).

xix. **There also seems to be a disconnect between public expenditures and the environment priorities as defined by the COED.** This will undermine the importance of the environmental priorities in ensuring that the environment is mainstreamed in the productive sector of the economy. Water and air, which were considered among the first two degradation priorities in the COED, were provided with very few investments. The water and wastewater $COED_{2005}$ (1.08 percent) exceeded the yearly average water and wastewater investments (1 percent) over the 1999-2008 periods in terms of the average GDP.

xx. **The situation is further aggravated by the large subsidies in the wastewater and solid waste sectors.** Water cost recovery is only achieved in BML despite low tariffs, whereas treatment and disposal waste cost recovery is quasi inexistent because the very low municipal fee is barely collected for waste collection and drainage (*Arsifa wa Majarir*) by municipalities. Both sectors' O&M costs are subsidized by GOL transfers through the MOEW or through the reallocation of an increasing share of the IMFU.

xxi. **The challenge for reaching financial sustainability is not to increase government investments but to meet certain socioeconomic criteria** by, first, prioritizing the investments and reallocating the O&M costs, and second, by devising a financial management system and implementing it on the basis of clear priorities and well-defined outcomes through the mobilization of local resources.

xxii. **One of the most prevailing challenges faced by Lebanon is pollution as it is affecting public health.** The pollution scale is high, and high also is the cost of addressing it. Two sectors were selected by the GOL as they are sources of water and air pollution namely: the wastewater sector and the solid waste sector. Other sectors are also sources of water and air pollution such as water quality and transport; however, the GOL requested that the focus be on wastewater and solid waste because of:

a) Provision of wastewater services as well as disposal of municipal solid waste are still considered to be acute issues that are the source of public discontent from the health protection point of view and from the lack of large state budget interventions with no foreseeable cost recovery until the quality of the services are substantially improved.

b) The Ministry of Water and Energy as well as the Ministry of the Environment are, respectively, preparing a water strategy and solid waste strategy in which the optimization of the investments in terms of both economic and environment benefits are not properly addressed. The CEA would provide the necessary options for the Government to weigh budgetary intervention based on financial costs and environment and economic benefits. This would necessitate the prioritization of the two target sectors at the urban and possibly at the governorate levels and the provision of these sector services.

c) The infrastructure system and investment portfolio were built in these two sectors according to an engineering approach in which politics and low accountability were prevailing. Such an approach is supply-driven with limited communication and inputs form the immediate users/beneficiaries and stakeholders of these services at the local level.

xxiii. The CEA is therefore addressing both issues from the perspective of: (a) optimizing the investments in functions of economic and environmental benefits for protecting public health instead of a purely engineering approach; (b) improving the governance in these two sectors by ensuring the proper management of these two sectors up to the expectations of the Lebanese citizens and strengthening the participation and involvement of the local communities in most aspects of the decision making of the two sectors; and (c) strengthening the environmental policies and institutions to manage and control pollution and enhance governance in general and in these two sectors in particular.

Optimizing investments in the solid waste sector

xxiv. Contrary to the municipal solid waste collection services, whose improvements were both effective and equitable over the years, all over the Lebanese regions, the solid waste treatment and disposal subsector continues to face stern challenges. Except for Zahle, the two other landfills are close to full capacity (Tripoli and Nahmeh); open dumps are getting out of control; most old major dumps were not closed down properly or rehabilitated. The draft SWM law has not been enacted, the institutional framework is quasi absent and cost recovery for waste disposal and treatment is zero, with the exception of the municipalities of Zahle, which are charging US$ 12/ton to other municipalities for waste disposal. The Treasury and IMFU are therefore footing the bill for waste disposal and treatment, at a high rate of US$ 95/ton in Beirut and Mount Lebanon. This disproportionate level of spending is becoming the normal course of business for a special segment of the society and is depriving other regions for similar services and at a unit cost level of about US$135-145/ton, including collection and sweeping, which is equivalent or greater than in higher income countries. SWM services are provided by the private sector through regional solid waste contracts which increased regional monopoly powers and reduced competition and therefore efficiency.

xxv. The solid waste disposal landscape has not changed during the last 15 years. There has been a series of national waste management plans, and Council of Ministers (COMs) decisions which were not implemented. The CEA found that the approach adopted to proceed with solid waste disposal is incomplete. The CDR/MOE and the Ministry of Interior and Municipalities (MOIM) are entrusted with the preparation of a SWM plan (without prior public consultation), which is, when approved by the COM, relayed to CDR for implementation. CDR in turn contracts the services of a Lebanese consulting firm to prepare the tender documents and detailed engineering design of landfills, estimate the costs, propose methods of financing, and prepare also the environmental impact assessment report. The detailed costing of the plan as a whole, the cost/benefit analysis or cost-effectiveness analysis of the different alternatives of SWM treatment and disposal, the cost recovery options, and the institutional framework, are bypassed for the sake of urgency and time.

xxvi. The CEA attempted therefore to fill in the gaps in this approach by estimating the cost of mitigation for municipal waste disposal and treatment in the latest COM decision of 2006, which foresaw the establishment of 8 sanitary landfills (2 by region: BML, NL, SL, BB) and 26 facilities for sorting and composting in the different Lebanese Cazas. The plan called for the Lebanese treasury through the CDR to cover the investment cost and the O&M of treatment and disposal, while municipal solid waste collection and transport costs would be covered by the different municipalities. Subsequent to the 2006 plan, CDR and the MOE proposed an amendment to the 2006 plan, approved by the COM in 2010, in which a waste to energy facility (WTE) was proposed to be established for Beirut and Mount Lebanon as no land was available for the construction of a landfill in this region.

xxvii. The CEA conducted a thorough analysis of both plans by covering 11 options with investments over 20 years, including the WTE option suggested by the 2010 SWM Plan. The analysis included for each option the estimated capital and O&M costs, and the cost recovery for investments and O&M per year. The results of the analysis showed the following:

a) The implementation of the full 2006 SWM Plan (based on landfilling, recycling, and composting) is the most expensive and amounted to a capital cost of US$ 400 million (US$ 13.6/ton) and a yearly O&M cost of 17.6 million (US$ 11.9/ton);
b) A change in the engineering design for establishing energy cells in the 8 proposed landfills (without composting and recycling facilities) with associated electricity generation and carbon finance is the least expensive option, amounting to a total capital cost of US$ 286 million (US$ 9.7/ton) and an annual operating cost of 8.8 million (US$ 5.9/ton); and
c) The establishment a waste to energy (WTE) facility for Beirut and Mount Lebanon (BML) alone would increase the capital cost to US$ 885 million (49.2/ton) and an annual O&M cost of US$ 39 million (US$ 48.7/ton). When considering the WTE for BML, the capital and O&M full cost recovery net of transaction costs is almost equivalent to the combined treatment and Nahmeh landfill O&M of US$ 95 per ton.

xxviii. Given these very large investments, it would be impractical to assume that Lebanon would resolve the solid waste disposal issues in the short term of 1-4 years. However, steps should be taken during the short and medium term, so that the legal, regulatory, and institutional architecture for waste management is established first and supported in parallel by cost-efficient

investments in SWM disposal services based on the options proposed. Detailed recommendations are provided in the section below.

Optimizing investments in the wastewater sector

xxix. Wastewater management is considered a high priority issue in Lebanon, with an estimated municipal wastewater load of 248 million m^3 per year in 2010, equivalent to 119,348 tons of Bio-oxygen Demand (BOD_5). The bulk of raw sewage generated from residential and industrial areas is discharged directly into the sea or inland watercourses without treatment prior to disposal. The GOL does not have an agreed national policy per se, but existing and largely informal strategies and plans have been updated by CDR (taking the lead), MOEW, and MOE to comply with Lebanon's international commitments, i.e. the UNEP Barcelona Convention and EC Horizon 2020.

xxx. Only 66 percent of the population was connected to an improved sewer network in 2007. The construction of wastewater network systems is lagging behind. With the exception of the Beirut administrative region, all districts have large gaps in the wastewater network connections, even though extensive developments to wastewater infrastructure have been made since 1998. CDR plans are to have 28 major wastewater treatment plants (WWTPs) with a design capacity of 360 million m^3 per year. To date, there are about 11 operating WWTPs and 4 constructed WWTPs that are not yet connected to the network**.** When only considering the design capacity of all 28 WWTPs, 19 per cent of the domestic wastewater generated in 2010 is considered to be treated with a removal of 6 percent of BOD_5. The amount of sludge to be generated in 2010 was estimated at 260 tons/day. The reform of the water and wastewater legal and institutional framework initiated in the early 2000s remains incomplete. The RWE, which have the responsibility of the water and sanitation in the four regions, are weak due to the lack of institutional capacity which prevent operational efficiency and adequate planning and prioritization of the investments. Cost recovery for wastewater is inexistent; the GIZ has provided assistance to develop tariffs for wastewater, but these have not yet been implemented.

xxxi. The MOEW has completed the formulation of a water sector strategy which still needs to be approved by the COM. The strategy covers legal, institutional, technical, managerial, and financial aspects of the water, wastewater, and irrigation sectors. It aims to improve services and put the sector on the sustainable footing by recouping more than the sector O&M expenditures by 2015. The new 2011 MOEW Strategy calls for WWTP and network investments to the tune of US$ 2.2 billion over the 2011-15 period. The MOEW is also preparing a more detailed wastewater strategy which is to address the problem of pollution and wastewater disposal in a radical manner throughout the country.

xxxii. In reviewing the CDR plan for wastewater as well as the tariff study carried out with the assistance of GIZ, the CEA noted the following features:

a) The amount of US$ 354 million disbursed by CDR from 1992 till 2008 on wastewater investments led to a reduction of 6 percent of total BOD to be removed in 2010; and
b) The GIZ tariff study did not include the necessary investments for some investments associated with outfalls and sludge.

xxxiii. The CEA has therefore proposed a new approach in which the investments would be "calibrated" against the reduction of wastewater pollution represented by BOD_5. This would enable optimization of the necessary investments, taking into consideration the pre- and post-wastewater treatment, while maximizing the environmental benefits. In this regards, the CEA analyzed four mitigation options to determine the incremental investment cost needed to marginally reduce the municipal amount of 165,563 tons of BOD_5 generated in 2010 to 8,000 tons in 2030. The results of the analysis indicated that:

a) The proposed CDR investment plans (based on secondary treatment) seems underestimated, and the sector absorptive capacity is limited, with US$ 253 million worth of completed investments so far and US$ 344 million of ongoing investments between 1992 and 2009. Moreover, it is moderately likely, given the past sector performance, that US$ 2.2 billion between 2011-2015 will be effectively spent as formulated in the new 2011 MOEW Strategy, bringing the total sector spending to US$ 2.8 billion between 1992 and 2015 (not accounting for USAID direct investments) but short of the US$ 3.6 billion needed to reduce BOD_5 from 160,000 tons in 2010 to 33,000 tons in 2030. A further decrease of BOD_5 to 8,000 tons in 2030 would require an upgrade to tertiary wastewater treatment plants at an additional cost of US$ 150 million.
b) The wastewater tariffs would have to be increased to US$ 337/household/year for covering the capital cost and US$ 67/household/year for covering O&M costs. This corresponds to 1% and 0.2% of the household GNI, respectively. More importantly, wastewater tariffs would be difficult to introduce if water services are not adequate.

Environmental Policies and Institutions

xxxiv. Despite overall political instability, sluggish economic performance, and frequent COM changes, there have been substantial achievements in Lebanon's institutional and legal framework since the establishment of the first MOE in 1993. Lebanon has prepared a series of strategic documents that guided the environmental policies highlighted in successive COM Policy Statements. The MOE developed opportunities and strengths that enhanced its ability to assess environmental needs, setting strategies and action plans, and implementing/supervising national and regional projects and program. There is also a vibrant civil society and a strong media that supports environmental protection. Lebanon has achieved improvements in its environmental legal framework with the enactment of the Framework law for the Protection of Environment 444 (2002), which included all the principles of the Rio Declaration on Environment and Development (1992). The MOE also prepared two decrees on the environment impact assessment and strategic environmental assessment, both awaits the COM's approval.

xxxv. In parallel, there have been also some distinctive successes in implementing a number of national programs and projects that had an impact on the quality of life of the Lebanese people. To cite only a few, the Government decision to provide substantial investments since 1996 for addressing municipal waste collection and disposal in Greater Beirut has led, despite its prohibitive cost, to a Clean Capital City. Municipal waste collection has also substantially improved in urban and rural areas, reaching a collection rate of 100 percent and 95 percent, respectively, the highest rates among the MNA countries. The banning in 2002 of lead in gasoline as well as the use of diesel in taxis have substantially improved the air quality in

Lebanese cities and resulted in the decrease of the cost of degradation due to air pollution by 0.3 percent of GDP. The cleaning up of the oil spills as a result of the hostility of 2006 has enabled several beaches to reopen for access to ordinary citizens. Twenty Development Partners succeeded not only in putting the issue of environment on the GOL policy agenda, but in building the environmental infrastructure at the national and local level.

xxxvi. In spite of these significant strides, considerable challenges remain. The political economy is prevailing when it comes to ownership or management of natural assets and resources (water, coastal areas, and land). Priority settings are constantly changing. Each of the 11 Ministers of Environment had his own agenda and priorities, and few were translated into actions that could be monitored. Coordination and integration of sectoral policies are weak in view of the lack of qualitative and quantitative assessments of impacts. The institutional sustainability of the MOE is questionable. It is clearly understaffed if it is expected to perform all the functions in the organizational chart. The enforcement and monitoring regime and the lack of disclosure of information constitute the weakest chain in the environmental management system.

xxxvii. The Lebanese EIA system was also analyzed to determine the equivalence with that of the World Bank's 11 operational principles in accordance its policy for the use of country systems. The analysis showed the World Bank's EA policy, the EC Directive on EIA, and the Lebanese EIA system have many common features and are comparable in many aspects. There are, however, two significant gaps, namely the lack of standard TORs and guidelines for specific sectors and a lack of public consultation and disclosure of the EIA summary and Initial Environment Examination (IEE) to the public as required by articles 13 and 14 of the Environment Protection Law. The acceptability assessment, which reflects the application of the EIA system in Lebanese projects, indicated that Lebanon has a modest institutional and legal EIA infrastructure at the national level, and a weak track record on implementation, monitoring, and enforcement of the environment management plans, although the EIA review is quite thorough and the comprehensiveness and quality of the EIA reports are adequate. However, as long as the EIA decree and its annexes are not enacted, the track record for Lebanon's performance of its EIA system will suffer and will affect its credibility vis-à-vis foreign direct investments and development partners' support.

xxxviii. In summary, **Lebanon has made significant progress in developing its institutional and legal infrastructure with the assistance from the international community**. The most important factors in improving the management of the environment in Lebanon would a strong political will, enhanced coordination among the major ministries and institutes involved in environmental sustainability, a strengthened the demand side of governance through disclosure of information and public participation, an improved EIA system, and monitoring and enforcement of environmental regulations.

The Way Forward

xxxix. The solutions aimed at remedying the constraints and limitations should be manifested not only by promulgated or documented statements but also by the performance record of the entire government to engage in policy reforms and improve governance and accountability that are considered to be the cornerstone for Lebanon transition to environmental sustainability. The CEA is limiting its recommendations to three major pillars that focus on:

A. Strengthening environmental governance;

B. Managing environmental risks; and

C. Improving the programming and cost-efficiency as well as maximizing the environmental benefits in the wastewater and solid waste sectors with emphasis on poor areas.

xl. The proposed recommendations under each pillar could be implemented within a short-term (1-3 years) or medium-term (3-5 years) timeframe, subject to the political dynamics prevailing in Lebanon. These recommendations are also presented in Tables 8.1 and 8.2, delineating the time frame and the ministries/institutions responsible for their implementation.

Strengthening Environmental Governance

xli. The main objective of **Strengthening Environmental Governance** is to provide the necessary technical and capacity building tools to empower stakeholders and society in managing their environmental resources with accountability, transparency, and participation. This would require:

Enhancing coordination among relevant institutions:

a) **At the policy level,** in the short term: by **increasing inter-ministerial coordination on environmental sustainability** through the COM until a National Environment Council is formed at the highest level and backed by an institution with intellectual leadership. Such coordination would require that, on a semi-annual basis, the COM include in its agenda a review of the progress made in the implementation of its ministerial program on the environment, review the elements of the strategy in the solid waste and waste water sectors, approve the various decrees related to EIA and environmental compliance, and follow up with the parliamentary committees for approving the solid waste management law. After such coordination is established using the MOE in a secretariat function, the COM would, in the medium term, establish the National Environmental Council, after consultation with the different political parties, parliamentary leaders, and representatives of the civil society.

b) **At the operational level**: (i) delineate, in the short term, in the form of matrices, clear mandates and responsibilities of selected environment-related institutions so that they could collectively focus their efforts on few priority sectors such as water, wastewater, solid waste management, and coastal zone management, that have an impact on the quality of life of the Lebanese citizen and demonstrate economically sustainable results; and (ii) cooperate with the selected environmental institutions, in the establishment in improving compliance with environmental legislation and enhance enforcement capacity through development of monitoring, reporting, and inspection capability. In the medium term, (i) ensuring that polluting enterprises would comply with auto-control and self-monitoring as required by Law 444 and by outsourcing regular inspections to qualified laboratories or universities to enable the MOE to take the necessary

legal actions against polluters; and (ii) **Expanding the involvement of the private sector for environmental services in a transparent and competitive manner**. Priority should lie within a few "champion" sectors that are ready to move concurrently on catalyzing policy reform and leveraging private and public capital. The main criteria for the selection of sectors are: (i) where the results would be easiest to achieve; (ii) where there are financially feasible projects already available for attracting private capital; and (iii) where there can be partnerships and cost-sharing mechanisms between private and public capital, with the possible support of development partners. With the right policies in place, the private sector should be able to invest or manage urban investments in the water, wastewater, and solid waste.

c) **At the grass roots level**, enhancing public participation by:

In the short term:

i. Supporting the business community to organize and participate in consultations on all environmental assessments and provide access through the Government and other channels to environmental information, analyzing and publishing environmental data and trends, and using the media to provide facts and solutions on the major environmental issues, and organizing national campaigns.

In the medium term:

i. Providing stakeholders and interest groups with tools that would enable them to be actively involved in decision-making, particularly in the wastewater and solid waste sectors at the governorate levels.
ii. Improving the level of public awareness on environmental issues in general and wastewater-related issues in particular, especially among rural women.
iii. Creating partnerships in development among policy makers, civil society, and local communities in ways that enhance their mutual trust and collaboration.
iv. Activating the role of media by developing accessible-to-locals media messages.
v. Enhancing capacities of all concerned parties and equipping NGOs with tools and methodologies that would help them to effectively carry out awareness creation.

Managing Environmental Risks

xlii. The main objective of **Managing Environmental Risks** is to reduce environmental threats due to pollution and natural resources degradation and adapt to potential environmental perils due to climate change. This can be achieved through:

In the short term:

i. ***Reinforcing the Policy and Planning Department in MOE*** by undertaking the appropriate policy and economic analyses based on costs and benefits, valuing the

environmental implications of major economic and sectoral policies, and establishing performance indicators.

ii. Strengthening the Environmental Assessment System in Lebanon at the policy and project levels through the issuance of strategic environmental assessment (SEA) and environment impact assessment (EIA) decrees.

iii. Designing and implementing an incentive system with national banks and financial institutions to award polluters that: (i) mitigate negative impacts of point sources of pollution; and (ii) enhance positive impacts by using clean technologies.

iv. Piloting the establishment of 1-2 regional departments within MOE, nominating staff and provide training, and gradually transfer functions of coordination and monitoring activities.

In the medium term:

i. ***Strengthening the private sector department in the service of environmental guidance of MOE*** by introducing environmental regulations that allow flexible market mechanisms to achieve environmental objectives and introduce good governance, increased transparency, and access to environmental information.

ii. Providing assistance to Lebanese universities and research centers to develop a climate change action plan that assesses the impacts and vulnerability of climate change in the water, agriculture, and infrastructure sectors based on the 2011 UNDP/MOE Second National Communication that addresses climate change risks, vulnerability, and adaptation assessment; and propose adequate measures to adapt to or mitigate climate change risks, and provide incentives to encourage green development.

Improvement of Programming and Service Delivery

xliii. The main objective of the **Improvement of Programming and Service Delivery** is to strengthen the solid waste and wastewater management planning and implementation and improve their service delivery with preference given to the poor areas of Lebanon. This objective can be achieved for the solid waste sector by:

In the short term:

i. Involving all stakeholders, including political parties and local leaders, to reach consensus and ensure transparency on the revised MOE plan and to provide the opportunity to present also the cost-benefit analysis provided in the CEA.

ii. Focusing first on addressing the institutional and legal framework related to solid waste management by selecting a model that can be adapted to Lebanon for planning and implementing the solid waste management at a national and local scale, and enacting in parallel the integrated solid waste management law.

iii. Proceeding with a sustained awareness and education campaign to bring to public attention accurate and reliable information, provide a forum for conflict

resolution, increase public awareness, and suggest practical alternatives to waste minimization and disposal.

In the medium term:

i. Designing and implementing a gradual cost recovery for Beirut and Mount Lebanon which are taking full advantage of solid waste services at the cost of the Lebanese Treasury, and consider subsidizing the solid waste treatment in the governorates where poverty exits, namely in the Cazas of Akkar, Hermel, and West Bekaa.
ii. Establishing two sanitary landfills based on the least-cost options proposed in the CEA for energy cells in two Cazas, such as in the north and south of Lebanon where poverty exists.

This objective can be achieved for the wastewater sector by:

In the short term:

i. Addressing shortcomings related to the strategy, namely the definition of clear institutional responsibilities of the Regional Water Establishments for wastewater management.
ii. Improving the wastewater chain (pre-treatment, treatment, and post-treatment) planning, coordination, and O&M, fostering community participation and empowering the Regional Water Establishments (RWE) in devising, financing, implementing, and overseeing such undertakings.
iii. Revising the proposed wastewater tariffs to be introduced in 2011 by reflecting also the post-treatment costs and O&M of wastewater treatment plants.

In the medium term:

i. Calibrating the investments in wastewater with the reduction of wastewater pollution using the proposed options in the CEA.
ii. Exploring the opportunity cost of tertiary treatment in light of the climate change-related effects on water resource availability in the future.

xliv. The World Bank, in partnership with **international donors and financing institutions,** is prepared to provide assistance in implementing the recommendations of the CEA, provided that the Government takes the lead in proceeding with the policy and institutional reforms for reaching its environmental objectives related to economic growth. Such assistance would come so as to support the recommendations and timeframes indicated for the three major pillar areas mentioned above, namely:

a) **Knowledge Sharing and Strengthening Environment Governance** through:

In the short term:

i. Supporting the establishment of a realistic monitoring and enforcement regime and build capacity to strengthen the EIA systems for environmental management to better manage current and future pollution.

ii. Providing expertise in environmental policies and assessment of costs and benefits, and establishing a sound analytical base for informing decision-making for policy making and for investment decisions on projects and programs (also, in the medium-term).

In the medium term:

i. Developing quantitative and qualitative methods, tools, and techniques to improve environmental governance and strengthen cross-ministerial coordination and participation in policy making in the solid waste and wastewater sectors.

ii. Providing expertise to develop sustainable development indicators and core indicators of environmental governance related to the institutional reforms, polices, and regulations in the solid waste and wastewater sectors.

iii. Strengthening knowledge on assessing of impacts of climate change on water resources, and water and wastewater infrastructure as a follow-on to the UNDP/MOE study on climate risks, vulnerability, and adaptation assessment.

b) **Improving the Management of Environmental Risks,** particularly in reducing water, wastewater, and soil pollution that could adversely affect public health and/or the Lebanese ecosystem. Such activities include:

In the short term:

i. A Technical Assistance for a Pollution Abatement Activity that could subsequently be designed as a project. This activity would be designed to mitigate environmental risks due to pollution, increase the environmental performance in point sources/polluting enterprises, and introduce cleaner production and green investments. This would be achieved through an established market-based instrument, using the national banking sector, and through a combination of technical assistance as well as output-based aid intervention at the level of SMEs.

ii. The enhancement of the World Bank's Operational Effectiveness in Lebanon by relying gradually on the national environmental impact assessment system after the enactment of the EIA decree. This enhancement would consist of: (a) adopting a more efficient safeguard system based on upstream considerations in the planning of policies, programs, and projects and on predictable environmental guidelines for private sector development; and (b) pilot testing of the simplification procedures in Lebanon by the harmonization of the national systems with the World Bank policies in EA in the water, wastewater, and solid waste sectors.

In the medium term:

i. The mobilization of concessional and innovative financing in managing and reducing environment and climate change risks, and bridging the gap between public expenditures and local resources generated from cost recovery in the solid waste and wastewater sectors.
ii. Help Lebanon access GEF grants and Climate Change funds to cover incremental costs associated with green development in terms of climate change mitigation and adaptation.

c) **Improving the programming, and cost-efficiency of solid waste and wastewater management sectors by**:

In the short term:

i. Assisting in the design and implementation of the institutional and legal framework for solid waste management and in the design of a fee for cost recovery, based on the options provided in the CEA.
ii. Considering program support for the inducing the necessary institutional, legal, and technical reforms related to the solid waste sector.
iii. Revisiting the optimization of the investments and the tariffs to include post-wastewater treatment that will feed into the ongoing wastewater strategy of the MOEW.

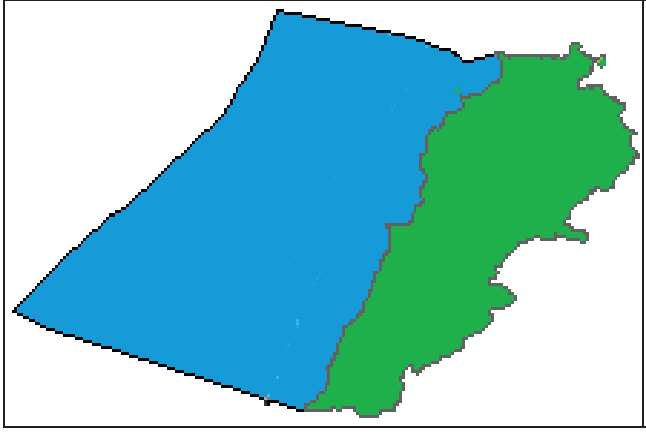
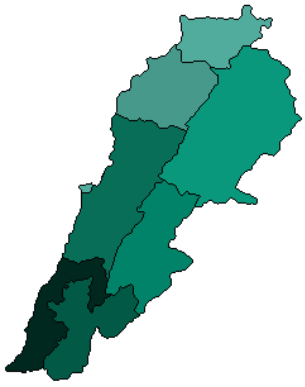
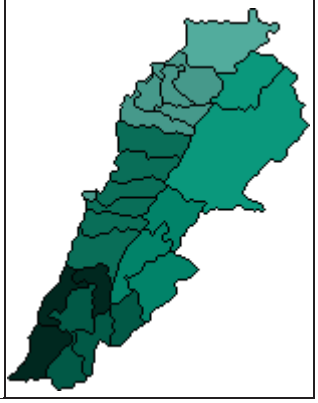
In the medium term:

i. Establishing performance indicators for the monitoring of services delivery of solid waste and wastewater.

Chapter 1: Background

1. **Lebanon's current resident population was estimated at 3.8 million in 2007[1] with an increasing net flow of migrants[2], resulting in the lowest population growth rates in the Middle East and North Africa (MNA) region: 1.2 percent.** While more than 87 percent of the population live in urban areas, the majority of the Lebanese and the bulk of the economic activity are nevertheless concentrated along the coastal corridor (1,620 km^2), hence constituting a growing pressure on the environment. The main issues include: natural resources management, especially with regards to the stress on water; wastewater connection and treatment; municipal solid waste management; land use and especially coastal zone use management; air pollution hot spots especially in urban areas with a significant increase of the number of cars and ensuing traffic jams, as well as in Selaata-Chekka due to the cement-fertilizer industrial cluster in Northern Lebanon; a growing concern about the increased intensity and frequency of the effects of the natural disaster-climate change continuum (droughts, higher temperatures, forest fires, etc.); and the environment governance system.

Figure 1.1: Lebanon Government Tiers

Tier 1: One State with deconcentration functions Land area ≈ 10,225 km^2 Marine area ≈ 19,516 km^2 (UNCLOS ratified in 1995) Population: 3.8 million (2007).	**Tier 2: Eight Mohafazat** (2003) regrouped into 4 regions/service areas in the CEA: BML, SL, NL & BB	**Tier 3: Thirty-four Cazas** with 945 municipalities and 386 hamlets (2008)
		

Note: The first quadrant map shows the Lebanon landward and seaward in terms of territorial waters, contiguous zone and the exclusive economic zone. BML stands for the Mohafazat of Beirut and Mount Lebanon; SL for South Lebanon and Nabatiyeh; NL for North Lebanon and Akkar; BB for Bekaa and Baalbeck-Hermel.
Source: Adapted from Sea Around Us website: <www.seaaroundus.org>; Local Liban website: <www.localliban.org>; MOSA/CAS 2007; METAP (2009); and Lebanon CEA Cost of Mitigation Background Paper (2010).

2. **The *Taif Accord*, which brought an end to the 1975-89 Civil War, called for the strengthening of municipalities and administrative decentralization at the *Caza* (District) level and below.** However, the Lebanese decentralization drive has been gridlocked since the 1990s and could not move ahead without a political consensus to resolve a number of issues.

[1] CAS (2008). Data on population remains a conundrum in Lebanon in terms of residents and non-residents, with a big unknown being the number of Syrian seasonal workers.
[2] Di Bortolomeo *et al.* (2010).

Despite the amendment of the electoral law in 2008, the new law failed to redefine the role, functions, and possibly administrative jurisdiction of the current regional and local administration in conjunction with the central government. Hence, the three-tier government (Figure 1.1) remains highly centralized, as it is responsible at the central level for social services such as health and education capital investments, but allows for the *déconcentration* (literally the creation of branches managed by the center) and even decentralization (Regional Water Establishments since 2005 that are meant to become corporatized) of certain public utilities and line ministry services which, however, result in a heavier bureaucracy.[3]

3. **The strong recovery that followed the end of the Civil War had its costs. Rapid accumulation of public debt to unsustainable levels reached US$ 51.2 billion by 2009, excluding payment arrears and the debt of Banque du Liban[4], unsustainable environmental management led to environmental degradation equivalent to 3.4 percent (3.9 percent when considering the Global Environment) of Gross Domestic Product (GDP) in 2000[5], and poverty levels seem to have worsened since reaching 28 percent in 2004.[6]** Growth slowed down after the initial boom of post-war reconstruction from 8 percent during 1987-1997 to zero in 2006 due to: the prevailing macroeconomic stance since 2000, the political situation since 2005, and the aftermath of the July 2006 war with Israel that resulted in significant environmental degradation, notably irreversible damages due to the Jiyeh oil spill.[7] Nevertheless, despite the 2008 global financial crisis and an international commodity price-driven inflation, the economy is nonetheless performing well, with a growth rate exceeding the 9 percent mark since 2008 in nominal terms and a preliminary GDP of US$ 34.5 billion in 2009.[8] The drivers of this growth are mainly attributable to services (74.5 percent of GDP), namely tourism and the construction sectors, to the detriment of a shrinking industrial sector and a sluggish agricultural sector. Yet, these driving sectors are taking their toll on the environment in terms of increased pressures on natural resources, mainly water and land use/soil (quarries).

4. **Recently, the Government of Lebanon (GOL) set four major strategic pillars for economic and social policy: (i) enhancing the potential for economic growth through structural reforms; (ii) maintaining macroeconomic, financial, and monetary stability; (iii) implementing the Paris III reform program; and (iv) designing a new social policy to improve the quality and the coverage of social services.[9]** In the framework of the 2007 Paris III reform program, the energy, telecom, and social sectors remain among the priorities of the GOL, as it has identified infrastructure bottlenecks in electricity, water, telecommunication, and transportation as major impediments to competitiveness.

5. **The GOL has started delivering on sectoral reform since 2009 in line with the GOL key objectives**: the Ministry of Energy and Water (MOEW) has submitted a plan to reform the electricity sector (US$ 4.9 billion over 4 years) and has prepared a draft National Water Sector Strategy (US$ 5.1 billion over 5 years) that covers the water, wastewater, and irrigation sectors that still need to be debated and ratified by Parliament. Parliament has adopted the Oil and Gas

[3] Doumani (2007).
[4] World Bank (2010a).
[5] World Bank (2004a).
[6] Laithy et al. (2008).
[7] World Bank (2007).
[8] World Bank (2010c).
[9] World Bank (2010a).

Bill, notably comprising the setting up of a sovereign fund to manage the proceeds of future revenues from offshore oil and gas production; the Ministry of Post and Telecommunications is engaged in a comprehensive reform of the sector; the Ministry of Environment (MOE), together with the Council for Development and Reconstruction **(**CDR), has prepared an updated solid waste management (SWM) Plan; and the Ministry of Social Affairs has tested the pilot for a National Poverty Targeting Program funded by the World Bank.[10]

6. **Although acknowledged by the GOL, the environment has nevertheless remained a secondary priority, characterized by an incomplete legal and institutional framework as well as by ineffective policies to address the challenges and political constraints to deliver reforms.** The pre-Civil War cumulative neglect and the post-Civil War economic recovery called for badly needed environmental safeguarding and management by the GOL. Hence, the Ministry of Environment (MOE) was established in 1993 to address environmental challenges. The Framework Law 444/2002 for the Protection of the Environment was promulgated to ensure the environmental sustainability. The Law was supplemented by a draft Environmental Impact Assessment (EIA) decree which has still not yet been endorsed 8 years later by the Council of Ministers (COM). Law 690/2005 reorganized the MOE, but 4 years were necessary to issue Decree 2275/2009 that regulated and defined the units, their functions, and responsibilities. Most protection measures, in line with international conventions ratified by the GOL, were enacted such as: preparing a Strategy on Biodiversity; producing the first and second communication to the UNFCCC (1999 and 2011); implementing a five-year plan for reforestation; setting up the Lebanese Environment and Development Observatory (LEDO) that was unfortunately dismantled at the end of the project; establishing national standards through LIBNOR; and preparing a draft Decree on Strategic Environmental Assessment (SEA). Conversely, the badly needed ratification by Parliament of the Integrated Coastal Zone Management Protocol (2008) of the Barcelona Convention to help curb the rapid artificialization of the coast, due to the construction boom, is still pending.

7. **On the policy side, the MOE prepared its State of the Environment Report (SOER) and a Strategy Framework in 1996**. This was followed by the preparation of the Second SOER in 2002 (and which is currently being updated; forthcoming in June, 2011) as well as the draft European Commission (EC) *National Environmental Action Plan* (NEAP) in 2006 (that is about to be updated) and in which the MOE articulated its environmental strategy with seven objectives. The GOL introduced an effective policy in 2002 to ban lead in gasoline and prohibit the use of diesel engines for taxis by providing an incentive system for converting light diesel engines into gasoline ones. Most recently, in January 2010, the MOE has prepared a very ambitious program of the themes to be implemented in cooperation and partnership with relevant stakeholders. With all these strides at designing policies and formulating strategies, the environment domain has moved from the narrow interest of a limited number of professionals to become one of the national challenges for the Lebanese society.

8. **Regarding implementation, the CDR has been the executing agency for most government and development partner-financed reconstruction and development projects since 1977 with a number of projects having a direct or indirect bearing on the environment.** Moreover, CDR's restored planning prerogatives led to the production and endorsement by the COM early 2009 of the 2004 National Physical Master Plan of the Lebanese

[10] World Bank (2010b).

Territories (NPMPLT), which: (i) defines Lebanon's potential assets; (ii) determines Lebanon's comparative advantages by region; and (iii) establishes Lebanon's position in a rapid globalizing world over the next decades.[11] More importantly, in order to ensure policy-wide coherence in the future, the sector-wide strategy harmonization with the NPMPLT that was entrusted to the Ministry of Transport and Public Works still needs to be implemented. Yet, the NPMPLT still needs to be updated to notably address the 6-year time lag since its finalization in order to address air pollution and to cover the natural disaster-climate change continuum.

9. **The climate change projections for Lebanon suggest a more rapid warm-up than the global average and an annual fall of precipitation, leading to less runoff, more evapotranspiration, and increased periods of drought.** Yet, climate-driven changes in renewable surface and groundwater are modest (less than 300 million m^3 per year) in comparison to the projected impacts of population and economic growth (973 million m^3 per year) by 2025[12], which leaves ample room for water-resource management improvements. Lower precipitation is expected throughout the country, coupled with a shrinking ice cap. Nevertheless, the largest annual rainfall reductions will mainly occur in coastal zones and within the Bekaa Valley, which could negatively impact the agriculture sector and force farmers to migrate from certain areas. The growing intensity and frequency of droughts coupled with higher temperatures is significantly increasing the risk of forest fires. Also, a pattern change of a number of species (mainly insects) has already been observed in Mount Lebanon, and Lebanon could be prone to the emergence or re-emergence of a number of diseases. The 2011 UNDP/MOE Second National Communication to the UNFCCC suggests a number of cross-sectoral adaptation and mitigation measures that will urgently need to be prioritized based on costed multi-criteria risk analysis. Yet, the GOL, through its research and outreach outlets (Lebanese Agricultural Research Institute and the Lebanese Center for Energy Conservation Project) and universities, is actively involved in monitoring the exacerbating effects of climate change as well as promoting both energy efficiency and renewable energy.

10. **Despite this environmental progress over the years, Lebanon is still faced with two major environmental challenges: (i) reversing the course of environmental degradation while promoting climate-proof policies; and (ii) in doing so, ensuring that environment is integrated in policies, programs, and projects to achieve sustainable outcomes.** At present, there are no environmental policy documents that would address these national and global challenges and give sufficient attention to competing/conflicting pressures between different sectors, stakeholders, and interest groups. The 2002 SOER and the draft 2006 NEAP are a voluminous set of documents with partial techno-economic assessments of priorities and policies to be carried out. Nevertheless, the MOE faces difficult choices in setting its own priorities as these have been exacerbated by the fact that, with its limited financial means and effective oversight, it has spread itself too fast and too thin during the last decade.

[11] METAP (2009).
[12] Wilby (2010).

Chapter 2: Objective, Work Scope and Expected Outcomes

2.1 Objective

11. **In order to address the environmental challenges, the World Bank has developed a partnership with the GOL through the preparation of a Country Environmental Analysis (CEA), which is aimed at providing the analytical underpinning for integrating environment into the development process.** The Lebanon CEA has the following three main objectives:

- Provide a comprehensive overview of Lebanon's performance with regard to environment sustainability during the last ten to fifteen years;
- Facilitate mainstreaming of specific environmental issues into relevant sector activities for strengthening the development process and poverty alleviation efforts; and
- Guide and assist in the capacity building and strengthening process as pertains to specific environmental priorities as well as in relation to mainstreaming of global environmental issues with those at the national level.

2.2 Work Scope

12. **The CEA does not attempt to address Lebanon's environmental concerns in a comprehensive manner**. It is sharply focused on the sustainability of key environmental issues that are: (i) causing detrimental impacts on public health and/or serious degradation of key natural resources; (ii) resulting in irreversible damage; and (iii) requiring multi-sectoral interventions and coordinated policies and efforts. In doing so, the CEA has focused at the request of the GOL representatives on four major cross-sectoral issues that were assessed by the preparation of four background documents:

- Environmental sustainability performance with emphasis on environment-related spending (ERS) as a proxy for the public expenditure review for the environment (PERE) to determine the effectiveness, efficiency, and equity of the *supply* of fiscal funds, and including a rapid update of the national COED;
- Solid waste management (SWM) including cost of mitigation options to determine the *demand* for funds;
- Wastewater management (WWM) including cost of mitigation options to determine the *demand* for funds; and
- Policy and institutional assessment including the EIA.

The difference between the cost of mitigation (demand) and government financing (supply) will constitute the gap to be determined that will form the basis for recommending policy reforms in these sectors and that will be synthesized in the CEA for Lebanon.

13. **For the four above issues, Lebanon faces the following challenges**:

- Pollution scale is high, and high also is the cost of addressing it. This would necessitate the prioritization of the two target sectors at the urban and possibly at the governorate levels and the provision of these sector services.
- The infrastructure system and investment portfolio were built according to an engineering approach in which politics and low accountability were prevailing. This led to poor service delivery for disposal and treatment, resulting in the unwillingness from the users to pay for these services. and therefore depriving the operators with additional resources to maintain the system.
- Utilities and operators at the sub-national entities such as municipalities and regional agencies are not creditworthy and cannot raise private capital. Given such constraints, municipalities and utilities prefer to finance the collection of wastewater and solid waste which would bear health benefits for the dwellers. However, they have little financial incentives to treat these wastes, as these are considered as a public good, hence requiring large state budget interventions.
- Municipal solid waste and drainage network (*Arsifa wa Majarir*) fee levels are very inadequate for effective cost recovery, and their effects on revenues for sustainable operations and maintenance (O&M) are negligible. Low fees and low cost recovery were not, however, financial barriers for private sector involvement as contractual agreements were reached but were subsidized by the GOL, municipalities or utilities. Nevertheless, policy reforms in terms of increasing low fees/tariffs, achieving cost recovery and clearing cross-subsidization (e.g. Electricité du Liban, etc.) have lagged behind for political and social reasons, adversely affecting the public debt in general and the sustainability of new investments in particular.
- The GOL is still using centrally-directed supply-driven approaches to provision of sanitation and municipal waste service infrastructure with limited communication and inputs form the immediate users/beneficiaries and stakeholders of these services at the local level.
- Treatment standards required for municipal wastewater treatment and municipal solid waste (MSW) disposal facilities are high, which would increase investments costs.
- Water pollution is expected to increase due to increased urbanization, expansion of industrial activities, and increased tourist infrastructure. Moreover, the climate change effects on water resources are projected to be significant over the next decades, which would increase the water scarcity and alter the water balance.

2.3 Expected Outcomes

14. **For all of the above issues, the CEA attempts to assess policies, public expenditures, and institutional capacity in managing key environmental resources and risks.** In particular, the CEA has attempted to answer a limited number of key questions: Has the environmental landscape changed over the past 20 years? And if so, where does Lebanon stand in terms of environmental sustainability? How can Lebanon optimize its investments in the wastewater and solid waste sectors in conjunction with its environmental benefits, and what are the key policies and institutional measures required from the MOE to optimize these environmental benefits in the short and medium term? The CEA results will be in line with the World Bank's 2010

Country Partnership Strategy (CPS) that has set out a general framework for engagement with the GOL over the next five years (fiscal years 2011-2014). In doing so, the CEA pays particular attention to environmental policy analysis and to the economic valuation of environmental resources and of their degradation.

15. **The CEA draws on past analytical work supported by the World Bank, such as the sector work on water, agriculture, and energy as well analyses and strategies such as the draft 2006 NEAP and the wastewater studies carried out by the EU, GIZ, and FAO**. The CEA is also guided by the results of the 2004 *Cost Assessment for Environmental Degradation* referred to as the 2004 $COED_{2000}$ in Lebanon, the 2007 *Cost of Hostilities* (COH_{2006}), covering their impact on Lebanon's environment during the 2006 war, and the more recent 2009 *Environmental Degradation, Remedial and Averted Costs* (EDRAC) in the Northern Lebanon Coastal Zone referred to as the 2009 *Cost of Coastal Zone Environmental Degradation* ($CCZED_{2005}$).[13] All these assessments were based on cost-benefit analysis for the identification of policies and demonstrated the economic importance for a clean environment. They are increasingly considered to be tools for the decision-making process in setting priorities.

[13] World Bank (2004a); World Bank (2007); and METAP (2009).

Chapter 3: Overview of Environmental Sustainability in Lebanon

16. **Environmental sustainability is defined as to ensure that the overall productivity of accumulated human and physical capital compensates for the direct or indirect loss of environmental assets.** In order to assess the extent to which a country could achieve environment sustainability, five indicators were used:

a) The Millennium Development Goals (MDG);
b) The Environment Performance Index (EPI);
c) The Adjusted Net Savings (ANS);
d) The Cost of Environmental Degradation (COED); and
e) The Environment-Related Spending (ERS).

3.1 The Millennium Development Goals

17. **Lebanon has made some progress towards achieving its Millennium Development Goals targets, and the United Nations Development Program (UNDP) has suggested in 2008 that Lebanon will achieve most of the MDGs by 2015, except for three major ones: (i) halving extreme poverty; (ii) reducing child mortality; and (iii) reversing environmental degradation.** A 2008 UNDP Progress Report on the 8 MDGs is about to be released with the main achievements related to the environment being assessed as follows:

- In terms of eradicating extreme poverty and hunger (MDG #1), nearly 28.6 percent of the population was considered to be poor in 2004-05. Moreover, 8 percent are considered to be extremely poor that cannot meet their food and non-food basic needs (less than PPP$ 2.4/day) with striking regional disparities[14] between Northern Lebanon (i.e. Akkar) and Greater Beirut.
- Yet below target, significant reductions in children less than 5 mortality rate (MDG #4) were achieved with a low infant mortality rate of 26/1000 live births.
- Lebanon will most likely not achieve the Ensure Environmental Sustainability (MDG #7) targets. The forest coverage (13 percent in 2003), and by extension the biodiversity loss, has increased since the 2006 war and is being exacerbated by climate change effects and natural disasters in terms of unabated forest fires over the last summers. As for the safe access to water, Lebanon has achieved more than 95 percent coverage when factoring in public and private networks and bottled water, and access to wastewater networks continues to grow steadily, with 67.4 percent coverage in 2004. Solid waste continues to be a major environmental problem with more than 700 open dumps used by the municipalities and where some of the waste is still burned. This causes major underground water pollution and air pollution, respectively.
- As for the Develop a Global Partnership for Development (Goal #8) targets, the process of international donor conferences following the 2006 war led to the Paris III (January 2007) reform program with the overarching objective "to stimulate growth, create employment, reduce poverty, and maintain social and political stability." Developing

[14] Laithy et al. (2008).

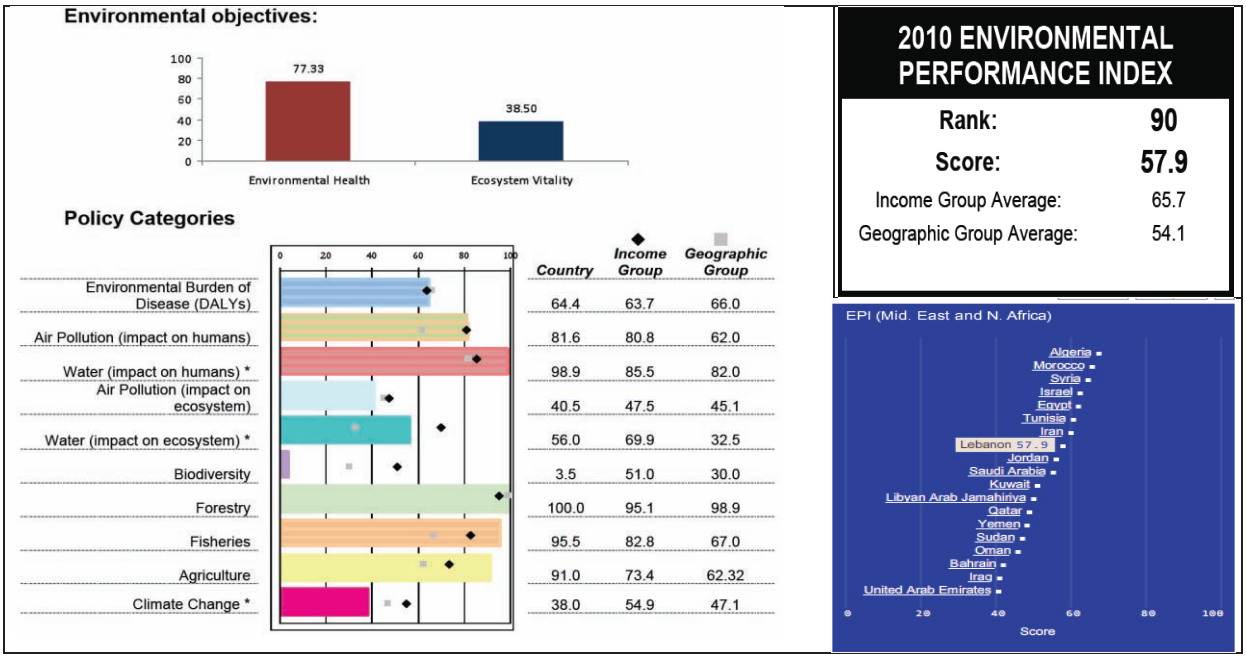
international cooperation for recovery, reconstruction, and reform is and remains a top priority for the GOL.[15]

3.2 The Environment Performance Index

18. **The Environment Performance Index[16] (EPI)** was developed to benchmark the environmental performance of a country relative to other countries. The index has two major environmental objectives: (a) reducing environmental stresses on human health; and (b) promoting ecosystem vitality and sound natural resource management. This index is composed of a combination of 25 performance indicators divided among six well-established policy categories (Figure 3.1).

19. **The higher the score, the higher is the environment performance of the country in achieving environmental sustainability**. A review of the trend of the EPI in Lebanon from 2008-2010 shows that Lebanon is still ranked 90th among 163 countries, and its score decreased from 70.3 in 2008 to 57.9 in 2010, indicating a lower performance in terms of environmental sustainability. The EPI for Lebanon indicates weak scores in environmental health and economic vitality in 2010, ranking 8th in comparison to the MNA countries (Figure 3.1).

Figure 3.1: Lebanon Environment Performance Index and Benchmarking, 2010



Source: Esty and Levy (2010).

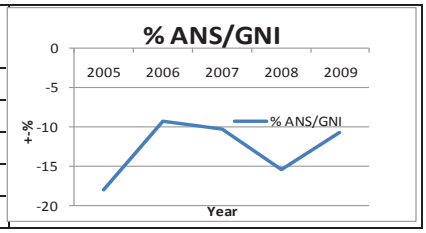
[15] UNDP website: <www.undp.org>. UNDP's MDG reported targets do not always reflect the most recent or official figures.
[16] Esty and Levy (2010).

3.3 The Adjusted Net Savings in Lebanon

20. **The Adjusted Net Savings (ANS) is a general environmental indicator that measures the net savings of a country at a macroeconomic scale, taking into consideration the investments in human resources, depreciation of physical assets, and decrease in natural resources.** This indicator is still imperfect as it does not take into account the physical assets and degradation/depletion of groundwater, agricultural soils, etc. While the Gross National Income (GNI) per capita is a widely used measure of current welfare, adjusted net savings indicate the prospects for future welfare. A negative savings rate indicates physical and natural assets will decline over time. Lebanon has been displaying a negative ANS trend as represented during the last five years (Table 3.1).

Table 3.1: Lebanon Adjusted Net Savings

Years	Adjusted Net Savings (ANS) as a percentage of Gross National Income (GNI)
2005	-18.1
2006	-9.3
2007	-10.3
2008	-15.4
2009	-10.8



Source: World Bank Green Book (2009).

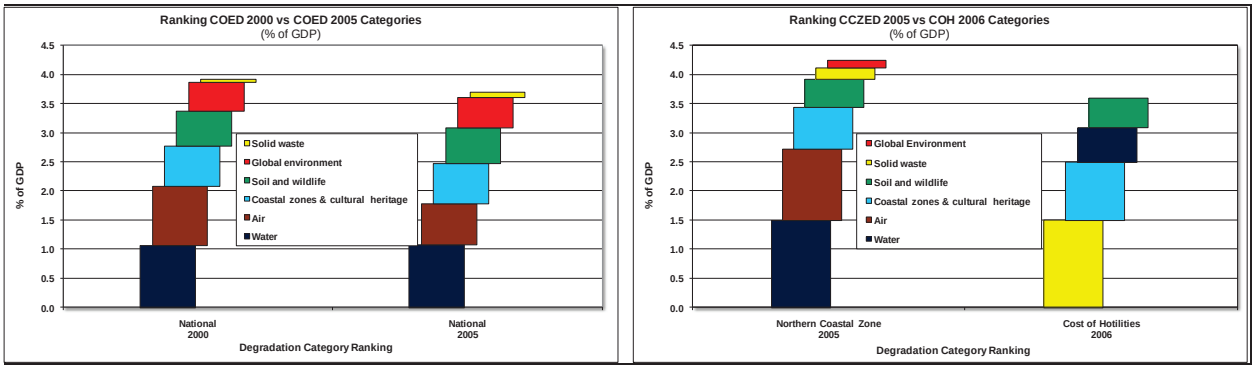
3.4 The Cost of Environment Degradation (COED)

21. **The COED, which is a measurement of environmental sustainability related to the present welfare of a society, is meant to help policymakers make informed and efficient choices to maintain the integrity of the environment and promote conservation based on a common denominator: monetizing the environmental damage and remedial interventions.** These results, which should be considered as a preliminary order of magnitude, could nevertheless help optimize the trade-offs between economic development and growth, well-being, and the preservation of the commons, especially the coastal zone. Moreover, these results provide policymakers with an instrument for integrating environment into economic development decisions and comparing damage costs as a percentage of GDP. Far from being exhaustive, the analyses cover six environmental categories: water; air; coastal zones and cultural heritage; soil and forest; global environment; and solid waste.

22. **The World Bank and METAP have produced a number of national, regional, and war-related COEDs for Lebanon, with results ranging from 3.6 to 4.2 percent of GDP from 2000 till 2006** (Figure 3.2). **The $COED_{2000}$ environmental priorities were extensively used by the MOE since 2004 to make the case to address Lebanon's urgent environmental problems.** A preliminary **rapid update** of the COED, which would require additional fine tuning, was therefore performed based on the $COED_{2000}$ and the $CCZED_{2005}$ in Northern Lebanon. The $COED_{2005}$ shows a slight reduction in relative terms when compared to the GDP: from 3.9 percent in 2000 to 3.7 percent in 2005, but it grew in absolute terms to reach US$ 799.5 million at 2005 prices (or US$ 969 million at 2008 prices). Although the ranking is the same for both years, the reduction is due to two factors: the 2002 ban of leaded gasoline has produced important environmental benefits in urban areas in terms of less cardio-pulmonary cases and loss of IQ; and the GDP (+20.7 percent) grew at a faster pace than environmental degradation (+13.2

percent) over the period at constant terms. However, all the other criteria air pollutants (PM_x, SO_x, NO_x, O_3, and VOC) increased in absolute terms over the period, which makes urban air pollution a growing problem that is exacerbated by non-point sources (significant increase of the number of cars and related exacerbation of traffic jams), and communal and residential power generators due to increased power outages.

Figure 3.2: COED, CCZED and COH, 2000-2006, Percent of GDP



Note: Instead of the carbon market rates, Stern's figures were used for the Global environment in the CCZED that produced lower global damages. Air pollution was not calculated for the Cost of Hostilities. Themes are color-coded in the figures: blue for water, brown for air, turquoise for coastal zones, green for soil and wildlife, red for global environment, and yellow for solid waste.
Sources: World Bank (2004); World Bank (2007); METAP (2009); and Lebanon CEA ERS Background Paper (2010).

23. **The $CCZED_{2005}$ and the COH_{2006} were performed to get a better understanding on the degradation in the coastal zone and the cost associated with the 2006 war, respectively.** The $CCZED_{2005}$ shows a higher level of degradation (4.2 percent of GDP), owing to the use of recent and more robust data, although lower amounts (derived from Stern, 2007) associated with carbon damages were used for the Global environment. Relative to GDP, the COH_{2006} shows almost a similar level of degradation (3.6 percent of GDP) in just more than a month of war when compared to a yearly $COED_{2005}$ (3.7 percent).

24. **When comparing the two prioritization methods, the COED and the draft 2006 EC NEAP produced in certain cases similar and in other cases opposite environmental priorities.** The NEAP, which is a comprehensive tool for decision makers, builds on a number of reports, especially the SOER (2002) and the CDR 5-year plan.[17] To get a sense of the critical environmental issues in Lebanon, the NEAP's broad long-term priority ranking is compared with the COED monetized ranking. The priority setting in the NEAP and COED are contrasted to shed some light on the pros and cons of each method. Nevertheless, it is important to note that the theme retained by both approaches have somewhat different scopes.

[17] NEAP (2006); and CDR website: <www.cdr.org.lb>.

Table 3.2: COED and NEAP Lebanon Priority Ranking, 2000-05

Monetized Environmental Degradation (Effect-based)							NEAP (Pressure-based) (various base years: 2000-05)	
Category	$COED_{2000}$			$COED_{2005}$				
	Ranking	US$ Million	% of GDP	Ranking	US$ Million	% of GDP	Pressure	Ranking
1. Water	1	175	1.07	1	233	1.08	1. Wastewater	1
2. Air	2	170	1.02	2	151	0.70	2. Air	1
3. Coastal zones & cultural heritage	3	110	0.68	3	162	0.69	3. Solid waste	1
4. Soil and wildlife	4	100	0.60	4	132	0.61	4. Unregulated construction	2
5. Global environment	5	90	0.50	5	114	0.53	5. Industry location	3
6. Solid waste	6	10	0.05	6	19	0.09	6. Agrochemicals	4
Total		**655**	**3.92**		800	3.70	7. Excessive irrigation	5
Total without Global Environment		***565***	***3.42***		***686***	***3.17***	8. Industrial waste effluents	6
GDP in current prices		*16,600*			*21,800*		9. Waste oil	7

Note: a ranking exercise was also performed under the SOER (2002) but is not reported in the Table. The final 2000 GDP was US$ 17.3 billion, whereas the COED used a preliminary estimate of US$ 16.6 billion, which brings the COED relative to the 2000 GDP to 3.79% instead of 3.92%.
Sources: World Bank (2004a); draft NEAP (2006); METAP (2009); MOET (2007); CAS (2008); and Lebanon CEA ERS Background Paper (2010).

25. **The difference between the COED and the draft NEAP environmental priorities could be explained not only by the method used but also by their associated step in the Driver, Pressure, State, Exposure, Effects and Action (DPSEEA) Framework, as the former is effect-based, whereas the latter is pressure-based.** Despite the different ranking criteria, approach, and base years (Table 3.2), i.e. monetization of the damage of 6 media and categories for the COED, and a complex evaluation exercise (indicator-based and scoring) using 9 stressors for the NEAP, the ranking for water (1 and 1 respectively) and air (2 and 1) remains almost similar; however, the solid waste ranking differs tremendously (a distant 6 and 1). As a matter of fact, a benefit transfer of a contingent valuation method based on a solid waste management study is used in the $COED_{2000}$, which was no longer used in the $COED_{2005}$, whereas the pressure approach is used in the NEAP. It therefore brings to the forefront one of the most critical and complex environmental issue facing Lebanon, especially in coastal urban areas, where population density, prime property value, and the nimbysm converge. It also underscores the limitation of the COED approach, which is giving in certain instances the wrong signals in terms of environmental degradation, because the bulk of the monetized damage is usually associated with ill health and premature death and is moreover a function of the technique used in accounting for premature death (human capital approach, value of statistical life, or a mid-point of both techniques).[18]

3.5 Conclusion and Recommendations

26. **The results of the four environmental indicators showed that Lebanon economic growth is not accompanied with an improvement in environmental sustainability which remains low.** In order to protect the welfare and the quality of life of present and future generations, Lebanon needs to build its economy around and not against its natural resources. Lebanon development strategies should place environmental sustainability needs at similar levels

[18] Doumani (2007).

of priority as its economic growth. There is still a strong emphasis on investments as a remediation for environmental problems, with less impressive progress on policy reforms. Such levels of financing can no longer be sustained with the increase of the GOL debt and the decline in GOL revenues, which cannot be used to finance additional basic environmental services such as water supply, sanitation, and waste management in rural areas or in social sectors. Under such circumstances, Lebanon has no alternative but to proceed with public expenditure efficiency based on output performance, impose gradually the recovery of services and resource utilization costs, and internalize the environmental degradation costs.

Chapter 4: The Environment-Related Spending

27. **The ERS,[19] which is the fifth indicator for ensuring financial sustainability of environmental expenditures, systematically assesses the equity, efficiency, and effectiveness of fiscal resources that the GOL has invested during the last ten years.** The Lebanon ERS particularly focuses on the water, wastewater, and solid waste sectors, among others, and evaluates the appropriateness of budgetary allocations (from national and international sources) relative to pressing environment issues and environmental policy priorities. The ERS hence attempts to: (a) estimate the investments made in the field of environment protection; (b) assess whether these investments were compatible with the GOL's development and environmental priorities; and (c) ascertain the sustainability of financial resources.

28. **Internationally, environmental expenditures are classified according to 2 main categories**:

- Environmental Protection (EP) activities, aiming at protecting the environment against pollution, losses in quality, and any kind of physical degradation (qualitative perspective). The Classification of Environmental Protection Activities (CEPA) was adopted by the UN Statistical Commission as an international standard in 2002.
- Resource Use and Management (RUM) activities, aiming at managing natural resources and avoiding/reducing their depletion (quantitative perspective). The on-going UN SEEA revision (System of Integrated Environmental and Economic Accounting 2012) will allow deriving the RUM activities and expenditures.

29. **In Lebanon, the EP and RUM are non-existent although the UN ESCWA-funded *Strengthening National Capacities in Environment Statistics, Indicators and Accounts* is helping regional governments set up the SEEA approach along three major themes:** scarce water resources, land degradation, and exploitation of oil and gas resources. Hence, the SEEA will be internalized within the GOL's Central Administration for Statistics green accounting system and will be available by 2010. Yet, air pollution is not included in the classification.

30. **To overcome these misgivings, an *Alternative Classification Matrix by Environmental Category and Entry Point* was therefore devised to chiefly focus on water, wastewater, and solid waste, and to a lesser extent on other environmental themes based notably on the COED categorization** (Annex I). The ERS therefore relies extensively on the review of the GOL budgets and Treasury, CDR expenditures, municipal budgets (when available), partner development projects, and stand-alone activities (NGOs, associations, etc.).

4.1 Environment-related Spending is Difficult to Track Down

31. **There are a number of actors responsible for environment-related spending**: the GOL budget through allocations to line ministries, CDR, the Council of the South (COS) and the Central Fund for the Displaced (CFD); the GOL Treasury through the fiscal replenishment of the Independent Municipal Fund (IMFU) whose monies are distributed according to a complicated

[19] This section builds on the Lebanon CEA ERS Background Document (2010).

formula to include the payment of waste management companies; municipalities through their direct or indirect appropriation or loan subscription can earmark funds for environment-related spending, but these amounts are very difficult to track down as the municipal electronic accounting system is still under development and covers only direct revenues to date;[20] autonomous public entities such as EDL and Regional Water Establishments (RWE), although these entities are facing budget constraints and have required exceptional transfers from the GOL through their line ministry tutelage to cover minimal operations and maintenance (O&M), as their cost recovery is below the MNA region benchmarks; development partners that shy away from using CDR as executing agency by either directly targeting other government entities (line ministries, municipalities, or other specialized entities such as the ones involved in energy efficiency) or opting to manage their investments by directly hiring consulting firms or NGOs; and intermediation mechanisms (grants, micro-credits, and guarantees) as well as the Banque du Liban that is incentivizing the banking sector to offer credits to underfunded sectors, including those addressing environment and energy efficiency.

32. **So far, the World Bank Group's International Finance Corporation (IFC) does not have, at least by design, any environment-related investments (equity, loans, and/or loan syndication). However, the IFC together with other Development Partners is fostering an investment environment conducive for private sector participation in public utilities and infrastructure financing as underscored by the Paris III reform program.** Interestingly, the Lebanese private sector has already initiated private-sector participation in SWM facilities. Additionally, the Lebanon Recovery Fund is a Multi-Development Partner Trust Fund that was established at the request of the GOL that enables Development Partners to pool their resources together to provide funding in the aftermath of the July 2006 war. The UNDP is acting as the administrative agent with a total portfolio of US$ 47.4 million at the end 2009 with partial reconstruction allocations targeting environment-related projects.[21]

4.2 The Budget and Treasury

33. **The central government and aggregate Treasury spending is equivalent to about half the GDP.** The central Government and aggregate Treasury spending on a cash basis amounted to an average US$ 8.4 billion per year over the 1999-2008 periods at 2008 prices and represented 34 percent of GDP (Table 4.1). On average, the Treasury debt service covers 40.7 percent of the aggregate spending. Administrative expenditures constitute 39.6 percent of aggregate spending and Treasury expenditures (in terms of advance to notably EDL since 2004) leaving 7 percent for investments. Whereas the debt service (-0.8 percent period growth) and Administrative Expenses (+0.6 percent) remained quasi constant over the 1999-2008 period, the increase in Treasury Expenditures (17.3 percent) is matched by a decrease in aggregate investments (-7.7 percent) in order to maintain the budgetary and aggregate Treasury spending (1.2 percent period growth) over the 1999-2008 period (Figure 4.1).[22]

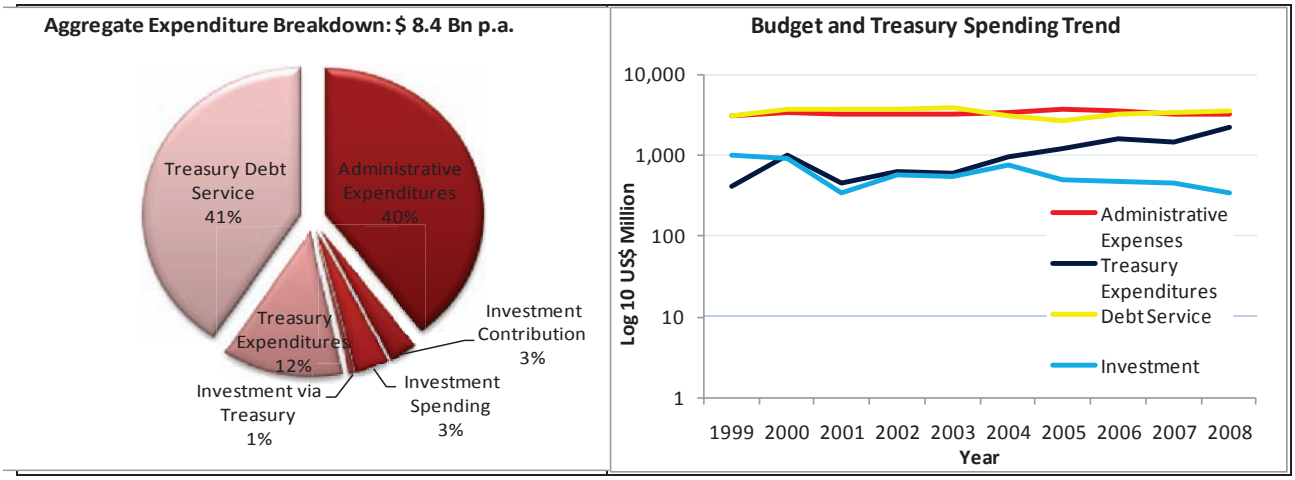
[20] USAID website: <www.usaid.gov/lb>.
[21] UNDP website: <www.undp.org/mdtf/lebanon>; and GOL website: <www.rebuildlebanon.gov.lb>. COM has to grant authorization to access the project portfolio but the website is down: <www.dadlebanon.org>.
[22] MOF (2009).

Table 4.1: Budgetary and Treasury Expenditures by Chapter, 1999-2008, US$ million 2008 ct

Chapter / Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	% Avg.	±% Avg. 08/99
Administrative Expenses	3,043	3,409	3,262	3,282	3,289	3,412	3,673	3,531	3,226	3,233	**39.6**	0.6
Investment Contribution	610	627	104	228	253	454	232	255	129	97	**3.6**	-12.8
Investment Spending	416	280	243	355	294	320	275	216	326	246	**3.5**	-2.9
Treasury Expenditures	416	1,017	450	640	606	980	1,206	1,575	1,454	2,239	**12.6**	17.3
Debt Service	3,154	3,657	3,743	3,798	3,865	3,088	2,692	3,307	3,441	3,519	**40.7**	-0.8
Grand Total US$ Million	**7,639**	**8,990**	**7,802**	**8,304**	**8,306**	**8,254**	**8,079**	**8,885**	**8,576**	**9,333**	**100.0**	**1.2**
GDP US$ Billion 2008 ct	**22.5**	**22.6**	**22.7**	**23.7**	**24.1**	**25.7**	**26.4**	**25.7**	**26.4**	**29.9**		**2.9**
GDP US$ Billion current	**17.4**	**17.3**	**17.6**	**19.2**	**20.1**	**21.8**	**21.8**	**22.4**	**25.1**	**29.9**		**5.7**
Lebanon CPI (CAS)	77.3	76.6	77.6	80.9	83.3	84.7	82.5	87.1	95.2	100.0		2.8

Note: Period growth is obtained by averaging the logarithms of the year-to-year growth ratios.
Source: MOF (2009); World Bank (2010c); and Lebanon CEA ERS Background Document (2010).

Figure 4.1: Annual Budgetary & Treasury Expenditure Share & Trends, 1999-2008 US$ Million 2008 ct



Note: Investment Contribution (3.6 percent) includes budgetary allocations (2.93 percent) as well as Treasury allocations (0.62 percent) to CDR, Council for the South and Council for the Displaced. Therefore, the Treasury allocations are disaggregated and labeled Investment via Treasury in Figure 4.1's first quadrant pie chart. Investment Spending (3 percent) is neither broken down by investment type, i.e. project (short term or yearly) and programmatic (long and medium-term) investments nor by investment execution, as some line ministries transfer some of their investment allocations to CDR for implementation over several years.
Sources: MOF (2009); and Lebanon CEA ERS Background Document (2010).

34. **The Treasury has been under a lot of strain**. Increased transfers have been necessary not only to cover the ballooning EDL energy bill (+27.4 percent period growth) but also the indirect revenues of municipalities (+6.6 percent): the proceeds collected by the GOL on behalf of municipalities suffer a time-lag of 12 to 24 months and necessitate sometimes Treasury advances: they are in part deposited in the IMFU or transferred to CDR to cover solid waste management major outsourcing contracts.[23]

[23] MOF (2009).

The Ministry of Environment

35. **The MOE has one of the smallest budget allocations among line ministries: budget law allocations to the MOE are equivalent to US$ 3.3 million per year on average over the 1999-08 period (+5 percent period growth at 2008 prices) in sharp contrast with the MOE actual budget that amounts on average of US$ 2 million per year over the period (-1 percent period growth and 40 percent less than budgeted), reflecting a relatively low MOE absorptive capacity, although US$ 3.8 million are budgeted for 2011 .** In relative terms, its budget appropriation represents on average 0.02 percent of the aggregate budgetary and Treasury expenditures. Up to 96.8 percent of the MOE budget is on average, over the 1999-2008 period, allocated towards administrative expenses. The remaining share of 3.2 percent is allocated towards studies and monitoring and amounts to US$ 60,000 on average per year over the period at 2008 prices (+15.1 percent period growth).

Table 4.2: Ministry of Environment Budgetary Expenditures, 1999-2008, US$ Million 2008 constant prices

Year Chapter	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	% Avg.	±% Avg. 08/99
Actual Budget and Treasury	**7,639**	**8,990**	**7,802**	**8,304**	**8,306**	**8,254**	**8,079**	**8,885**	**8,576**	**9,333**	**100.0**	**1.2**
Total Actual Budget	**3,936**	**4,067**	**3,394**	**3,706**	**3,626**	**3,946**	**4,042**	**3,714**	**3,584**	**3,505**	**44.6**	**-0.7**
Ministry of Environment Actual disbursement basis	1.9	1.9	1.3	1.5	3.7	1.8	2.6	2.2	1.6	1.3	0.02	-1.0
Ministry of Environment Budget Law Allocation	2.1	2.4	3.4	4.4	2.2	3.8	3.1	3.4	4.0	3.7		5.1
Budget Law/Actual Disbursement difference	0.1	0.5	2.1	2.9	(1.5)	2.1	0.6	1.2	2.4	2.4		
Percentage difference (%)	7	20	61	66	-66	54	18	36	60	66		
GDP US$ Billion 2008 ct	22.5	22.6	22.7	23.7	24.1	25.7	26.4	25.7	26.4	29.9		2.9

Sources: MOE (2008) and Lebanon CEA ERS Background Paper (2010).

36. **The MOE regularly declined being granted additional allocations it said it did not to need.** As a result, the MOF has regularly commended the transparency of the MOE regarding its budget requests, which were characterized by their accuracy, their transparency, and the quality of the supporting documents presented.

37. **The MOE has leveraged its budget with grants to the tune of US$ 2.4 million per year over the period at 2008 prices or about 121 percent of the MOE actual budget of US$ 2 million.** Yet, new grants managed by MOE have been decreasing in number and amount in 2008, which could jeopardize its operations: less than half the grants (49 percent) obtained during the 1999-2008 period are still active, and a US$ 250,000 grant on POPs funded by a Canadian Trust Fund managed by the World Bank has built MOE capacity and updated the legal framework on PCBs. The allocation of the grant amounts lacks effectiveness when compared to the environmental category rankings (Figure 4.1). This is due to the development partner priorities, especially when it comes to the compliance with international legislation. Hence, the largest environmental category to benefit from grants is by far the Natural Disasters and Global Environment category (US$ 1.2 million on average per year over the period). More specifically,

the MOE has leveraged its budget to improve the state and management of 6 out of 8 protected areas, but its irregular yearly allocations jeopardize their sustainable management.[24] The yearly budgetary expenses averaged US$ 0.2 million over the 1999-2008 period at 2008 prices, which were doubled thanks to ongoing development partner projects that sometimes are disbursed without MOE oversight. Conversely, the MOE has provided small grants to environmental NGOs since 1994 to the tune of US$ 0.95 million over the 1999-2003 period at 2008 prices.[25] The MOE and CDR are coordinating the phased GIZ Environmental Fund for Lebanon (2007-2010 with US$ 11 million equivalent in total and US$ 6.3 million at 2008 prices for the first phase) that was launched as quick disbursement grants to mitigate environmental risks and economic impacts of the 2006 War in Lebanon.[26]

Table 4.3: MOE Program Budget and Leveraging, 1999-2008 in US$ 000′ 2008 constant prices

Entry point	$COED_{2005}$ Environmental Category Ranking							
	1	2	3	4	5	6		
	Water	Air, Odor, Radiation, Noise & Vibration	Coastal Zones & Cultural Heritage	Land use, Soil & Wildlife	Natural Disasters & Global Environment	Solid Waste	Institutional, Legal and Regulatory Capacity	Total
MOE In Cash	-	38	-	237	360	34	234	904
MOE In Kind	-	155	-	697	1,635	252	580	3,318
Grant	-	989	517	3,051	9,788	1,472	7,071	22,888
Other Partners	-	158	-	535	-	426	168	1,288
Total	**-**	1,341	517	4,520	11,783	2,184	8,053	28,398
Yearly Average	**-**	134	52	452	1,178	218	805	2,840

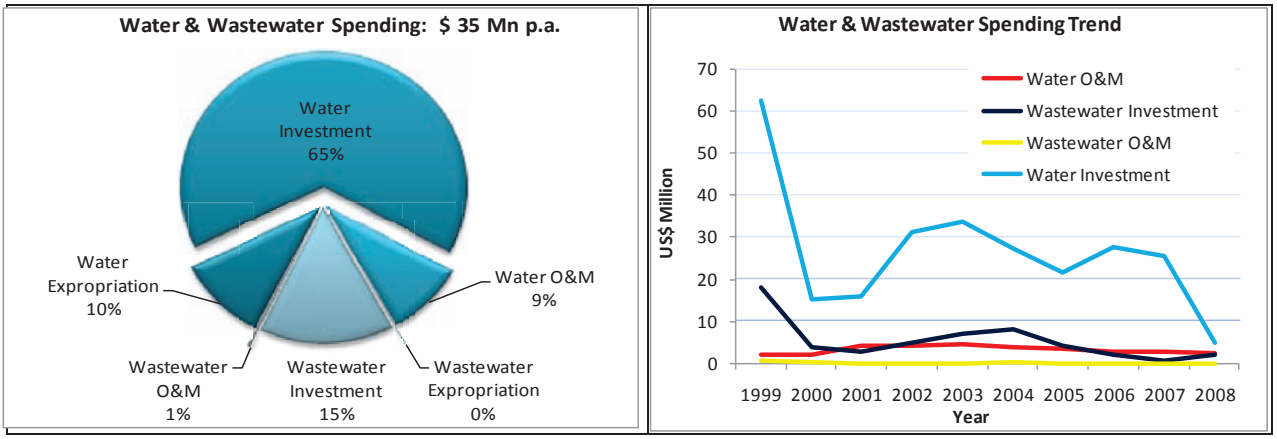
Note: Grant amount is based on the signing year of the grant. COED and grant ranking are color coded, e.g., red ranks first, yellow ranks second, etc. In cash correspond to cash payments towards the activity whereas in kind contribution correspond to mainly staff time.
Source: Lebanon CEA ERS Background Paper (2010).

The Ministry of Energy and Water

38. **The MOEW's mission is to manage and implement energy, water, and wastewater policies with total budget appropriations of US$ 42.2 million per year over the period 1999-2008** (Table 4.1). With regards to water and wastewater, most investments are carried out by CDR (see below), but MOEW transfers some of its appropriations to cover the O&M of certain RWEs. *Investment Spending* includes environment-related investments such as water supply, irrigation, and runoff management as well as wastewater treatment plants. Collectively, these sectors amount to an average of US$ 35.2 million per year over the 1999-2008 period at 2008 prices. Their share, however, represents a negligible 0.5 percent of total budgetary and Treasury expenditures and has been on a constant decline with a minus 9.5 percent period growth. Still, budgetary water, irrigation, runoff, and wastewater spending is broken down further by function, i.e. investment, land expropriation and O&M, and by line ministry allocation (Figure 4.2).[27]

[24] These transfers made to protected areas fall under Article 14-2-1 (transfers to non-profit organizations) in the budget and this irregularity could result from budgetary constraints and is characteristic of transfers to non-profit organizations allocated to all Ministries and does not target the MOE as such.
[25] UNDP Small Grant Program website: <www.sgp.undp.org>.
[26] Environmental Fund website: < www.therefordesign.net>.
[27] MOF (2009).

Figure 4.2: Annual MOEW Expenditure Share & Trends, 1999-2008 US$ million 2008 constant prices



Note: water includes water resources, irrigation, and runoff. Investment includes expropriation and investment.
Source: Lebanon CEA ERS Background Paper (2010).

39. **Considering budgetary water and wastewater O&M under *Investment Spending* is misleading.** Line ministry water supply and irrigation vs. wastewater spending is uneven with an 85 to 15 percent split of total water to wastewater allocations. For water supply, irrigation, runoff and wastewater, investments remain the largest line item (80.3 percent), followed by land expropriation (10.3 percent) and O&M (9.4 percent). Due to the poor RWE cost recovery, the MOEW has been transferring an average of US$ 2.5 million per annum since 2000 to support the O&M of the water supply networks, although this trend was reversed in 2004 with the MOEW starting to directly outsource O&M of some water treatment stations. In terms of line ministries, the MOEW assumes 99.6 percent of all water supply, irrigation, runoff, and wastewater budgetary spending amounting to US$ 35.1 million. The Ministry of Defense, Ministry of Housing and Cooperatives, MOA, and MOIM made exceptional small contributions (average US$ 0.1 million per year) over the period (Table 4.2).[28]

The Ministry of Interior and Municipalities, and the Independent Municipal Fund

40. **The majority of the MOIM budget appropriations averaging US$ 350.5 million per year (3.8 percent in relative terms and +3.1 percent period growths) are allocated towards fulfilling its primary obligation as Ministry of Interior.** Yet, the MOIM has jurisdiction over municipalities, which in turn were responsible for waste collection to disposal. Nevertheless, the MOIM prerogatives have been duplicated, as both the MOE and MOIM have dealt with policies, legislation (e.g., MOIM provided fiscal incentives since 2002 to municipalities that hosted landfills but environmental safeguarding was not compulsory), strategy, and planning over the last decade. Furthermore, SWM started being contracting out from the 1990s in several regions, and a solid waste management plan was jointly devised by CDR and the MOE in 2006 under the aegis of the COM that was followed in 2010 by a new plan submitted by the MOE to the COM (see below). To add to the fragmentation, a number of waste recycling and treatment plants were funded by the EC and implemented through the Office of the Minister of State for Administrative Reform (OMSAR), which did not have the prerogatives to deal with the waste sector but ended up building its in-house capacity to implement the solid waste composting and recycling plants (Box 4.1).

[28] MOF (2009).

Box 4.1. OMSAR Solid Waste Management Activities

Through EC funding of € 14.2 million, OMSAR is implementing a SWM program that aims to build 12 SWM facilities (sorting and composting facilities) with a cumulative capacity of about 700 t/d or about 18% of the total waste generated in Lebanon. These facilities will serve around 1 million inhabitants in Lebanon or about 25 percent of the Lebanese population.

OMSAR SWM program has also supported Lebanese municipalities in the supply of collection equipment: 15,500 bins of different sizes (50 to 1,100 liters), 53 collection and handling equipment (compactor trucks, pickups, wheel loaders, skid steer loaders, etc.), and specialized waste management equipment at a total cost of nearly € 3.2 million.

OMSAR launched and conducted the largest awareness initiative in the country with a budget of € 161,800 to promote proper MSW management and sorting at the source: so far 74 events were organized and 3,806 people were trained. Also, 370 people went on field visits.

OMSAR succeeded in providing operations and maintenance financing to these 12 facilities from the National budget. The funding secured is US$ 15 million calculated on an average cost of US$ 25 per ton for sorting, composting, and transfer to a landfill. OMSAR is responsible for monitoring operations at these facilities through operation contracts. After the three years period, municipalities will follow the same path that Zahle followed with respect to sustainability and cost recovery.

Source: OMSAR website: <www.omsar.gov.lb>.

Table 4.4: Solid Waste Management Selected Outsourcing Annual Cost, US$ million in 2008 constant prices

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
SWM Outsourcing										
CDR										
SWM Payment for Beirut intra muros	29.3	31.9	29.0	31.4	29.5	30.6	33.7	32.3	28.4	-
SWM Payment for Aley, Chouf & Metn	65.4	73.8	68.6	76.4	73.7	81.1	92.1	89.4	83.4	-
SWM Payment for Kesrwan	8.3	9.2	8.5	9.6	9.4	10.3	11.7	11.8	10.7	-
Subtotal Averda and Laceco	103.0	115.0	106.1	117.4	112.6	122.0	137.4	133.5	122.4	110.6
SWM Payment for Al Fayhaa FOM									6.7	6.0
SWM Payment for Saida FOM									0.9	1.1
SWM Payment for Jezzine FOM										0.2
Total SWM Expenditures	103.0	115.0	106.1	117.4	112.6	122.0	137.4	133.5	130.0	117.9
Ministry of Finance										
Distribution of Revenues Accruing to Municipalities through IMFU	NA	NA	NA	NA	NA	NA	NA	158.3	63.3	190.3
Payments for SWM through IMFU	NA	NA	NA	NA	NA	NA	NA	136.3	134.4	153.2
Other	NA	NA	NA	NA	NA	NA	NA	13.7	11.9	6.0
Treasury Transfers to Municipalities	151.0	383.8	93.9	282.9	143.3	362.3	308.5	308.3	212.4	349.5

Note: 2008 figures are preliminary. CDR figures are on a commitment basis (payment due) whereas MOF figures are on a disbursement basis.

Sources: CDR (1996-2008); MOF (2001-08); and Lebanon CEA ERS Background Paper (2010).

41. **Weak local government capacities, complex legal regulations, and unclear expenditure assignments have blurred fiscal relations between the central government and local authorities**.[29] Municipalities enjoy autonomy over their own budget and have recently been allowed to borrow. Transfers from the central government via a tax-sharing arrangement are channeled through the IMFU, which is required to distribute revenue based on a complicated formula to supplement the narrow base of municipal fiscal resources. Currently housed at the MOF while SWM contracts are being overseen by CDR, the IMFU was increasingly being used to fund SWM operations to the tune of 119.5 million on average per year with a 2.5 percent growth over the 1999-2008 period, representing about 47.5 percent of total IMFU allocations

[29] IMF (2005).

over the 2006-2008 period (Table 4.3). Conversely, discretionary amounts are being directly disbursed by smaller municipalities for SWM outsourcing.

4.3 CDR Spending

42. **CDR's operations are partly financed from: (i) development partners' funds;[30] (ii) regular project subsidies granted by line ministries; (iii) transfers coming from the budget and Treasury; and (iv) from municipalities through the IMFU for the payment of SWM contractors.** Thus, before 2010, only a portion of the public funds (ii, iii and iv) was duly budgeted.[31]

Table 4.5: Foreign and Local Spending by CDR, 1999-2008, US$ Million in 2008 constant prices

Year / Sector	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	% Avg.	±% Avg. 08/99
Agriculture	1.9	1.7	3.3	1.6	2.3	1.8	0.7	0.2	0.0	5.3	0.5	-36.6
Irrigation	8.3	13.1	14.4	9.6	12.0	8.1	0.9	0.1	0.5	0.2	1.8	-42.4
Land use & Env.	1.6	1.3	2.8	5.5	2.1	1.5	3.8	5.8	5.1	6.3	1.0	16.0
Electricity	152.4	65.3	59.4	14.0	6.1	6.3	10.1	3.3	1.3	7.4	8.7	-34.6
Solid Waste	2.9	1.6	4.5	449.4	4.0	1.7	9.3	0.1	23.6	149.8	17.3	16.1
Water Supply	73.0	52.0	70.8	48.5	45.3	32.0	86.3	37.5	31.1	31.3	13.6	-7.6
Wastewater	7.1	23.1	28.4	16.4	34.8	33.2	26.2	75.4	36.1	29.6	8.3	14.4
Sub Total	247.2	158.0	183.6	545.1	106.5	84.7	137.4	122.4	97.7	230.0	51.1	-6.1
Other	169.2	154.8	232.8	147.6	241.0	214.9	210.4	157.9	115.1	185.6	48.9	-1.3
Grand Total	**416.4**	**312.8**	**416.4**	**692.7**	**347.5**	**299.6**	**347.8**	**280.3**	**212.8**	**415.6**	**100.0**	**-4.1**

Note: Period growth is obtained by averaging the logarithms of the year-to-year growth ratios.
Sources: CDR (2009); CAS (2008); IMF (2009); and Lebanon CEA ERS Background Paper (2010).

43. **There was a significant slowdown in investments managed by CDR since the last decade.** Aggregate investments managed by CDR over the 1992-2008 and 1999-2008 periods amount to the equivalent of US$ 8.95 billion and US$ 3.1 billion, respectively, at current prices. Over the 1992-2008 period, budgetary and Treasury transfers represented the largest share of the funds managed by CDR, i.e. 57 percent over the period. However, CDR is increasingly trying to use long-term soft loans from multilateral and bilateral institutions as well as occasionally from commercial banks to finance its projects in order to offset the declining transfers from the GOL. CDR commitments, however, reveal a limited absorptive capacity of the country with an average reaching US$ 560 million per year with notable variations over the period.[32]

44. **Finalized projects implemented by CDR accounted to US$ 6.5 billion over the 1992-2008 period, whereas projects under implementation as of end 2008 amounted to US$ 2.45 billion.** Over the 1992-2008 period, the transportation sector remained the largest recipient of signed contracts with 25 percent, followed by electricity with 17 percent, water supply and wastewater treatment with 15 percent, solid waste with 14 percent, education with 11 percent,

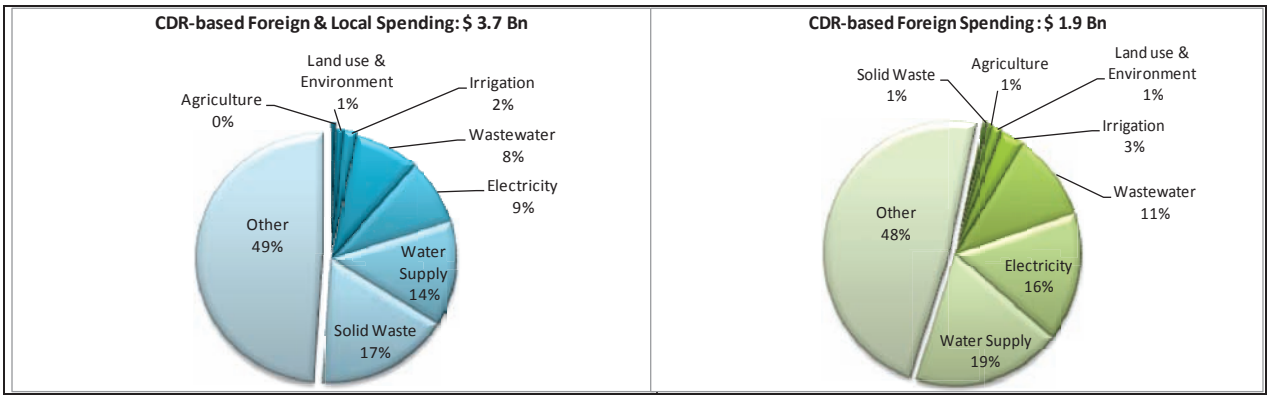
[30] CDR financing from development partners' funds were included as an annex in the budget starting the 2007 Budget Proposal and as a budget line item starting 2010 Budget Proposal.
[31] IMF (2005).
[32] CDR website: <www.cdr.gov.lb>.

post and telecommunications with 9 percent and public health with 4 percent, while other sectors accounted for the remaining 6 percent. None of the annual CDR Progress Reports, however, mentioned any kind of evaluation, performance review, and/or audit of the finalized programs or projects.[33]

45. **CDR spending was almost equally covered by local and foreign sources over the 1999-2008 period, but the relative share of these allocations varied significantly across sectors.** Aggregate local and foreign spending amounted to US$ 3.7 billion over the 1999-2008 period at 2008 prices, whereas foreign spending alone reached 1.9 billion or 52 percent of total CDR spending (Table 4.4).[34]

46. **Both foreign sources (-5 percent period growth) and aggregate local and foreign sources of CDR spending over the 1999-2008 period declined (-4.1 percent) at 2008 prices.** However, foreign sources registered a much sharper drop (-11 percent period growth) than the combined local and foreign sources (-6.1 percent period growth) for environment-related sectors (Table 4.4).[35]

Figure 4.3: Aggregate Local and Foreign Spending by CDR, 1999-2008, US$ billion in 2008 constant prices



Sources: CDR (2009); CAS (2008); IMF (2009); and Lebanon CEA ERS Background Paper (2010).

47. **When comparing local and foreign CDR spending to foreign CDR spending, the wastewater, solid waste, water, and electricity sectors stand out.** Most sectors maintained their relative shares with small variations when comparing local and foreign CDR spending to foreign CDR spending alone, except for wastewater, solid waste sectors, water, and electricity. Indeed, the relative share of total CDR spending on the four sectors is completely altered when considering local vs. local and foreign spending. For instance, foreign spending has dried out for the solid waste sector following the redesign, downsizing, and finally cancellation of the 1996 World Bank Solid Waste Environmental Management Project (SWEMP) and represented a mere 1.8 percent of total CDR solid waste spending (Figure 4.3).[36]

[33] CDR website: <www.cdr.gov.lb>.
[34] CDR website: <www.cdr.gov.lb>.
[35] CDR website: <www.cdr.gov.lb>.
[36] CDR website: <www.cdr.gov.lb>.

48. **CDR spending figures are not broken down by *Studies and Monitoring, Investment, and O&M* categories.** Nevertheless, the disaggregation is attempted in the next section. Considering the aggregated amount could give a wrong picture, especially when it comes to solid waste where the bulk of the allocated amounts cover O&M.

49. **The solid waste and wastewater sectors rank first and fourth, respectively, in terms of CDR environment-related spending.** When local and foreign spending is considered, the relative share of solid waste was the highest among the environment-related sectors with a total US$ 647 million over the 1999-2008 period at 2008 prices and represented 17 percent of total CDR spending, even exceeding water supply spending of US$ 508 million. Indeed, CDR is managing the solid waste O&M outsourcing of large contracts, which explains the significant +16.1 percent period growth in spending over the 1999-2008 period. Conversely, Lebanon is bound by a number of international conventions or adheres to a number of regional initiatives (e.g., Barcelona Convention and Horizon 2020) regarding land-based pollution, which explains the foreign involvement in the wastewater sector: local and foreign spending reached an aggregate US$ 310.4 million over the 1999-2008 period at 2008 prices and represented 11 percent of total CDR spending, with 69 percent covered through foreign sources (Table 4.4 and Figure 4.3). The water sector and electricity have been two high GOL priorities since 1992. However, the heavy investments in these sectors (US$ 508 million and US$ 326 million, respectively, over the 1999-2008 period) were not matched by a dramatic improvement in services over the years.[37] The land use and environment sector covers mainly the rehabilitation of cultural heritage sites (World Bank Cultural Heritage and Urban Development project with US$ 31.5 million at current prices) with a small share for reforestation and forest fire prevention (US$ 5.8 million at current prices).[38]

4.4 Other Environmental Spending

50. **A number of development partners target line ministries, municipalities, or communities/NGOs to fund projects, which remain challenging to account for.** For instance: French cooperation is directly funding conservation activities; USAID targeted municipalities to fund wastewater treatment, recycling and composting plans; the EC funded recycling plants through OMSAR; and Qatar contracted a Lebanese consulting firm to implement its reconstruction drive in the South after the 2006 war. When available, amounts transferred to line ministries, municipalities, or communities/NGOs were considered in the aggregated figures in Table 4.6.

51. **The GEF Small Grant Program (US$ 837,000 during 2006-08), UNIFIL Quick Impact Projects (US$ 1.8 million in 2008-09) as well as third parties grants (environment-related without real MOE oversight) were allocated to other line ministries and their outlets, NGOs, the Tripoli Environment and Development Observatory, academia, as well as consulting firms or individual consultants.** Table 4.4 gives an incomplete picture of these grants that are not managed by CDR (with the exception of the Environmental Fund – see above) as a number of them fall between the cracks, and regional grants are not accounted for in the totals. Although partial, the third party grants amount to US$ 93.5 million over the 1999-2008 period at 2008 prices, which represents about 3-fold the amount of grants managed by the MOE.

[37] World Bank (2008); and World Bank (2009).
[38] CDR website: <www.cdr.gov.lb>.

There is a significant disconnect between environmental COED ranking and the allocation of these third parties grants. More importantly, the land use category Soil and Wildlife ranks first in terms of annual endowment over the period with an amount equivalent to the aggregate resources managed by the MOE for a theme that is the closest to the MOE objectives (Table 4.3).

52. **Financial services covering banking and banking services, credit organizations, investment funds (public and/or private), loan guarantees, and insurance are available in Lebanon.** Lebanon has a developed banking sector that provides a wide scope of services. On the one hand, Lebanon lacks the financial and insurance framework to attract private investors to participate in infrastructure investments, e.g. in electricity, water, and wastewater utilities: these shortcomings are being addressed by the International Finance Corporation (IFC) as well as other financial institutions such as the European Investment Bank (EIB) and the US Overseas Private Investment Corporation (OPIC) involved in the promotion of public-private partnerships and will not be covered in this context. On the other hand, Lebanon has micro-credit initiatives that cover socio-economic credits including agriculture and environment-related activities. Although credit guarantees exist (KAFALAT[39]) some insurance is lacking for certain sectors such as agriculture or sustainable land management.

Table 4.6: Selected Grants Managed by Third Parties, 1999-2008 in US$ Million 2008 constant prices

Entry point	$COED_{2005}$ Environmental Category Ranking							
	1	2	3	4	5	6		
	Water	Air, Odor, Radiation, Noise & Vibration	Coastal Zones & Cultural Heritage	Land use, Soil & Wildlife	Natural Disasters & Global Environment	Solid Waste	Institutional, legal and Regulatory Capacity	Total
Total	2.9	10.9	8.1	40.9	18.6	4.7	7.3	93.5
Yearly Average	0.3	1.1	0.8	4.1	1.9	0.5	0.7	9.3

Note: the grant amount is based on the signing year of the grant. COED and grant ranking are color coded.
Source: Lebanon CEA ERS Background Paper (2010).

53. **The EC-funded Economic and Social Fund for Development (€ 31 million in 2002-08 leveraged to the tune of US$ 0.6 million in 2007 by the World Bank), Al Majmoua and AMEEN, are the most prominent examples of intermediation mechanism.** They were created to improve access to financial services for underserved populations and sectors. A number of activities targeted environment-related activities.

54. **The Banque du Liban has launched an initiative to support rural development and the environment**. The Banque du Liban has branches in each Mohafaza in Lebanon and is using these branches as a platform for supporting local development through launching dialogues and raising awareness between the private sector, banking sector, municipalities, NGOs, etc. The Banque du Liban can also play a role in fiscal policy so as to support sustainable development in general and sustainable land management in particular. So far, the Banque du Liban has issued a circular giving a subsidy on interest rates to environmental projects and exemptions on compulsory reserves within the Banque du Liban, which will incentivize banks to grant loans to the environment sector.[40] The annual cost of these interest subsidy policies are shared with the

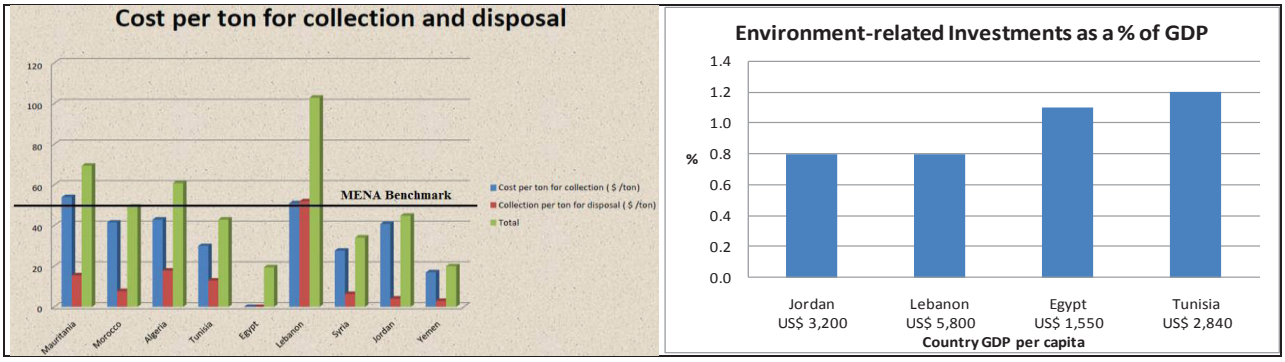
[39] Kafalat website: <www.kafalat.com.lb>.
[40] BDL website: <www.bdl.gov.lb>.

Treasury which has paid LP 128 billion to subsidize the interest rate subsidy programs administered by the Banque du Liban in 2010 as compared to LP 99 billion in 2009.

4.5 Benchmarking Environment-related Investments

55. **The environment-related spending and investments reached an average of US$ 433 million and US$ 203 million per year, respectively, over the 1999-2008 period.** Investments are equivalent to 0.8 percent of GDP. This is less than the PERE performed in Egypt (1-1.3 percent of GDP), Tunisia (1.2 percent of GDP), and Jordan (0.8 percent of GDP), though it is expected that Lebanon ERS should have been higher, as the GDP per capita of Lebanon (US$ 5,800) is almost twice as much as Tunisia's (US$ 3,200) and Jordan's (US$ 2,840) and four times higher than Egypt's (US$ 1,550). Nevertheless, the computation methods and expenditure categories between the four countries could differ and therefore should be carefully considered (Figure 4.4).

Figure 4.4: Solid Waste Cost and Environment-related Spending Benchmarking



Sources: GTZ (2010) and various World Bank PERE (2004-2009).

4.6 Environment-related Investment Priority and Equity

56. **There seems to be a disconnect between public expenditures and the environmental priorities as defined by the COED.** This will undermine the importance of the environmental priorities in ensuring that the environment is mainstreamed in the productive sector of the economy. Water and air, which were considered among the first two degradation priorities in the COED, were provided with very few investments. The water and wastewater $COED_{2005}$ (1.08 percent) exceeded the yearly average water and wastewater investments (0.6 percent) over the 1999-2008 period in terms of the average GDP. Although it is the other way round for solid waste (0.2 percent and 0.09 percent, respectively), the $COED_{2005}$ shows some limitations at capturing the extent of the degradation associated with the poor treatment and disposal of solid waste in contrast to the draft 2006 NEAP ranking, where water, air, and solid waste rank first. It is important to note that air (0.7 percent of GDP) in the $COED_{2005}$ registered a significant retraction as compared to the $COED_{2000}$ (1.02 percent of GDP) due mainly to the ban of both lead in gas and diesel engine for taxis. Nevertheless, other ambient criteria pollutants are on the rise, especially in Beirut, and are causing increased health damages associated with specific pollutants due to: traffic congestion due to the number of cars approaching the million mark; communal or residential power generators increasingly being used to compensate for electric

grid outages; and the growing air traffic, whose NO_x is being dispersed northward and ends up being trapped in Beirut's narrow streets due the multiplication of high rises.[41]

Table 4.7: Environment-related Investment, 1999-2008 Yearly Mean in US$ million 2008 constant prices

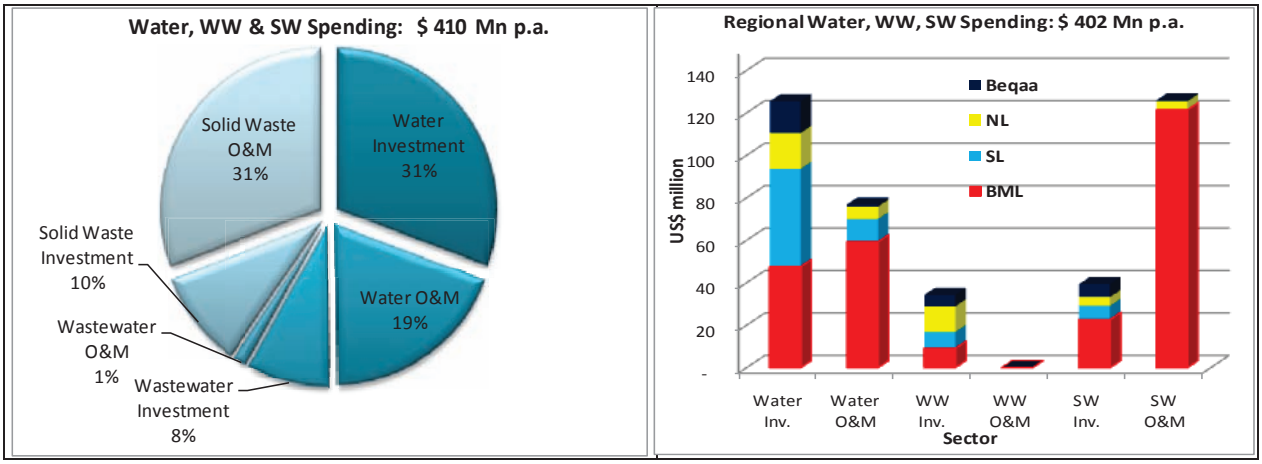
Entry point	$COED_{2005}$ Environmental Category Ranking								
	1a	1b	2	3	4	5	6		
	Water	Wastewater	Air, Odor, Radiation, Noise & Vibration	Coastal Zones & Cultural Heritage	Land use, Soil & Wildlife	Natural Disasters & Global Environment	Solid Waste	Institutional, Legal and Regulatory Capacity	Total
Stud./Mon. TA	4.4	0.3	1.2	1.1	6.6	3.1	1.0	2.4	21.6
Investment	125.7	34.3	0.0	-	2.2	0.8	39.6	-	202.6
O&M	78.3	6.0	-	-	-	-	126.0	-	210.3
Total	**208.4**	**40.6**	**1.2**	**1.1**	**8.8**	**3.9**	**166.6**	**2.4**	**433.0**
% Investment/GDP	0.5	0.1					0.2	-	0.8
% O&M/GDP	0.3	0.0					0.5	-	0.8
% COED/GDP	1.08						0.09		1.17

Note: the Water category under the COED was split up for the purpose of the exercise. Most investments with indirect impact on categories 2 to 5 are not reported in the table.
Source: Lebanon CEA ERS Background Paper (2010).

57. **Most of the investments and O&M costs were concentrated in the water and solid waste sectors, with large regional disparities, although water, wastewater, and solid waste spending are not equitably distributed by region** (Figure 4.5). Spending favors Beirut and Mount Lebanon (BML) and is still skewed against secondary cities and rural areas. In BML, spending exceeds the population in relative terms whereas in South Lebanon and Nabatiyeh (SL), spending is equilibrated, and in North Lebanon and Akkar (NL) and the Bekaa-Hermel spending is lagging behind, especially where water and wastewater coverage is the lowest. However, investment and O&M spending varies largely by sector and by region where, for instance, solid waste spending per capita in BML reached US$ 77.3 per capita per year on average over the 1999-2008 period. The other regions' solid waste spending was relatively low, ranging between US$ 9.9 to 13.4. When comparing water to solid waste results, it is interesting to note that the average yearly water investments are equivalent to the solid waste O&M.

[41] Exchange with Jocelyne Gerard (USJ).

Figure 4.5: Water, Wastewater & Solid Waste Spending, 1999-2008 Yearly in US$ million 2008 constant prices



Note: Second quadrant figure includes budgetary, CDR, municipal, and Development Partner spending only, hence the lower total of US$ 402 million. Solid waste O&M costs include IMFU funds transferred to CDR only.
Source: Lebanon CEA ERS Background Paper (2010).

Table 4.8: Regional Development Investment, 1999-2008 Yearly Average, US$ million 2008 constant prices

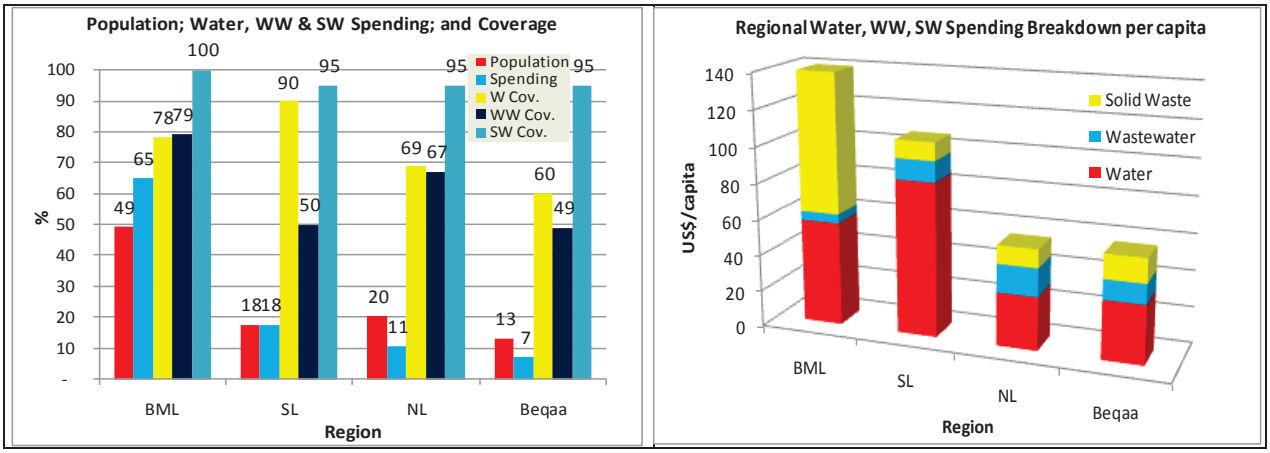
Region	Pop.	Spending				Coverage			Spending/capita			
		W	WW	SW	Total	W	WW	SW	W	WW	SW	Total
		(US$ million)				(%)			(US$)			
Beirut and Mount Lebanon	**1.87**	**107.1**	**9.3**	**144.3**	**260.7**	**78**	**79**	**100**	**57.4**	**5.0**	**77.3**	**139.6**
-Investment		*47.7*	*9.3*	*22.8*	*79.8*				25.6	5.0	12.2	42.7
-O&M		*59.4*	*0.0*	*121.5*	*180.9*				31.8	0.0	65.1	96.9
South Lebanon	**0.67**	**56.7**	**7.7**	**6.6**	**71**	**90**	**50**	**95**	**84.9**	**11.5**	**9.9**	**106.3**
-Investment		*46.0*	*7.6*	*6.4*	*60*				68.9	11.4	9.6	89.9
-O&M		*10.7*	*0.1*	*0.2*	*11*				16.0	0.1	0.3	16.4
North Lebanon	**0.77**	**22.6**	**12.1**	**7.8**	**42.5**	**69**	**67**	**95**	**29.3**	**15.6**	**10.1**	**55.1**
-Investment		*16.8*	*12.1*	*4.1*	*33*				21.8	15.6	5.3	42.7
-O&M		*5.8*	*0.0*	*3.8*	*9.6*				7.5	0.0	4.9	12.4
Bekaa	**0.50**	**16.0**	**5.5**	**6.6**	**28.1**	**60**	**49**	**95**	**32.3**	**11.0**	**13.4**	**56.7**
-Investment		*14.9*	*5.4*	*6.1*	*26.4*				30.1	11.0	12.4	53.5
-O&M		*1.1*	*0.0*	*0.5*	*1.6*				2.3	0.0	1.0	3.3
Total	**3.80**	**202.4**	**34.5**	**165.4**	**402.3**	**79**	**66**	**98**	**53.2**	**9.1**	**43.5**	**105.8**
-Investment		*125.5*	*34.4*	*39.4*	*199.2*				33.0	9.0	10.4	52.4
-O&M		*77.0*	*0.1*	*126.0*	*203.1*				20.2	0.0	33.1	53.4

Note: Figures include budgetary, CDR, municipal and Development Partner spending only. Solid waste O&M cost include IMFU funds transferred to CDR only and do not include other municipalities' solid waste management O&M spending. Water coverage includes only public networks; private networks exist but are not included above.
Source: Lebanon CEA ERS Background Paper (2010).

58. **The situation is further aggravated by the large subsidies for the wastewater and solid waste sectors.** Water cost recovery is only achieved in BML, despite low tariffs, whereas treatment and disposal waste cost recovery is quasi inexistent because only a very low municipal fee is barely collected for waste collection and drainage (*Arsifa wa Majarir*) by municipalities. Both sectors' O&M is subsidized by GOL transfers through the MOEW or through the reallocation of an increasing share of indirect revenues (IMFU) collected by the MOF on behalf of municipalities. The municipalities in Lebanon do not have the financial resources or the tax base to provide and sustain adequate SWM and wastewater services. This has led to the under-

funding of direct investment and operational expenditures, and failed to generate additional resources to reach financial sustainability and improve the services. GIZ is helping the GOL to introduce a wastewater tariff that is derived from WWTP investment and operating costs that will gradually recover initially O&M and later on possibly capital investments (Table 4.7 and Figure 4.6).

Figure 4.3: Population, Water, Wastewater & SWM Spending & Coverage, % & US$ Period Average



Source: Lebanon CEA ERS Background Paper (2010).

4.7 Conclusions and Recommendations

59. **A sustainable overall public strategy should aim at ensuring the quality of economic development and growth, well-being, and the commons.** Nevertheless, the continuing fall of public investments (due to increasing Treasury transfers to the Electricité du Liban, especially since 2004) and growing debt limits its ability to achieve overall economic sustainable development and protect the commons.

60. **Policy, institutional, and market failures are creating distortions, affecting notably the environment.** Moreover, the current GOL setup (central and local levels) is preventing the achievement of good coordination, decentralization, and governance practices to have the lowest tier and most efficient possible management of public services and the commons that will benefit the constituents and preserve environmental resources. These distortions are exacerbated by the average macroeconomic performance of the Lebanese economy, despite occasional surges over the 1999-08 period.

61. **The policy issues related to the water and wastewater tariffs and the WSM fee are beyond the MOE competence and mandate, although it has an inherent interest in these tariff and fee corrections.** Moreover, most heavy investments having some bearing on the environment are implemented by CDR or other entities outside the purview of the MOE. In terms of equity, all water, wastewater, and solid waste spending is poorly targeted regionally. The lowest investment per capita is in Northern Lebanon which includes the largest pockets of poverty: this is not contributing to an equitable distributional process that will increase or create equal opportunities. As for the efficiency, all public utilities are inefficient, and so is the quasi

monopolistic nature of SWM private operators when it comes to segregation and disposal. As for effectiveness, and despite the heavy investments for both sectors, so far none of the water and wastewater objectives were achieved (service is poor, coverage is low especially for sanitation, or service has not started yet). Moreover, the SWM problem (segregation to disposal) is far from being resolved all over the Lebanese territories, except for a few exceptions (e.g. Zahle) and could worsen, should immediate and decisive choices not be made.

62. **The MOE budget (about US$ 2 million per year) covers administrative expenses, leaving minimal resources to fund programs and projects; this reflects the low absorptive capacity of the MOE.** The MOE portfolio is therefore driven by Development Partners, especially in terms of complying with international laws (Montreal Protocol and exceptionally the Jiyeh oil spill) and promoting conservation (together they represent 55 percent of grants provided over the 1999-2008 period (US$ 13.4 million at 2008 prices). Yet, the MOE successfully implemented a number of programs and projects such as: entrusting the management of protected sites to NGOs; or internationally recognizing and awarding a MOE-managed project as good practice due to private fund leveraging and efficient management (e.g. POPs). Moreover, the MOE benefited indirectly from a COM policy that helped reap averted costs in terms of improved ambient air quality (e.g. leaded fuel and diesel fuel cab bans). Nevertheless, a number of programs and projects were abandoned either for political reasons (ABQUAR addressing quarries) or financial reasons (environment and development indicators), which makes the MOE decision-making regarding its prevention policy susceptible to interference and weaknesses; hence forfeiting accountability. The MOE four general policy principles are confronted with the ERS process (Table 4.8):

1. Regionally balanced development;
2. Protection through prevention;
3. The Polluter-Pays-Principle; and
4. Integration of environmental policies into other sectoral development policies.

Table 4.9: Rapid Overview of MOE and Other Public Entity Achievements

ERS Building Blocks	MOE and Other Public Entity Achievements
Sustainability ownership	The MOE has shown mixed results when it comes to sustainability of ownership as some projects helped to effectively mainstream functions whereas others failed to do so. Moreover, the irregularity of yearly allocation from the budget raises some concerns with regards to the protected area stewardship.
Efficiency and Effectiveness	The MOE proved to be efficient at managing some Development Partner grants whereas the effectiveness issue lays most of the time outside of its purview.
Targeted vs. Actual Output and Performance	Green accounting and Monitoring and Evaluation remain an essential missing link across the board to gauge development projects in Lebanon although the Paris III reform program has some built in indicators to measure progress on the implementation of the program.
Government Capacity for Budgetary Execution, Expenditure Control and Procurement Process	The GOL has the capacity for budget execution, expenditure control and procurement process although transparency and enforcement could be improved for accountability and in checks and balances.

ERS Building Blocks	MOE and Other Public Entity Achievements
Fiscal Decentralization and Equity in Distribution	The decentralization is an instrument, not a goal in itself, for efficient and participatory governance including environmental management but its process is however deadlocked since the early 1990's but most major line-ministries have embark on a process of *déconcentration* (literally the creation of branches managed by the center) of certain public utilities and line ministry services (roads, environmental mitigation, etc.). The MOE will be able to implement the *déconcentration* process and set up an environment police with the ratification of Law 690/2005. In terms of distribution, neither CDR targeted investments nor the mechanism of transferring funds to municipalities through IMFU reveals a degree of transparency and equity the citizen could trust.

Source: Lebanon CEA ERS Background Paper (2010).

63. **Financial, technical, legal, and political issues confound the process of decision-making through restrictions.** This is more pronounced in Lebanon, where resources are severely limited. Accordingly, successful decision-making should determine how, how much, where, and when to effectively use scarce resources.[42] So far, the SWM Plan proposed in 2006 was rejected on financial grounds: it was too expensive (US$ 300 million). Conversely, the NERPs were implemented without an attempt at optimizing the costs. For instance, none of the secondary wastewater treatment plants was considered for tertiary treatment with the benefits that would accrue in terms of additional supply of water, especially during summertime (aquifer recharge, industrial zones, water reuse for selected cropping, water storage for forest fire preparedness instead of using salty water, etc.). The COED has provided decision makers in Lebanon with a tool that will help them determine priorities. It did not go further by performing cost-benefit analysis to optimize choices regarding costs of mitigation for wastewater treatment plants and solid waste that would help decision makers make informed choices.

64. **The challenge for reaching financial sustainability for the water, wastewater, and solid waste services is not to increase government investments but to meet certain socioeconomic criteria** by: prioritizing investments and reallocating the O&M costs; and devising a financial management system and implementing it on the basis of clear priorities and well-defined outcomes through the mobilization of local resources and adjusting or introducing fees, tariffs, and ecotaxes.

[42] NEAP (2006).

Chapter 5: Solid Waste

5.1 Key Solid Waste Facts

65. **With a population estimated at 3.8 million in 2007, the municipal solid waste generation is equivalent to 1.48 million tons per year with:**[43] BML generating 2,200 tons/day, SL with 650 tons/days, NL with 750 tons/day, and the BB with 500 tons/day. Most of the waste content is organic (about 50 percent) with slight variations across regions.

66. **Municipal solid waste collection coverage has improved over the years with:** 100 percent coverage in BML and about 95 percent coverage for the other regions. Urban sweeping has also improved; it is usually connected with solid waste collection contracts.

67. **Municipal solid waste treatment is uneven across regions and lacks proper incentives.** A small number of sorting plants is operated in the South and the North and soon in Hbaline (private operator), in Zahle (municipality) and in Beirut (private operator). Beirut's Karantina and Amroussieh plants are under-sized and cannot handle all the generated amount of organic waste (only 15 percent of the waste is treated in the composting plants), while most of it still is disposed at the Nahmeh landfill south of Beirut without any prior separation of recyclable waste and composting of bio-degradable waste. Approximately 8 percent of solid waste was recycled and 8 percent composted in 2005. Various government-led, private company-led and entrepreneurial-led (scavenger small gangs) initiatives usually supported by development partners have created a growing formal and informal market for uncertified and certified organic compost as well as recyclables. Separation at the source has unfortunately been discounted, except in Greater Beirut where designated recycling containers are used by dwellers on a voluntary basis. Yet, a successful 1995 community-based initiative *Sorting of Solid Waste in Arabsalim Project* in Southern Lebanon is being sustained and replicated on demand in rural areas through voluntarism. Otherwise, not all municipal garbage is being segregated and sorted after collection by SWM service companies outsourced by municipalities or by municipalities themselves when sorting facilities exist. A list of transport and recycling companies targeting the municipalities was produced thanks to the Italian Cooperation (but unfortunately neither updated nor online), and the market prices of recyclables and compost are affected by increased competition and the fluctuation of the price of oil (plastic).

68. **About 84 percent municipal solid waste generated ends up in landfills or open dumps.** There are only two sanitary landfills in Lebanon, with a new sustainably managed one in Zahle and one in Nahmeh (serving BML) that is a cause for concern because it is close to full capacity. Once the Nahmeh one is full, only 53 percent of the waste generated in Lebanon will be disposed in an environmentally sound way in accordance with international standards. Over the years, major dump sites were closed down with, for instance, mixed results for Beirut's Normandy and acceptable results for Zahle. Otherwise, waste disposal ranges from controlled dumping and methane flaring (Tripoli with 300 tons/day and close to full capacity; Bourg Hammoud was stabilized in 1997 but is still unresolved as it is sinking into the sea) to open and uncontrolled dumps polluting air, watersheds (rural areas), and coastal zones (e.g. Khalde old dump, Saida, and Tyre).

[43] This Section builds on the Lebanon CEA Solid Waste and Cost of Mitigation Background Documents (2010).

69. **The newly built Amroussieh municipal solid waste incinerator (10 tons/hour self-combustible furnaces for a cost of US$ 16 million) located in the southern suburbs of Beirut was set ablaze in July 1997 by citizens due to its proximity to dwellings (nimbysm).** In certain remote areas of Lebanon, solid waste is still being burnt in the open or close to river beds.

5.2 Actions Taken Have Produced Mixed Results

70. **Despite all the solid waste investments over the 1992-2008 period, the legislative and institutional reform initiated at the end of the 1990s is unfinished and impedes proper management as well as efficient gains for the sector.** Existing legislation consists of fragmented regulations not specifically dealing with solid waste. There are two key legal instruments addressing the SWM sector:

- Decree 8735/1974 on pollution from solid waste and wastewater, assigning SWM as a municipal responsibility; and
- Decree 9093/2002 providing municipalities with an incentive to host a waste management facility. The Decree introduced a financial incentive to municipalities by offering a 5-fold increase in the budgeted IMFU allocation if the municipality establishes a sanitary landfill or a solid waste processing plant (incinerator/recycling/compost, etc.) within the municipal cadastral boundaries and a 10-fold increase if at least 10 municipalities are allowed to dispose of their waste in the sanitary landfill or use the processing plant.

71. **Regarding the origin of wastes having an impact on the environment, Law 216/1993 entrusted the MOE to assess all sources of solid waste generation; it was complemented by setting landfill standards and promoting recycling (Law 444/2002) that are poorly enforced.** The remaining elements of the legal framework either provide authority for entities to act with respect to municipal solid waste, or address other types of waste. The entities that are empowered under the legal framework to act have generally not done so, with the consequence that the country suffers a vacuum of national leadership in the sector.

72. **Under the tutelage of the MOIM, municipalities are therefore institutionally responsible for waste collection.** Responsibility for treatment and disposal were not very well defined, with CDR overseeing the management of major landfills and some municipalities overseeing others on an *ad hoc* basis (see Zahle below).

73. **To clarify collection and disposal responsibilities, the COM initially approved the household SWM Plan proposed by CDR and the MOE, pursuant to Decision No.1 dated 28/6/2006, but the implementation of the comprehensive plan was perceived as very costly.** Accordingly, CDR started studying several contracting proposals and alternative methods for securing funding sources, in order to reduce the cost (Box 5.1).

Box 5.1: The 2006 and 2010 Solid Waste Management Strategies

SWM is considered a priority issue in Lebanon. Whereas a dramatic improvement has been achieved in terms of collection and street sweeping (without, however, a demand-management effort to reduce waste), a major problem resides in the remaining SWM chain management and its cost-effectiveness: from segregation to proper disposal.

2006 SWM Plan

The COM initially approved the Household SWM Strategy proposed by CDR, pursuant to Decision No.1 dated 28/6/2006, but the implementation of the comprehensive plan was perceived as very costly. Accordingly, CDR started studying several contracting proposals and alternative methods for securing funding sources, in order to reduce the cost. This included resorting to low interest loans, risk reduction, and increasing competition by allowing Lebanese contractors to participate in the supply of equipment, as well as in the construction, treatment, and landfill works. CDR submitted these proposals to the COM, which approved in its Decision No. 88, dated 10/11/2007 to: (i) commission a committee formed of representatives of the MOIM, MOE, MOF, and CDR, which will work under the supervision of the Prime Minister. This Committee shall propose the proper solutions for the Plan tender in the light of the options provided by CDR, to be submitted to the COM for approval; and (ii) extend the sweeping, collection, and landfill contracts for 3 years under the same conditions, in order to ensure continuity of work.

The Plan approved by the COM was based on the following principles: recycling and composting to the greatest extent possible in order to reduce the quantity of dumped waste; and distribution of recycling, sorting, and composting plants on all Cazas, with one or more sanitary landfill in each service area. For this purpose, Lebanon was divided into four service areas: BML, SL, NL, and BB. The Plan also considers the provision of incentives to municipalities whose lands will be used as sorting stations, composting plants, sanitary landfills, or incinerator centers. Moreover, the plan gave incentives to municipalities on the basis of US$ 2 per ton for hosting a sorting and composting facility and US$ 4 per ton for hosting a sanitary landfill.

2010 SWM Plan

The formulation of the SWM Plan revolved along ways and means, siting, financing, and prerogatives. Moreover, a committee was set up, headed by the Prime Minister, and including the Ministers in charge of the Ministry of Displaced, MOE, MOEW, MOIM, OMSAR; and the CDR President, to formulate the Plan. The SWM Plan, which was endorsed by the COM in September 2010, was formulated along these principles:

1. Consider the WTE in large cities by considering waste as a source of energy.
2. Implement the 2006 Plan in the remaining parts of the country by also considering the WTE option.
3. Engage the private sector and facilitate its involvement in various SWM stages through turnkey or different options.
4. Mandate the MOE and CDR to merge the two proposed strategies in conjunction with the above.
5. Mandate the MOEW to propose legislation, allowing the private sector to produce and sell the energy generated through the WTE process.
6. Provide incentives to the municipalities that will host the SWM activities including WTE, segregation, composting, recycling, and landfilling through an increase of IMFU transfers that will be determined by the MOF and the MOIM.
7. Mandate the CDR in coordination with the MOE to select an international consulting firm to: (i) propose a suitable solution and best alternative that fits the Lebanese context; (ii) carry out due diligence to short list only proven technologies; (iii) assess and categorize the companies; (iv) elaborate the tender; (v) evaluate the bids; and (vi) supervise the implementation.
8. Mandate the MOE to select an international consulting firm to supervise the implementation of the Plan in conjunction with its timetable and ensure quality assurance.
9. Mandate the MOE to select a local consulting firm to elaborate an awareness campaign to raise the WTE public acceptability.

Sources: CDR (2008); Lebanon CEA ERS Background Paper (2010); and COM Decision of September 1, 2010.

74. **The December 2009 Policy Statement of the *Cabinet of Development and Progress* brought the environmental categories to the forefront, with solid waste taking center stage and being assigned to the MOE:** "devising rapid solutions to addressing open dumps on Lebanese territories and adopt adequate ways and means to tackle the waste." Moreover, the new Electricity plan (June 2010) includes the use of alternative sources of energies, including Waste to Energy (WTE) technologies.

75. **The 2010 SWM Plan, which was initiated pursuant to the COM Decision No. 1 of 3/2010, and endorsed by the COM Decision 55 of September 1, 2010, favors the WTE option in large cities and builds on the 2006 SWM Plan for the rest of the Lebanese territories, although WTE options should not be overlooked (Box 5.1).** A public-private partnership is suggested in terms of a 25-year BOT, where the GOL will provide the land and the operator will build and operate facilities in large cities, and will sell the electricity to the GOL at an agreed price. According to the MOE, *the current 4,500 tons of annual waste refuse could produce as much as 170 megawatts at a cost of 9 cents per kilowatt against 19 cents when produced by EDL*.[44] CDR launched the international tender in December 2010 (Box 5.1).

76. **Since the mid-1990's, SWM outsourcing became the rule.** However, the Zahle Municipality regained control of the landfill O&M since 2007 due to its proven capacity to manage it, and it increased its recycling capacity thanks to USAID funding (Zahle is charging other municipalities US$ 10 a ton for waste). The first outsourcing contract was signed for Greater Beirut in 1996 and was gradually expanded to Mount Lebanon and most recently to Kesrwan. Other major urban areas and Federations of Municipalities followed suit.

77. **Solid waste service costs vary by region.** Collection and sweeping are more or less in line with international benchmarks, unlike treatment and disposal costs in BML (Figure 4.1 and Table 4.6) with about US$ 95 per ton (Figure 4.4 and Box 5.2). Although not reported in the CDR 2008 progress report, the MOF Public Finance Review of 2008 reports a US$ 25.2 million increase in payments for SWM in 2008 to cover the costs resulting from the revision of the tariffs for the treatment and disposal of solid waste, which supersedes the 2007 COM Decision to renew the contract for 3 years without incurring any cost increase. Whereas the figures are not readily available for BML, resale of compost (BML Sukomi's contract only allows the distribution of compost) and recycling materials cut treatment and disposal gross costs by more than half in Jbeil and by almost a third in Zahle after the 2007 increase in composting and recycling capacity (Figure 5.1).

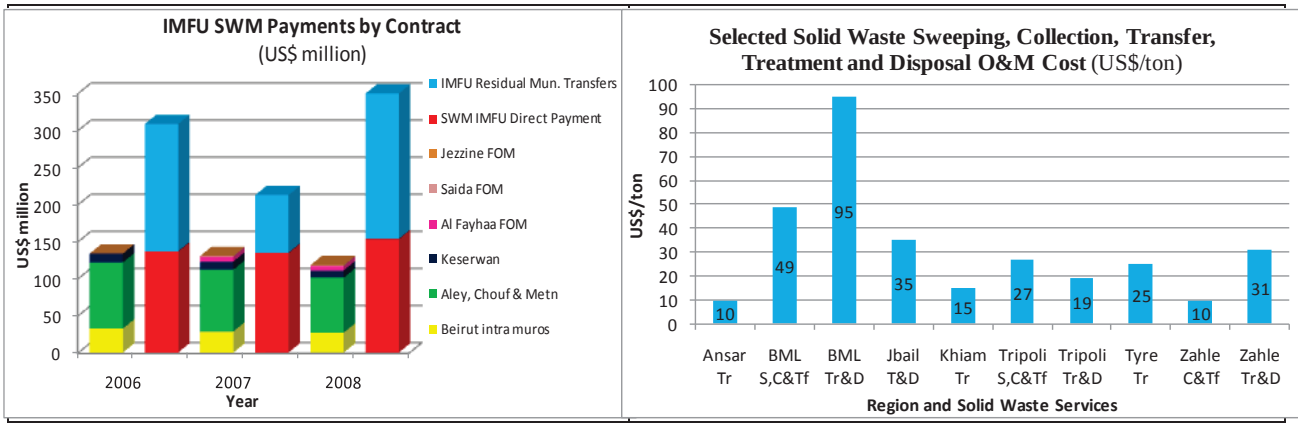
Box 5.2: Solid Waste Management International Benchmarking, US$ per ton

Sanitary landfill costs are not the major part of total solid waste costs:
- Sanitary landfill ≈5-20 US$/ton but could increase due to the opportunity cost of land (speculation, density, etc.).
- Collection ≈20-80 US$/ton (with upper bound being door-to-door collection).
- Street sweeping ≈ may add 10-40% to collection costs.
- Formal source segregated recycling may add ≈30-100% to collection costs if door-to-door using separate vehicles.
- Transfer ≈5-12 US$/ton, if needed, depending on truck sizes, traffic speeds, and hauling times.
- Composting ≈15-50 US$/ton.
- Incineration to EU/US standards ≈150-200 US$/ton.
- Carbon funding for SWM is proving difficult to manage and marginally reduce disposal cost.

Source: Adapted from Cointreau (2008).

[44] Interview with the Minister of Environment, Mohammed Rahal, in L'Orient-Le Jour, June 2010.

Figure 5.1: Selected Solid Waste Management O&M Outsourcing and Cost by Region, US$ per ton



Note: IMFU CDR figures are on a commitment basis, whereas IMFU MOF figures are on a disbursement basis, hence the discrepancy in the figures in the first quadrant. Tr: treatment cost; Tr&D: treatment and disposal cost; C&Tf: collection and transfer cost; S, C&Tf: sweeping, collection and transfer cost. O&M cost varies with gas prices. Recycling resale is unknown for BML; compost is distributed free of charge.
Source: Lebanon CEA ERS Background Paper (2010).

78. **Of a total of 1,331 municipalities and hamlets in Lebanon, the SWM company Averda operates less than one forth of them.** There were 945 municipalities in 2008 in Lebanon with 36 Federations of Municipalities. Moreover, 386 hamlets without municipalities are managed by Mohafazat, where, in few cases, they use the services of SWM companies operating in their jurisdiction.

79. **Estimated actual sweeping (only major urban areas) and collection of solid waste has an average 98 percent coverage and cost about US$ 55.9 million in 2008** (Table 5.1). Based on the cost per ton obtained by region, BML has the highest waste generation per capita, generates 55 percent of waste, and absorbs 65 percent of total sweeping and collection costs.

Table 5.1: Estimated Regional Sweeping and Collection Cost in 2009, US$ million

Cost Region	Population	Estimated Generation kg/day	Estimated Generation ton/day	Estimated Generation ton/year	Coverage %	Total Coverage ton/year	Collection/ Sweeping Cost US$/ton	Total Collection/ Sweeping Cost US$ million
BML	1.87	1.18	2,200	803,000	100	803,000	45	36.1
SL	0.67	0.97	650	237,250	95	225,388	30	6.8
NL	0.77	0.97	750	273,750	95	260,063	30	7.8
BB	0.50	1.00	500	182,500	95	173,375	30	5.2
Total	**3.81**		**4,100**	**1,496,500**	**98**	**1,461,825**	**38**	**55.9**

Source: Adapted from Lebanon CEA ERS Background Paper (2010).

5.3 How Is the Solid Waste Sector Performing?

80. **Contrary to the municipal solid waste collection services, whose improvements were both effective and equitable over the years all over the regions, the solid waste treatment and disposal subsector faces stern challenges**. Except for Zahle, all landfills are close to full capacity (Tripoli and Nahmeh); open dumps are getting out of control; most old major dumps

were not closed down or rehabilitated; and the commons are facing increased pressures from uncontrolled dumping that is affecting the quality of air, watersheds, and coastal zones, which in turn have some bearing on environmental health, tourism, recreational areas, amenities, fish catch, etc.

81. **The municipal solid waste legal and institutional framework is antiquated and gives the wrong signals as a regulatory and even an economic instrument to municipalities, the private sector, and households.** For instance, municipalities had to manage (Tripoli and Zahle) landfills by default, by using their own scarce resources; the MOIM gave financial incentives to municipalities to host waste coming from other municipalities, although safeguarding was not compulsory but was never applied; household behavior change to reduce waste generation and increase recycling at the source was discounted by the GOL. There is a general distrust of household *vis-à-vis* the quality of government services that translates into a high level of *nimbysm* and a resistance to pay a fee.

82. **The GOL policy has not clearly been articulated along simple building blocks**. For instance: sector governance with municipalities in charge of collection, sweeping and transport, and GOL responsible for treatment and disposal; public participation, engagement, and consensus building for waste generation reduction, and landfill and/or incinerator *siting*; private sector transparent engagement and regulation to ensure service quality, efficiency, and effectiveness; and the commons' preservation. The 2006 CDR and MOE provided a preliminary delineation of management and financial responsibilities between municipalities (collection and sweeping) and the GOL (treatment and disposal) that was reemphasized in the 2010 SWM Plan. Despite these revisions, the plan proved to be too expensive, especially when compared to other service sector investments and O&M (Figure 5.1). Until 2009, the lack of a coherent policy, priority setting, and timetable for the implementation of a solid waste master plan has eroded the GOL sovereign prerogatives. It has also resulted in a demand for collection, treatment, and disposal driven jointly by municipalities and the private sector, and directly funded by development partners (EC, Italian Cooperation, USAID, etc.). Awareness campaigns have been conducted by the MOE, private sector, NGOs, etc., but the message was not harmonized and reflects policy fragmentation. As for the 2010 SWM Plan implementation, it has reached the international tender stage and seems to be on schedule.

83. **Although the hierarchy principles promoting the "4 Rs" (reduce, reuse, recycle, and recover waste) are still not legislated, they are, however, being considered in solid waste management contracts** (Figure 4.3). For instance, Averda's contractual specifications for Beirut and parts of Mount Lebanon stipulate that 10 percent of SW should be recycled and 50 percent should be composted. Nevertheless, these contractual specifications were never enforced and therefore not achieved, which unfortunately led to additional waste disposal that reduced the lifespan of the Nahmeh landfill. Conversely, Zahle's municipality understood the necessity to increase the recycling and composting capacity, which led to the increase of the landfill lifespan from 17 years to 26 years and reduced both its treatment and disposal O&M costs by two third (Figure 5.1). In Jbeil, the private operator is aiming at only 5 percent disposal (which remains to be seen if it will be achieved) as the resale of compost and recycling materials will increase its profit margins where the contracts are based on input tonnage (Figure 5.1). The remuneration of BML's operator contract treatment and disposal operations is also based on input tonnage, which meant that there were no built-in incentives (remuneration based on an input/output formula that could have reduced the waste to be disposed in landfills) to increase waste treatment and

minimize waste disposal. Hierarchy principles have recently been updated to include WTE processes that seem costly but promising in terms of land use optimization, electricity generation from "renewable energy", and carbon footprint reduction.

Figure 5.2: The Expanded Hierarchy of Waste Management

Source: Colombia University website: <www.seas.columbia.edu/earth/wtert/faq.html>.

Table 5.2: Estimated Waste Fee based on Municipal Actual Direct Revenues, US$ million, 2008 constant prices

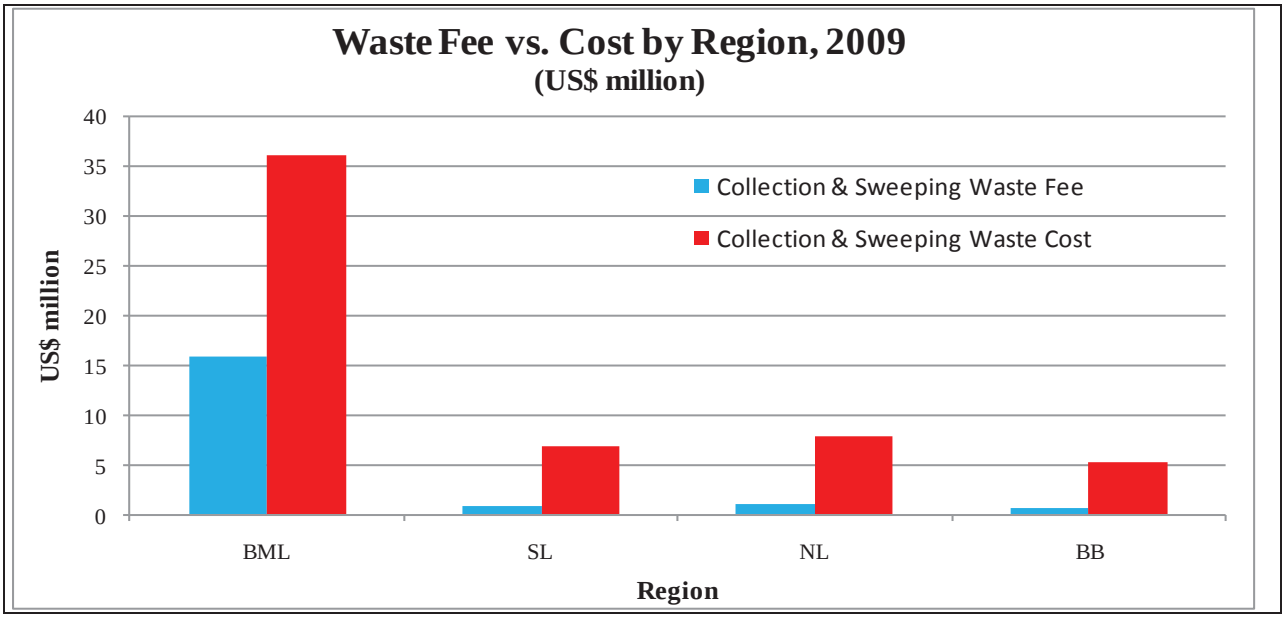
Region / Revenues	Number of Municipality	Municipal Actual Direct Revenues					Estimated Waste Fee	
		2003	2004	2005	2006	2007	2006	2007
BML	308	NA	NA	NA	103.2	138.8	10.3	13.9
Beirut	*1*	*NA*	*NA*	*NA*	*61.2*	*97.7*	*6.1*	*9.8*
Mount Lebanon	*307*	*32.1*	*39.5*	*43.1*	*42.0*	*40.9*	*4.2*	*4.1*
SL	254	6.2	6.6	7.2	6.1	6.7	0.6	0.7
Nabatiyeh	*116*	*1.4*	*1.3*	*1.8*	*1.2*	*1.7*	*0.1*	*0.2*
South Lebanon	*138*	*4.8*	*5.3*	*5.4*	*4.9*	*5.0*	*0.5*	*0.5*
NL	236	8.4	10.2	11.1	9.9	9.4	1.0	0.9
BB	147	3.8	4.4	5.4	4.3	5.1	0.4	0.5
Total	**945**	**50.4**	**60.7**	**66.9**	**123.5**	**159.9**	**12.3**	**16.0**

Note: as stated in the document "Due to the large scale of revenue in Beirut Municipality it is not included in the sample from 2003 to 2005." A 10 percent was applied to the 2006 and 2007 actual direct revenues. The Arsifa wa Majarir fee is not usually strictly allocated towards waste collection as it also covers the combined drainage-sewerage network O&M.
Sources: USAID website: <www.lebanon.usaid.gov>; and authors.

84. **Municipalities perceive a fee for solid waste collection and sweeping, and drainage, that represents a fraction of the real cost incurred for SWM O&M**. The *Arsifah wa Majarir* fee is set at 1.5 percent of the lease assessment, if collected (Table 5.2 and Figure 5.3). Thanks to the USAID-University of Albany-supported municipal budget automation program, it was possible to obtain the total municipal direct revenues by region. Based on the results of coastal

municipalities of northern Lebanon,[45] the budgeted versus actual fee collected represented 14 and 7 percent, respectively, of direct revenues. An average 10 percent was applied across the board to the 2007 direct revenues to estimate the aggregated fee collected, which represents less than 30 percent of the actual collection and sweeping costs.

Figure 5.3: Estimated Regional Collection & Sweeping Waste Fee and Cost, US$ million, 2009 constant prices



Source: Lebanon CEA Cost of Mitigation Background Paper (2010).

85. **There is no tax levied on solid waste generation or on waste landfilled, which means that a share of the IMFU municipality scarce resources have been relocated towards the cost of treatment and disposal of solid waste.** The IMFU is, however, in *deficit*, as payments made exceeded revenues collected on behalf of the municipalities. In other words, the municipalities could be said to be indebted to the Treasury.[46] Therefore, the sector is not financially sustainable and is increasingly burdening public (Treasury advances) and municipal (forgone opportunity to use the funds for investment alternatives) finances. Municipalities perceive a fee for solid waste collection and sweeping that represents a fraction of the real cost incurred for SWM O&M (Figure 5.3). Given the municipalities' scarce resources and their inability to increase waste fees, most costs are covered by indirect taxes (resources transferred through the IMFU) that could have been put towards better use. As for treatment and disposal, the GOL is considering it as a public good and no fee is levied on treatment and disposal. Since solid waste treatment and disposal responsibility is not clear-cut, O&M and land expropriation have usually been covered by both municipalities through IMFU and the GOL through budget appropriation, whereas most capital investments in terms of loans and grants have been directly or indirectly (through CDR or third parties) provided by development partners.

[45] Doumani (2007).

[46] This deficit does not take into account the 10 percent VAT collected from telecommunications and that have not been paid to the municipalities yet. At this stage, it is not possible to say whether what should be paid to the municipalities in telecommunications VAT would cover the deficit accumulated by municipalities following the distribution of their revenues and the payments made to solid waste management companies.

86. **Although most municipalities favored private sector participation in the provision of services, regional solid waste contracts increased regional monopoly powers and reduced competition and therefore efficiency.** This policy is affecting the performance and efficiency of providing waste management services, especially when it comes to landfill management.

87. **The waste collection and sweeping proved effective over the last decade, unlike treatment and disposal effectiveness, which led to a worse off situation for Lebanon, except in Zahle.**

88. **The determinants (gender, income, education, urban vs. rural, trust, and reciprocity to gauge behavioral change, nimbysm) of solid waste generation and the lack of accurate projection of waste recycling-composting vs. generation (e.g. tourism sector, uncertainty, risks) has led to asymmetric information in terms of contract amendment and additional cost incurred by the GOL or the municipalities due to additional waste.** That was the case for the BML contract: after a 3-year no additional cost renewal in 2007, it had to be amended in 2008. This also led to *ad hoc* and costly interventions in terms of increasing the landfill capacity (Tripoli and Nahmeh). In general, the managerial capacity of municipalities to oversee the solid waste contracts was passed on the CDR, except in the case of Zahle.

89. **The MOE did not have so far the capacity to preserve the commons**: upstream, the EIA application decree has not been approved by the COM as yet; mid-stream, the standard regime must be updated; and downstream, it is not until recently that through Law 690/2005, the MOE will be able to create the environment police that would allow the enforcement of environmental law and penalizing contraveners.

90. **The Kyoto Protocol was ratified by Lebanon in 2006 (Law 738) and the MOE is the Designated National Authority.** Nevertheless, tapping carbon funding in order to defray some of the costs associated with sustainable landfill management is proving difficult in neighboring countries that were seeking carbon funding opportunities. As of December 2010, only one project is in the MOE pipeline.

5.4 Key Municipal Solid Waste Treatment and Disposal Issues and Challenges

91. **There are a number of institutional, policy and market failures that are preventing a sustainable, efficient, and effective management of the municipal solid waste treatment and disposal subsector.**

92. **Drivers are associated with higher mean income, more waste generation, and less land for garbage disposal:**

- Lebanon is an upper middle-income economy where the amount of waste generated is notably proportional to population and average income. Tourism could exacerbate waste generation.
- Lebanon is characterized by a high population density, especially in coastal zones, which is driven by a growing population and coastal migration.

- Land is becoming scarcer, especially in coastal zones, as national and regional speculation is driving land prices up for real estate/commercial/tourism development.

93. **Policy, legal and institutional framework, plan, environmental conservation, incentives, and public engagement are inadequate:**

- Municipal solid waste legal and institutional framework reform has been deadlocked until the end of 2009 and is politically sensitive; so are decentralization and governance.
- A policy calling for best SWM alternatives has been formulated in the 2010 SWM Plan submitted to the COM in the third quarter of 2010, although WTE was already considered for large cities (Beirut, Saida, and Tripoli).
- Unlike the 2006 SWM Plan that aimed to achieve a total reduction of up to 50 percent of waste generated, a WTE could reduce it 30-fold according to the MOE.
- The environment in general and the public domain in particular (air, watersheds, and coastal zones) are under increased pressure, and the MOE has limited safeguarding and enforcement capacity.
- Outsourcing treatment and disposal contracts lacked tariff capping and proper incentives as contracts were based on solid waste treatment input instead of an input/output ratio that would have improved composting and recycling output efficiencies.
- Public participation in planning, policy, and implementation is inexistent. Moreover, the public has shown distrust vis-à-vis GOL service provision, resistance to pay or increase direct fees, and sensitivity to nimbysm.

94. **Lebanon is faced with dire challenges when it comes to addressing the municipal solid waste treatment and disposal subsector:**

- Legal and institutional reforms are needed to support policy implementation: update legislative texts, assign clear institutional responsibilities and improve governance in terms of accountability, regulation, O&M cost recovery, safeguarding, and compliance (carbon funding).
- The new SWM Plan endorsed by the COM in 2010 still needs to be implemented along a well-defined timetable. However, a number of constraints (listed under issues in terms of drivers and inadequacies), should duly be addressed when it comes to policy formulation such as the coherence of the new Plan with the ongoing investments that were driven by development partners (the WTE option defeats the purpose of a number of newly implemented segregation and recycling facilities). Moreover, the Plan does not refer or is not in sync with the NPMPLT that was endorsed by the COM early 2009.
- Capital investment needs are substantial, which will require leveraging from both development partners and the private sector.
- Cost recovery through tariff/fee/tax increases remains an afterthought in the 2010 SWM Plan, which precludes that a larger share of IMFU monies as well as the GOL Treasury advances will be needed to achieve the full cost recovery.
- Engaging the public at all levels (policy formulation to implementation) to reach a consensus and avoid repeating previous mistakes. Awareness campaigns should be designed to reflect a coherent policy and avoid an outcome of the past, such as the setting ablaze the Amroussieh incinerator by citizens.

5.5 Solid Waste Treatment and Disposal Mitigation Cost Options

95. **In accordance with COM's decision based on the 2006 SWM Plan, the GOL is supposed to cover the investment cost and the O&M costs of treatment and disposal, while municipal solid waste collection and transport costs will be covered by the different municipalities**. The baseline waste generation was 1.48 million tons per year or about 4,000 tons per day in 2008, and the population is expected to grow at 1.65 percent per year. Lebanon is subdivided by Mohafaza where 8 landfills are proposed (2 by region: BML, NL, SL, BB) and by Caza, where 26 facilities for sorting and composting are considered.

96. **The 2006 SWM Plan also foresaw that half of the waste generated in the Greater Beirut area would be disposed of in Byblos, which does not seem to be fully appreciated by the population or politicians in Byblos (nimbysm).** Therefore, also, incineration could be an alternative to consider, or increasing the planned site in the Chouf. These alternatives are addressed from technical, environmental, economic, and financial aspects. Both alternatives, which are additional to the original plan, will require further decision by the GOL. However, it can already be said that planning for a major site in Chouf would likely result in a cost-effective solution.

97. **The municipal solid waste treatment and disposal analysis covers 10 options with investments over 20 years, including the WTE option suggested by the 2010 SWM Plan (Annex II):**

- Option 1: Sorting, Composting, and Landfilling in Accordance with the 2006 SWM Plan.
- Option 2: Sorting, Composting, and Landfilling in Accordance with a Modified 2006 SWM Plan where a 800,000 tons per year site will be built in the Chouf.
- Option 3: Energy Cells at all Proposed Landfills in Accordance with the 2006 SWM Plan with associated electricity generation and carbon funding.
- Option 4: Energy Cells at all Proposed Landfills in Accordance with a Modified 2006 SWM Plan with associated electricity generation and carbon funding.
- Option 5: Incinerator for Greater Beirut with associated electricity generation and carbon funding.
- Option 6: Incinerator for Greater Beirut and 2006 SWM Plan for the rest of Lebanon
- Option 7: Incinerator for Greater Beirut and Energy Cells at the Proposed Sites according to the 2006 SWM Plan for the Rest of Lebanon with associated electricity generation and carbon funding.
- Option 8: WTE for Greater Beirut with a 900,000 ton capacity.
- Option 9: WTE for Lebanon with one 900,000 (BML) and three 300,000 ton capacity for each of SL, NL, and BB.
- Option 10: Sorting, Composting, and Landfilling in Accordance with the 2006 SWM Plan in SL, NL, and BB.
- Option 11: Energy Cells at all Proposed Landfills in Accordance with the 2006 SWM Plan with associated electricity generation and carbon funding in SL, NL, and BB.

Table 5.3: Solid Waste Treatment and Disposal Capital, O&M & Cost Recovery, US$ in 2009 prices

	Options and Description	Capital Cost over 20 years		Operating Cost per year		Full Cost Recovery for Investment and O&M per year based on $FIRR_{10\%}$ [5]	
		US$ Mn	US$/ton	US$ Mn	US$/ton	US$ Mn	US$/ton
	Actual Sorting, Composting, and Landfilling in Greater Beirut and parts of Mount Lebanon investment over 10 years[1]	168	30.0	76.3	95.0		
	Actual Sorting, Composting, and Landfilling in Zahle investment over 17 years[1]	1.8	6.0	1.4	30.0		
1	Sorting, Composting, and Landfilling in Accordance with the CDR/MOE Plan	401.4	13.6	17.6	11.9	50.5	34.1
2	Sorting, Composting, and Landfilling in Accordance with a Modified [2] CDR/MOE Plan	375.6	12.7	14.6	9.9	45.6	30.8
3	Energy Cells at all Proposed Landfills in Accordance with the CDR/MOE Plan	338.5	11.4	9.4	6.3	15.5	10.5
4	Energy Cells at all Proposed Landfills in Accordance with a Modified [3] CDR/MOE Plan	285.8	9.7	8.8	5.9	10.4	7.0
5	Incinerator for Greater Beirut [4]	456.2	15.4	57.8	72.3	84.0	105.0
6	Incinerator for Greater Beirut and CDR/MOE Plan for the Rest of Lebanon	693.9	23.4	90.9	61.4	126.5	85.5
7	Incinerator for Greater Beirut and Energy Cells at the CDR/MOE Plan Proposed Sites for the rest of Lebanon	575.1	19.4	80.4	54.4	102.9	69.5
8	One WTE for Greater Beirut	884.9	49.2	38.9	48.7	76.0	95.0
9	Four WTE for Beirut (1x900,000) and the rest of Lebanon (3x300,000)	1,880.5	52.2	102.0	56.7	197.1	109.5
10	Sorting, Composting, and Landfilling for SL, NL and BB (BML not included)	233.8	16.7	10.2	12.8	13.9	19.9
11	Energy Cells for SL, NL and BB (BML not included)	112.3	8.0	3.1	3.9	4.8	6.9

Note: 1) Operating cost best estimates and net of recyclable and compost cost recovery; Zahle investment and O&M costs net of land cost and prior to 2007-09 USAID US$ 2.4 million recycling/composting capacity increase project; BML and Zahle O&M are based on the handling of 2,200 and 130 tons/day respectively.
2) In the modified alternative, the waste generated in the GB area would be disposed of in Chouf instead of Byblos.
3) Total amount of waste per year: 1.48 million tons.
4) Total amount of waste per year to Incinerator: 0.8 million tons.
5) FIRR stands for Financial Internal Rate of Return.
6) No assumption was made to improve demand management to reduce waste generation overtime.
Sources: Lebanon CEA Solid Waste and Mitigation Background Papers (2010).

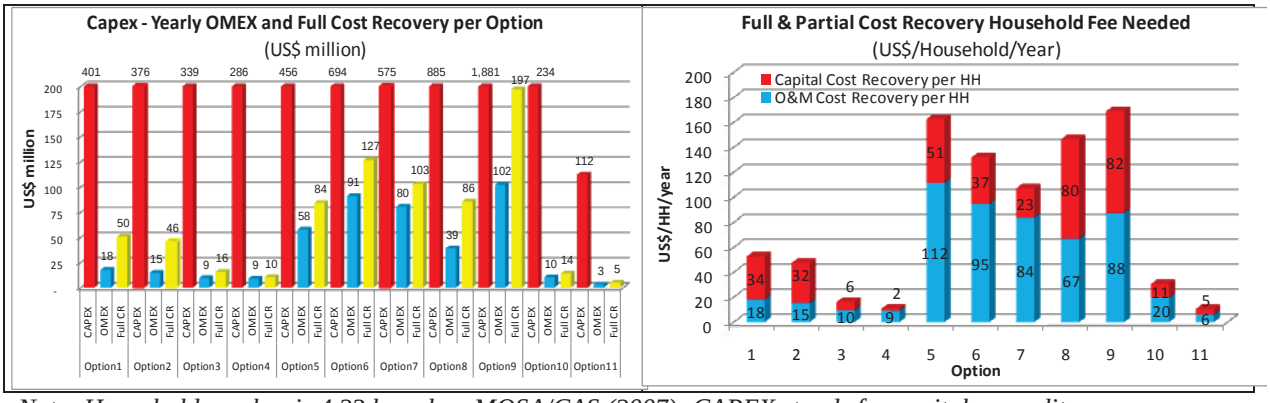
98. **The total investment cost (including design, VAT, contingencies, and land acquisition) for sorting and composting facilities is estimated at US$ 229 million, and the total cost for disposal sites (sanitary landfills without sorting and composting) is estimated at US$ 172 million.** The total investment cost for fulfilling the 2006 SWM Plan will reach about US$ 400 million. The cost for land acquisition for needed sites for sorting and composting in every Caza and selected disposal sites has been estimated at US$ 27 million, which cost is included in the total investment of US$ 400 million. With the modified 2006 SWM Plan, where a major site in the Chouf for 800,000 tons per year from the Greater Beirut area would be built, the investment in landfills could be reduced to US$ 146 million, and the total cost including sorting and composting would be US$ 375 million. Furthermore, two WTE options were considered based on the new 2010 SWM Plan, and the treatment and disposal (option 10) as well as energy cells (option 11) were considered for SL, NL, and BB that could be added to the incinerator (option 5) or WTE (option 8) in BML.

99. **The implementation of the full 2006 SWM Plan will be quite costly for the GOL, and the investment cost varies between US$ 286-694 million, depending on which technical solution would be chosen against US$ 300 million as calculated by CDR**: the 9 option results are illustrated in Table 5.2 and Figure 5.4. The O&M costs will range between US$ 6 and US$ 72 per ton, and the capital expenditure and O&M full recovery will vary between US$ 7 and US$ 105 per ton.

100. **The implementation of the new 2010 SWM Plan is even more expensive, ranging between US$ 885 and US$ 1,881 million, when a full WTE coverage is considered for the entire Lebanese territories.** The O&M will range between US$ 39 and 102 million per year, whereas the capital and O&M full recovery will vary between US$ 95 and 110 per ton.

101. **To achieve financial sustainability of the treatment and disposal investments, a preliminary fee per household per year, which was sometimes differentiated by region but not income, shows large variations across options and level of cost recovery**: full (capital and O&M) vs. partial (O&M only) as illustrated in Figure 5.4. Full cost recovery ranges between US$ 11 and US$ 170 (0.02 to 0.5 percent of the household GNI in 2009), whereas partial cost recovery varies between US$ 9 and US$ 112 per household per year (0.03 to 0.3 percent of the household GNI in 2009) net of collection and sweeping costs (about US$ 60 per household per year on average or 0.2% of the household GNI in 2009) that are partially recovered by municipalities. Nevertheless, the real collection cost is US$ 45 per ton in BML and about US$ 35 per ton in the rest of the country (Figure 5.4).

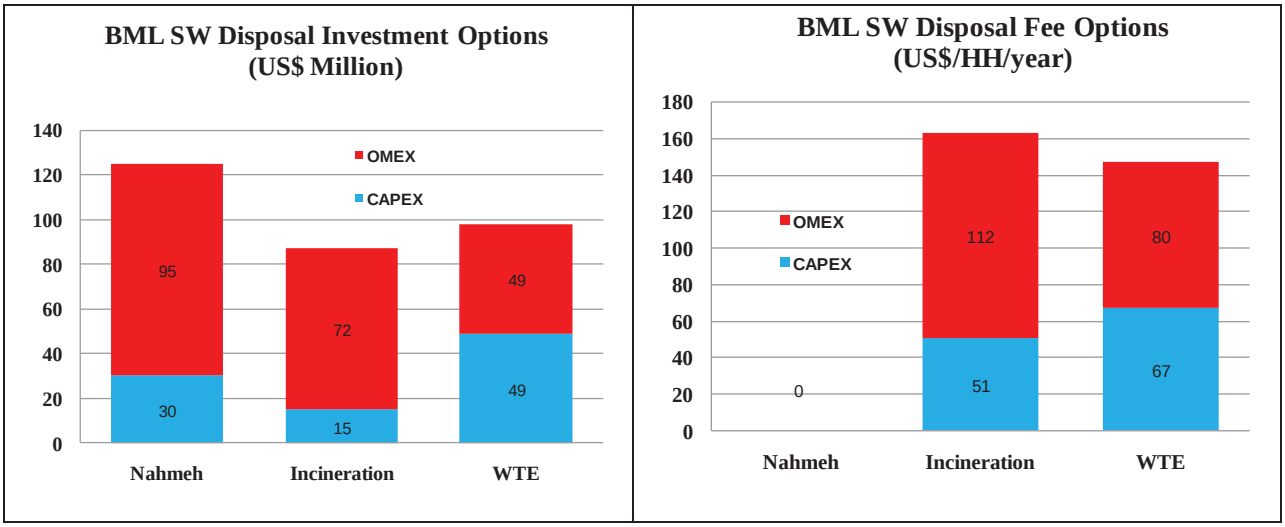
Figure 5.4: Capex, O&M, Full Cost Recovery and Fee for the 11 Options over 20 Years



Note: Household number is 4.23 based on MOSA/CAS (2007); CAPEX stands for capital expenditures.
Sources: Lebanon CEA Solid Waste and Mitigation Background Papers (2010).

102. **The highest investment and operations costs are for the 4 WTEs or Option 11 with a price tag of US$ 1.9 billion and yearly operating cost of US$ 102 million, after accounting for the resale of US$ 116 million worth of electricity over the period.** WTE operators could also recoup a benefit of US$ 3 million on average per year over 20 years should they decide to tap carbon funding after locking in an agreeable price. When considering the WTE for BML, the capital and O&M full cost recovery net of transaction costs is equivalent to the combined solid waste treatment and Nahmeh landfill O&M of US$ 95 per ton (figure 5.5).

Figure 5.5: Current Treatment and Disposal in BML as compared to Incineration and WTE Cost



Source: Authors.

5.6 Conclusions and Recommendations

103. **Although there has been impressive progress with the collection of solid waste by the private sector, the landscape for disposal of solid waste services has not changed during the last 15 years.** It would be therefore be impractical to assume that Lebanon would resolve the solid waste disposal issues in the short term. However, steps should be taken during the short and medium term so that the legal and institutional architecture for waste management is established and supported in parallel by cost-efficient investments in SWM disposal services:

a) There should be a political will and commitment that involves not only the COM but the political parties and religious institutions concerning the processing of municipal waste in an efficient, feasible, social, and environmental manner.

b) The institutional framework should be further studied and agreed, using models that can be adapted to Lebanon. One of these models is the establishment of a national agency of solid waste management for purposes of planning, promoting, and assisting municipalities in sustainable waste management as is the case in Tunisia which established, under the MOE, the National Waste Management Agency (ANGed). Other models would be to establish solid waste management departments in either the ministry of municipal affairs, as is the case in Morocco, and in large municipalities, as in the case of Greater Municipality of Amman.

c) The integrated solid waste management law should be enacted after a review of the institutional framework proposed in the law.

d) A sustained awareness and education campaign should be conducted to bring to public attention, accurate and reliable information, provide a forum for conflict resolution, increase public awareness, and suggest practical alternatives to waste minimization and disposal.

e) Cost-effectiveness for solid waste services in the BML should be reviewed by reassessing operations costs, and introducing competitive bidding to achieve better cost-efficiency and performance.

f) A decision tree is suggested along 5 criteria: Technology (T), Institutional/Regulatory (I), Capital investment (C), Operations and Maintenance (O), Land use/Nimbysm (L) with, for instance, considering two alternatives for 2 regions such as an incinerator or WTE in BML (Options 5 or 8), and treatment and disposal or disposal (Options 10 or 11) for the rest of Lebanon. Criteria are ranked by complexity as color-coded cells help assess the difficulty of the option implementation.

Table 5.4: Solid Waste Option Decision Tree

Solid Waste Option	Criteria				
1/2: Lebanon Treatment & Disposal	T	I	C	O	L
3/4: Lebanon Disposal (Energy cell)	T	I	C	O	L
5: BML Incinerator	T	I	C	O	L
6: BML Incinerator - Lebanon Treatment & Disposal	T	I	C	O	L
7: BML Incinerator - Lebanon Disposal (Energy cell)	T	I	C	O	L
8: BML WTE	T	I	C	O	L
9: Lebanon WTE	T	I	C	O	L
10: SL, NL and BB Treatment & Disposal	T	I	C	O	L
11: SL, NL and BB Disposal (Energy cell)	T	I	C	O	L

Note: T = technology; I = institution and regulation; C = capital investment; O = operations and maintenance; and L = land use and nimbysm. Color-coded complexity: Easy; Moderate; and Complex.

g) In order to solve the problematic situation for BML, WTE could be considered as an alternative with a capacity of 900,000 tons per year but at a cost of US$ 885 million. Such investments should be partially financed through a cost recovery of operational costs estimated at US$ 49 per ton of waste or US$ 75 per year for households. Nevertheless, considering the WTE option for the entire Lebanese territories (option 9) would cast some doubts on the waste policy coherence as previous investments and grants have allowed to set up a segregation, recycling,, and composting infrastructure in a number of areas in Lebanon: Zahle, Saida, Miniyeh, Hbaline as well as other smaller operations all over Lebanon (EC and USAID funding).

h) If chosen, the establishment of sanitary landfills with the option of energy cells should be piloted in one or two Cazas such as in North Lebanon with an estimated cost of US$ 44.0 million and/or South Lebanon with an estimated cost of US$ 40 million. Such pilots if successful, could be replicated in Baalbeck and Hermel.

i) A gradual cost-recovery system should be designed and implemented in BML first, the GOL could consider that the initial capital costs are sunk costs, and cost recovery would cover the operational and maintenance costs first. Nevertheless, the level of acceptability of the citizens for any of the 11 options is crucial for the sustainability of the waste sector in the future. This new fee could be included on the electricity bill (as is the case in Egypt and Jordan), or other efficient fee collection mechanism should be adopted. The solid waste fee should also be clearly identifiable to residents, so as to make the public aware of the fees for solid waste. International experience shows that residents are willing to pay for services, so long as the costs and quality of solid waste services meet their expectations.

Chapter 6: Wastewater

6.1 Key Wastewater Facts

104. **Wastewater management is considered a high priority issue in Lebanon with an estimated municipal wastewater load of 248 million m^3 per year in 2010, equivalent to 119,348 tons of Bio-oxygen Demand (BOD_5 --**Table 6.1).[47]

Table 6.1: Estimated Domestic Wastewater Generation, 2010

Wastewater Loads Region	Population 2007 (million)	Population equivalent 2010 (million)	Domestic WW Generation 2010 (million m^3/year)	Wastewater BOD_5 Load 2010 (tons per year)
BML	1.85	2.68	146.7	58,603
SL	0.66	0.96	35.0	20,945
NL	0.76	1.11	40.5	24,247
BB	0.49	0.71	25.9	15,553
Total	3.76	5.45	248.2	119,348

Note: Population growth is 1.16 percent per year over the period. BOD_5 load is based on 60 grams per capita per day BOD_5 emission, which is the average commonly used. Domestic water generation is based on an average of 150 liters/day/capita in BML and 100 liters/day/capita for the rest of Lebanon. The CDR 1.38 coefficient for population equivalent is used. Totals may not add up due to rounding.
Sources: MOSA-CAS (2007) and Lebanon CEA Wastewater and Cost of Mitigation Background Papers (2010).

Table 6.2: Projected Domestic Wastewater Generation, 2030

Wastewater Loads Region	Population 2030 (million)	Population equivalent 2030 (million)	Domestic WW Generation 2030 (million m^3/year)	Wastewater BOD_5 Load 2030 (tons per year)
BML	2.69	3.71	237.0	81,296
SL	0.96	1.33	72.8	29,056
NL	1.11	1.54	84.3	33,636
BB	0.71	0.99	54.2	21,575
Total	5.48	7.56	448.3	165,563

Note: Domestic water generation is based on an average of 175 liters/day/capita in BML and 150 liters/day/capita for the rest of Lebanon.
Sources: MOSA-CAS (2007) and Lebanon CEA Wastewater and Cost of Mitigation Background Papers (2010).

Table 6.3: Housing Connected to the Wastewater Network by Region and Growth, 2007

% of housing connected	Sewer Connection (%)			Septic Tanks (%)	Other (%)
Region	1998	2007	±% 2007/1998	2007	2007
BML	**NA**	**79.2**	**NA**	**21.1**	**0.7**
Beirut	*98.3*	*99.6*	*+ 1.3*	*0.0*	*0.4*
Beirut Suburbs	*89.3*	*96.8*	*+7.5*	*1.9*	*1.3*
Mount Lebanon	*33.9*	*64.2*	*+30.3*	*35.3*	*0.6*
SL	**NA**	**50.1**	**NA**	**45.9**	**3.9**
South Lebanon	*42.1*	*51.8*	*+9.7*	*36.6*	*11.5*
Nabatiyeh	*23.8*	*26.5*	*+2.7*	*72.8*	*0.7*
NL	**53.5**	**67.4**	**+13.9**	**27.3**	**4.8**
BB	**41.1**	**49.3**	**+8.2**	**50.5**	**0.2**
Total average	**58.5**	**65.7**	**+7.2**	**32.1**	**2.2**

Sources: CAS (1998) and MOSA-CAS (2007).

[47] This Section builds on the Lebanon CEA Wastewater and Cost of Mitigation Background Documents (2010).

105. **For the majority of dwellings and businesses connected to the sewer network, the bulk of their raw sewage is discharged directly into the sea or to inland watercourses without treatment prior to disposal.** Table 6.2 illustrates the domestic wastewater generation projection for 2030, with wastewater reaching 448 million m^3 and 165,563 tons of BOD_5.

106. **Only 66 percent of the population was connected to an improved sewer network in 2007.** The construction of a wastewater networks system is lagging behind. With the exception of the Beirut administrative region, all districts have large gaps in the wastewater networks connection even though extensive developments to wastewater infrastructure have been made since 1998 (+7.2 percent in 2007/1998 --Table 6.3). The remaining dwellings not yet connected to the sewerage system use open sewers, septic tanks, cesspools, or simply discharge the wastewater directly into the environment.

Table 6.4: Estimated WWTP Operating Capacity and Treatment Rate, 2010

Region / WWTP	Design Flow				Treatment 2010	
	Planned, Constructed, under Construction, Operating or Abandoned WWTP		of which CDR-Implemented Priority WWTP		Operating WWTP	Estimated BOD_5 Removed
	Million m^3/year	(#)	Million m^3/year	(#)	Million m^3/year	tons per year
BML *of which:*	**211**	**19**	**208**	**8**	**19.3**	**2,125.0**
Ghadir WWTP (pre-treatment)					*18.3*	*1,732.0*
Hamana (small scale)					*0.4*	*151.0*
Amatour (small scale)					*0.3*	*121.0*
Bater (small scale)					*0.3*	*121.0*
SL *of which:*	**49**	**27**	**40**	**3**	**20.2**	**1,955.0**
Saida WWTP (pre-treatment)					*20.1*	*1,902.0*
Barte and Deir Mimas (small scale)					*0.1*	*53.0*
NL *of which:*	**92**	**21**	**66**	**6**	**0.5**	**189.0**
Qobeyat (small scale)					*0.5*	*189.0*
BB *of which:*	**47**	**24**	**47**	**11**	**7.4**	**2,803.0**
Baalbeck (secondary at 10% capacity)					*4.4*	*1,666.0*
Aitanit (secondary treatment)					*1.8*	*682.0*
Fourzol (small scale)					*0.3*	*114.0*
Jabboule and Ain Archa (small scale)					*0.9*	*341.0*
Total	**400**	**90**	**360**	**28**	**47.4**	**7,072.0**

Note: Primary treatment is estimated to remove 40 percent of BOD, secondary treatment 80 percent, and tertiary treatment would allow the reuse of water for selective irrigation, industrial use or groundwater recharge. Some of the 90 WWTPs do not have any figures on capacity or cost.
Sources: Lebanon CEA Wastewater and Cost of Mitigation Background Papers (2010).

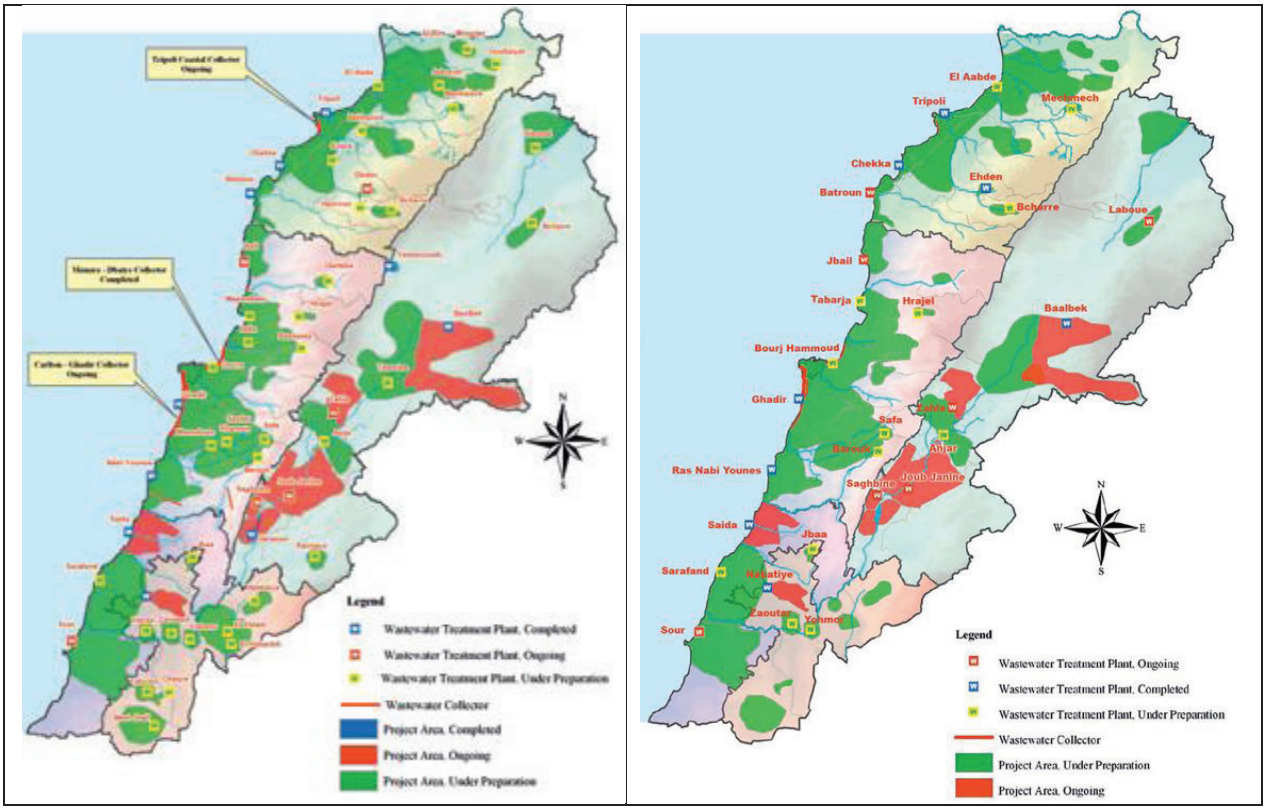
107. **Lebanon has about 28 major wastewater treatment plants (WWTPs) with a design capacity of 360 million m^3 per year that are already constructed, under construction, or planned by CDR, which exceeds 2030 needs** (Figure 6.1):[48] 12 WWTPs are located along the coastal zone and 16 WWTPs are inland and will cover 6.5 million population equivalent until 2030 with a total population equivalent estimated at 7.6 million by 2030. Also, some 44 small-scale waste treatment plants, of which about 50 percent were located on the Hasbani and Wazzani catchments, were totally or partially constructed. By 2004, however, only 5 were still

[48] CDR (2009).

properly running.[49] About 24 additional WWTPs are in or outside the CDR future project pipeline pending financing, directly built by development partners (e.g. Chacra by the Kuwait Fund), or being cancelled (e.g., Kenchara), bringing the total number of planned, constructed, under construction, operating, or abandoned WWTPs to about 90, with a total design flow of 400 million m^3 per year (Table 6.4).

108. **To date, there are about 11 operating WWTPs and 5 constructed major WWTPs (Tripoli, Batroun, Chekka, Ras Nabi Younes, and Nabatiyeh) that are not yet connected to the network.** When only considering the design capacity of all 28 WWTPs, 19.1 percent of the domestic wastewater generated in 2010 is considered to be pre-treated or treated to secondary levels. Moreover, the BOD_5 removed is equivalent to 5.9 percent of the BOD_5 generated in 2010 (Table 6.4). The first WWTP to be built in Lebanon, Ghadir, which is located south of Beirut, started its operations in 1996 and pre-treats network sewage, septic tank septage, and leachate from the Naameh landfill, with an average capacity of 50,000 m^3 per day.

Figure 6.1: CDR Wastewater Treatment Plant Location and Status: 52 in Total of which 28 Priority, 2009



Source: CDR (2009).

109. **In line with Horizon 2020, the 12 priority wastewater treatment plants for major coastal cities/agglomerations, which are discharging raw wastewater directly into the sea, are well underway.** Five plants are completed: Tripoli, Chekka, Ras Nabi Younes, Saida, and Ghadir. Only Ghadir and Saida are currently operational but both WWTPs are limited to

[49] MOE-MSC-IPP (2004).

preliminary treatment only as all the effluents are disposed into the Mediterranean Sea through outfalls. Yet, all other WWTPs completed, under construction, or under preparation have a biological (secondary) treatment component, including Tripoli that has not started its operations because most main sewerage networks (including the Qalmoun and Nahr el Bared sections) are still under construction. Moreover, Jbeil, Batroun, and Tyre are still under construction. The WWTPs of Bourg Hammoud, the upgrade of Ghadir, El Abdeh, and Kesrewan plants are at various stages of implementation, leaving the Sarafand WWTP that remains on hold pending funding. Inland, the only operational WWTP is the World Bank-funded Baalbeck that has just started operations. Otherwise, eight inland small-scale treatment plants are operational.

6.2 Sludge Load and Treatment

110. **The Sludge Management Master Plan study commissioned by CDR in 2003 estimated the quantity of sludge from the proposed treatment plants to reach an over-projected 334 tons of dry material per day in 2010** (Table 6.5). The 10 largest WWTPs were estimated to produce 74 percent of the total sludge load. The figures, however, seemed inflated and were adjusted by using the estimated population equivalent for 2010 and 2030, which produced lower loads reaching 260 tons of dry material per day in 2010 should all the WWTPs be in operation, and 306 tons of dry material per day in 2030.

Table 6.5: Estimated Quantity of Sludge Load in 2010 and 2030, tMS/d

Sludge Load Region	Horizon 2020 2003 estimations for 2010 (tDM/d)	Adjusted 2010 based on current population equivalent (tDM/d)	Adjusted 2030 based on projected population equivalent (tDM/d)
BML	176	128	151
SL	37	47	56
NL	63	46	54
BB	37	39	46
Total	**334**	**260**	**306**

Note: Horizon 2020 figures are based on a 8.9 million population equivalent. tDM/d = ton of dry material per day.
Sources: CDR (2003); MOSA-CAS (2007); Lebanon CEA Cost of Mitigation Background Paper (2010); and Lebanon CEA Wastewater and Cost of Mitigation Background Papers (2010).

Box 6.1: Sludge Technical Options

Generally, sludge was disposed of in sanitary landfills, but recent technical improvements allow adding value to treated-sludge or digested-sludge as these may be used as fertilizer or a soil amendment and conditioner. Sludge may also be treated chemically for use as landfill cover, or in landscaping or land reclamation projects.

Thermal reduction, especially incineration, is also considered as a sludge treatment process, which consists of transforming the dried sludge into ash in order to minimize its volume by about 75 percent and its weights by tenfold as the process ensures the complete destruction of organic matter including bacteria, pathogens, and viruses. Tripoli has a Thermylis incinerator (€ 10 million with € 2.6 million for a 3-year O&M contract) and was a 2004 addendum to the original EIB WWTP loan due to landfill availability concerns in Tripoli. The Saida and Ghadir WWTP are disposing of their sludge at the Saida coastal dump and probably at the Nahmeh landfill, respectively, although it is difficult to determine the volume and weight, and if they are being charged for the disposal. The CDR is considering introducing more incinerators to coastal plants, although they are costly and their emissions are toxic and need expensive abatement processes and constant monitoring.

The largest production of sludge results from large-sized WWTPs which are mainly located in coastal areas. Since agricultural activities are very limited in coastal zones, production of fertilizer from sludge is not feasible as it needs vast space and is not cost-effective as it requires transportation of fertilizer to inland areas. Therefore, the best technical option for sludge management in coastal areas is anaerobic digestion where power can be generated to

sustain the WWTP needs for energy.

In inland WWTPs, sludge should be treated for agricultural use as land conditioner or fertilizer where agricultural lands are nearby. The use of an incinerator is recommended in special cases and could also be used to treat hospital and industrial liquid wastes.

Source: Lebanon CEA Wastewater Background Paper (2010).

111. **The 2003 Sludge Management Master Plan study contained the following recommendations:** sludge from major urban areas and most plants in Mount Lebanon and the coast, representing 68 percent of the national load, should be incinerated. Incinerators would be required at Tripoli, Kesrewan, Bourg Hammoud, Ghadir, and Jiyeh and, of the remaining 32 percent, primarily from rural treatment plants, 20 percent of the national total would be stabilized and dewatered for direct application to the land, while 12 percent would undergo drying and pelletisation for subsequent agricultural use.[50] Yet, alternative options should be considered, especially should the WTE will be adopted for BML (see previous section and Box 6.1).

6.3 Wastewater Reuse

112. **After treatment, wastewater is either reused or discharged into the environment.** Through Decision 8/1 (1/3/2001), the MOE has set the National Standards for Environmental Quality (NSEQ) that covered air and liquid emissions for all sectors. Moreover, a proposal for guidelines for the reuse of treated wastewater and sewage sludge for agricultural purposes has been released by FAO[51] in 2010 and needs to be reviewed and adopted by the COM, as raw sewage is still used as a fertilizer, notably in the Bekaa, without any governmental oversight. Hence, highly treated wastewater effluent from municipal wastewater treatment plants can be reused as a reliable source of water for agricultural irrigation, landscape irrigation, industrial recycling, reuse, and groundwater recharge. If not reused, treated wastewater is commonly discharged into a water body and diluted when rivers are perennial.

Table 6.6: River Runoff in Lebanon, 2007

Volume Region	River Runoff million m^3 per year
BML	990
SL	430
NL	670
BB	1,310
Total	**3,400**

Source: Comair (2007).

113. **The potential for water reuse for selective irrigation, industrial and energy production, water table recharge, and water storage for forest fires (instead of using sea water) is tremendous and varies by region.** Still, it is important to mention that the selectivity for tertiary treatment and water reuse should carefully be assessed based notably on seasonal demand, needs, and risk mitigation in conjunction with the land use master plan (NPMPLT). The 28 major WWTPs with their 360 million m^3 capacity per year already represent about 10 percent of water runoff (Table 6.6). This volume represents 2/3 of the 15 percent projected reduction of

[50] CDR (2003).
[51] FAO (2010a); and FAO (2010b).

runoff by 2041-60 due to climate change effects.[52] Valued at half the subsidized cost of tap water, assuming all 28 major WWTPs are upgraded to tertiary treatment, the value of reused water would come up to about US$ 62.3 million (figure not discounted), provided the WWTPs are running at full capacity.

6.4 Wastewater Policies

114. Before the Draft 2011 National Water Sector Strategy, Lebanon did not have an agreed national policy *per se*, but existing and largely informal strategies and plans have been updated by CDR (which is taking the lead), MOEW, and MOE to comply with Lebanon international commitments, i.e. the UNEP Barcelona Convention and EC Horizon 2020.

115. Under the UNEP Barcelona Convention, the GOL is committed to preventing pollution of the Mediterranean Sea, and it has set the following priorities for protection from wastewater pollution: protection of the Mediterranean Sea; protection of inland water resources; protection of public health; and protection of the environment.

116. The EC Horizon 2020 initiative, whose aim is the de-pollution of the Mediterranean by tackling top pollution sources by the year 2020, is more geared towards coordination and public-private financing, as it calls for fostering strategic partnerships with the UNEP/MAP, MSSD the UNDP-World Bank Global Environmental Fund (GEF), World Bank, European Investment Bank, as well as the private sector to secure predictable and sustainable sources of funding. Moreover, the Clean Development Mechanism set forth by the Kyoto Protocol through development institutions or private emission right trading companies could possibly leverage the Horizon 2020 initiative.

6.5 The Legal and Institutional Framework

117. **The reform of the water and wastewater legal and institutional framework initiated in the early 2000s remains incomplete as the reform process has not yet achieved the desired results.** This is part due to: the lack of institutional capacity of 4 RWEs created in 2000, which prevent operational efficiency and adequate planning and prioritization of the investments; and the new sector law does not go far enough to make these authorities fully autonomous. Moreover, overlapping of functions is another challenge, such that the institutional responsibilities between RWEs and the municipalities need to be clarified and agreed upon. Therefore, major reforms are still required to make the sector more efficient and self-sustaining i.e. having viable tariff and financial scheme for the sector and establishing an adequate regulatory framework. Moreover, the institutional management of the wastewater sector remains ineffective. There are several government agencies involved to various degrees in wastewater management in Lebanon, often with overlapping functions. The roles and responsibilities are dispersed between various ministries, several authorities, and municipalities, making it difficult to discern clear sectoral responsibilities, and functional monitoring and enforcement systems. The main agencies are the MOEW, CDR, and the RWEs; these lack the expertise, resources and

[52] METAP (2009).

legislative support to implement a coherent policy.[53] Municipalities are still in charge of the combined drainage and sewer network.

118. Existing legislation for the protection of water resources in Lebanon dates back to 1925 and even to the Ottoman era. However, these laws were not updated and sparsely complemented with additional laws and application decrees. The main regulations directly related to wastewater are as follows:

- Decree 8735/1974 on pollution from solid waste and wastewater;
- Decision 52/1 (7/1996), MOE set out the requirements for measures to protect against air, water, and soil pollution;
- Decision 8/1 (3/2001) of MOE on the National Standards for Environmental Quality (NSEQ) guidelines developed under SPASI, covering air and liquid emissions of all sectors, and replacing corresponding standards under Decision 52/1 (7/1996). Although industries are already obliged to pre-treat discharges to meet the NSEQ requirements, in the pervasive climate of non-enforcement, taking on many hundreds of small firms and large powerful enterprises could prove to be a major challenge; and
- Decision 3/1 (8/2005) about environmental guidelines for the establishment and/or operation of small wastewater treatment plants. This Decision was prepared after the review of small-scale wastewater plants executed in rural areas by USAID: none of those still operating in 2004 discharged effluent in accordance with the NSEQ. Moreover, the adoption of the 2010 FAO water reuse guidelines is still pending.

6.6 Wastewater Strategy and Plan

119. **In line with the regional legislation, the objective of the wastewater strategy is to address the problem of pollution and wastewater disposal in a radical manner throughout the country**. As such, the CDR focused its wastewater sector efforts along three building blocks: execution of the emergency rehabilitation works of existing wastewater networks and pumping stations (National Emergency Reconstruction Program 1 -- NERP); completion of projects and rehabilitation of wastewater networks (NERP 2 and 3); and launching two programs for protecting the Lebanese coasts and water resources from pollution. The revised NERP program proposed the construction of 12 priority WWTPs along the coast (65 percent of the wastewater discharges in Lebanon) and 16 inland WWTPs (15 percent of the wastewater discharges in Lebanon) by 2010.[54] The WWTPs proposed under NERP are either in operation, under construction, or currently waiting for funding. The remaining areas that house 20 percent of the population will require around 77 medium- to small-scale WWTPs. Moreover, the 2003 Sludge Management Master Plan study has suggested options to dispose of the sludge generated from WWTPs but was not fully implemented, although the CDR is pursuing its broad lines, especially in terms of incinerators along the coast and in Mount Lebanon.[55] Tripoli, Jiyeh (to also cover Nabatiyeh) and Chekka WWTPs have incinerators that were installed to avoid disposing of the sludge in open dumps or near full capacity landfills. Incinerators are also planned for Bourg

[53] UNEP MAP for the Barcelona Convention website: <www.unepmap.org>; Horizon 2020 website: <http://ec.europa.eu/environment/enlarg/med/horizon_2020_en.htm>; GEF website: <www.gef.org>; EIB website: <www.eib.org>; Kyoto Protocol website: <www.unfccc.int>; and CDR (2008).
[54] CDR (2009).
[55] CDR (2002).

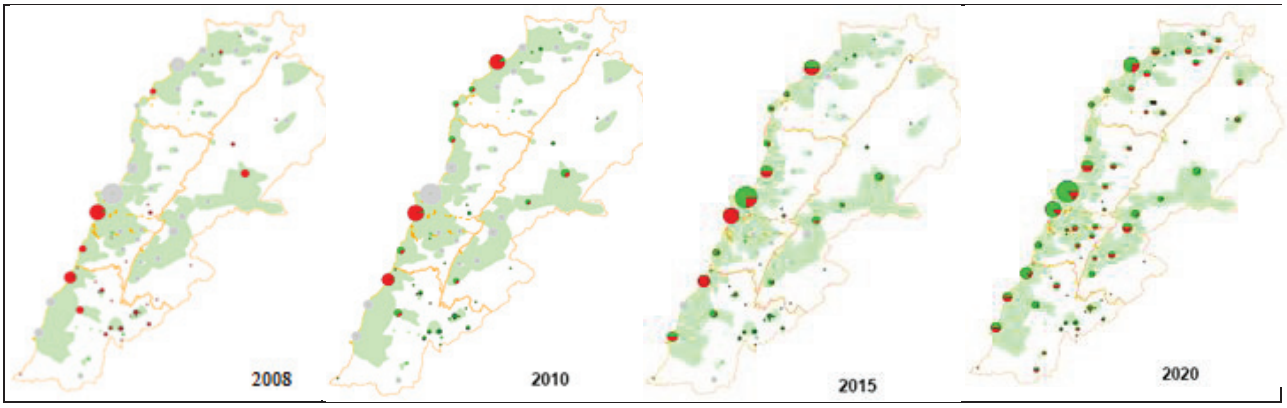
Hammoud and the upgrade of Ghadir. Conversely, water reuse remains an unresolved issue, as farmers are still using raw sewage for irrigation, especially in the Bekaa.

120. **The MOEW has formulated a draft water sector strategy which will be finalized in 2011.** The strategy covers legal, institutional, technical, managerial, and financial aspects of the water, wastewater, and irrigation sectors. It aims to improve services and put the sector on a sustainable footing by recouping more than the sector O&M expenditures by 2015.

6.7 Wastewater Sector Mitigation Cost Options

121. **The CDR wastewater implementation plan, including network and plants, was estimated at US$ 3.5 billion until 2030 in current prices, targeting a 6.5 million population equivalent and leaving a 1.2 million population equivalent gap by 2030.** Nevertheless, the plan is behind schedule and lacks coordination as: most large-scale municipalities have either wastewater networks without wastewater treatment plants or wastewater plants without the related networks; inland communities have neither sewerage networks nor treatment plants, which increase the risk of groundwater contamination; the communities in rural areas usually use on-site sanitation (septic tanks) where the authorities do not control any of them; and few communities treat their effluents in small treatment plants that often are not properly operated and maintained.

Figure 6.2: Evolution of Wastewater Treatment Capacity in Lebanon, 2008-2020



Source: Hassib (2009).

122. **GIZ estimated the actual investment and operating costs in current prices for 18 under construction or operating WWTPs: US$ 0.51 billion for the WWTPs and US$ 2.7 billion for the sewer network with a total cost of US$ 3.2 billion, and a dynamic prime cost of US$ 0.73/m^3 for investments and US$ 0.16/m^3 for operations and maintenance**.[56] GIZ analysis suggests 90 percent network coverage and treatment by 2020 and 100 percent by 2030 for the dwellers covered by the ongoing 18 WWTPs (Figure 6.3). Usually, the selection and design of wastewater treatment facilities is greatly dependent on the costs associated with treatment processes, including capital investment, operation and maintenance, land requirements, outfall requirement, and sludge handling and disposal.

[56] Hassib (2009).

123. **Four wastewater sector investment options have been considered along the coast to complement the GIZ analysis that will improve the quality of water and marine resources by 2030.** Therefore, the options also give an order of magnitude of the investments needed to provide improved sanitation to a 2.1 million population equivalent by 2030 that is in addition to the 5.5 million population equivalent covered by the ongoing 18 WWTPs when it will operate at full capacity by 2030.

124. **The options aim to determine the incremental investment cost needed to marginally reduce the municipal amount of 165,563 tons of BOD_5 generated to 8,000 tons in 2030.** The various investment costs associated with the marginal reduction of the BOD_5 are illustrated in Table 6.7 and Figure 6.4. The current GIZ assumptions, to which are added when necessary sludge disposal and incinerator costs, is in fact the ongoing wastewater program that is complemented by 4 options that cover the entire wastewater sector chain (sewer network to sludge disposal). The investment and O&M costs for all the 4 options are illustrated in Tables A3.1 and A3.2 (Annex III) where US$ per m^3 were calculated to recoup the full capital cost or the partial O&M costs. The scenarios include:

- ***No intervention*** only provides the total 165,563 tons of BOD_5 generated by a 7.6 million population equivalent in 2030.
- ***Ongoing*** is the baseline that includes the capital cost of 16 WTTPs and their associated network as considered by GIZ to which is added when needed the sludge disposal. However, the baseline does not include the Ghadir and Saida WTTPs, which are already under operation as pre-treatment plants since 1996 and 2001, respectively.
- ***Option 1*** includes the capital investments of: the upgrade of Ghadir and Saida to secondary treatment; their associated sewer network; and their incinerators.
- ***Option 2*** includes the capital cost to: bridge the 2030 gap to cover the entire 7.6 million population equivalent in 2030 (not connected to any kind of sewer treatment) by building secondary WWTPs including the 2 additional planned WWTPs along the coastal zones with their outfalls; their associated sewer network; and the sludge disposal.
- ***Option 3*** includes the capital cost to upgrade 10 coastal WTTPs included under *Ongoing* to tertiary treatment.
- ***Option 4*** includes the capital cost to bridge the 2030 remaining gap by upgrading WTTPs to tertiary treatment including the additional 2 coastal WTTPs.

125. **The WWTPs sector gap by 2030 Option 2, which consists of bridging the 2030 gap by introducing secondary treatment to a 2.1 million population equivalent, which is estimated at US$ 410 million, will give the highest *bang for the buck* in terms of reducing the BOD_5 or 46,000 tons** (Table 6.7 and Figure 6.4). Moreover, considering tertiary treatment is even more cost-effective, especially since Lebanon will reach the water scarcity level (less than 1,000 m^3 of fresh renewable water) by 2015 and the availability fresh water resource per capita will be further exacerbated by climate change effects (-15 percent runoff by 2050).[57] When compared to the cost per m^3 of desalinated water (less than US$ 1/m^3), the tertiary treatment is twice as cost-efficient, since investment cost and O&M of tertiary treatment do not exceed US$

[57] METAP (2009).

0.44/m^3 while the MOEW water sector strategy calls for a US$ 0.39/m^3 tariff. Therefore, tertiary treatment should be selectively considered where water supply augmentation is justified.

Table 6.7: Investments Needed for Marginal BOD_5 Reduction by 2030, US$ million and 000' Tons

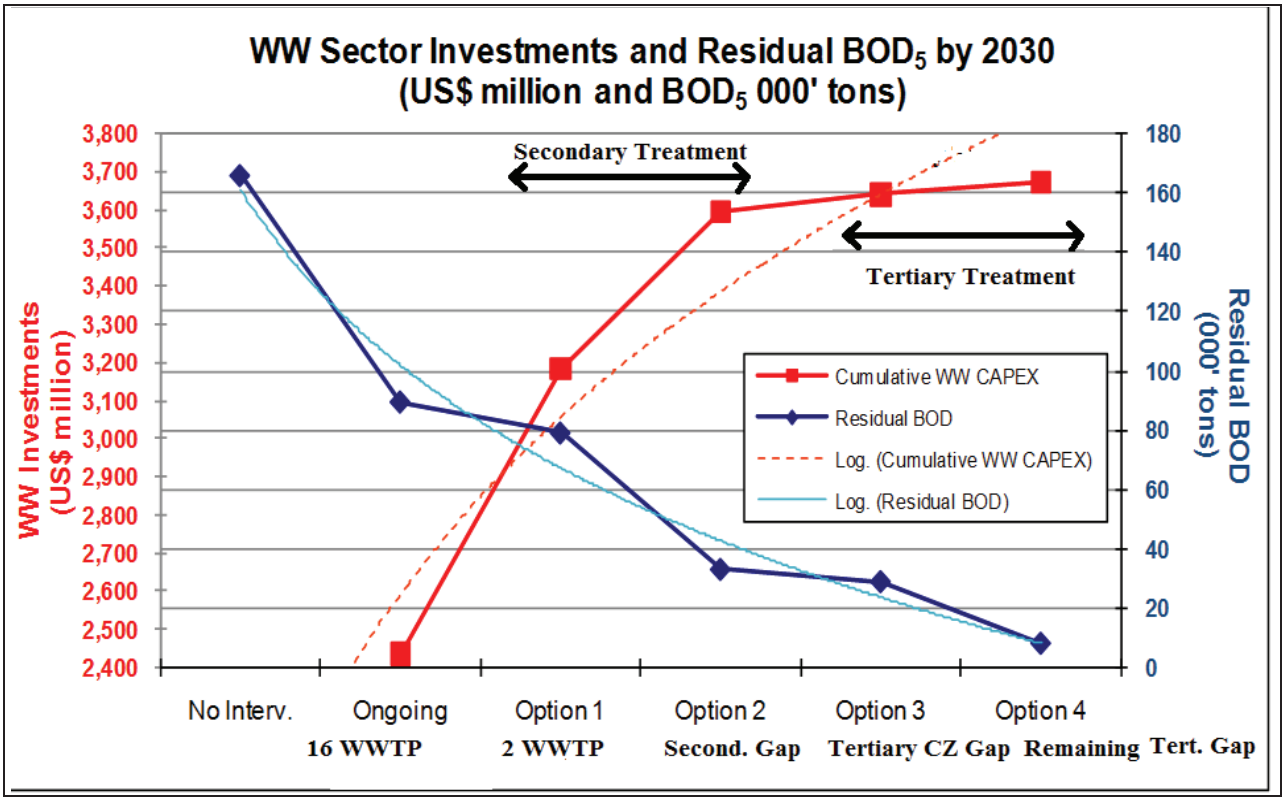
Option	Description	Investments						Residual BOD_5	Pop. equiv. 2030
		Cumulative WW Sector	WWTP	Sewer	Outfall	Sludge	Incin.		
		(US$ million)						(000' Tons)	Million
No Intervention								166	7.6
Ongoing	16 plants 2030 full capacity	2,435	436	1,988		11		89	4.3
Option 1	2030 Ghadir & Saida Secondary Treat.	3,185	74	664			15	79	1.2
Option 2	2030 Gap Secondary Treatment	3,595	120	269	6	12		33	2.1
Option 3	2030 Coastal 10 plants Tertiary Treat.	3,640	45					29	4.5
Option 4	2030 Remaining Gap Tertiary Treat.	3,671	31					8	2.1

Note: BOD_5 reduction is 80 percent with secondary treatment and 95 percent with tertiary treatment. Option 1 considers the upgrade of the both WWTPs to secondary treatment. It is estimated that most 2030 Gap Secondary capacity will be around 10,000 m^3 per day and include two additional WWTP that will be built along the coast (Abdeh and Sarafand). Ozonation for tertiary treatment is thought for WWTPs with a capacity greater than 100,000m^3/day. The small-scale WWTPs in operation listed in Table 6.4 are included under Option 2 for simplification purposes.
Source: Lebanon CEA Cost of Mitigation Background Paper (2010).

126. **So far, the RWEs have not introduced wastewater tariffs as the water tariff ranges across regions between US$ 118 and US$ 157 with an average of US$ 138 per household per year for one m^3 per day, although water provision lacks pressure, regularity, and continuity in most regions.** Moreover, this tariff remains subsidized and does not cover O&M, even though the new MOEW water sector strategy calls for an increase of the water tariff to US$ 142 per household per year by 2011 and US$ 164 per household per year in 2015 (based on 1 m^3 water consumption per household per day).

127. **GIZ's analysis suggested to GOL the introduction of a lower bound average US$ 46 wastewater tariff per household to recoup the 18 WWTP O&M that will gradually be supplemented by a lower bound US$ 233 to recoup the investment costs bringing the total suggested fee overtime to US$ 279 per household per year.**

Figure 6.3: Investments Needed for Marginal BOD_5 Reduction by 2030, US$ million and 000′ Tons



Note: See Table 6.7 note. CAPEX stands for capital expenditure.
Source: Lebanon CEA Cost of Mitigation Background Paper (2010).

Table 6.8: Suggested Wastewater Tariffs, US$ per household and % of GNI household

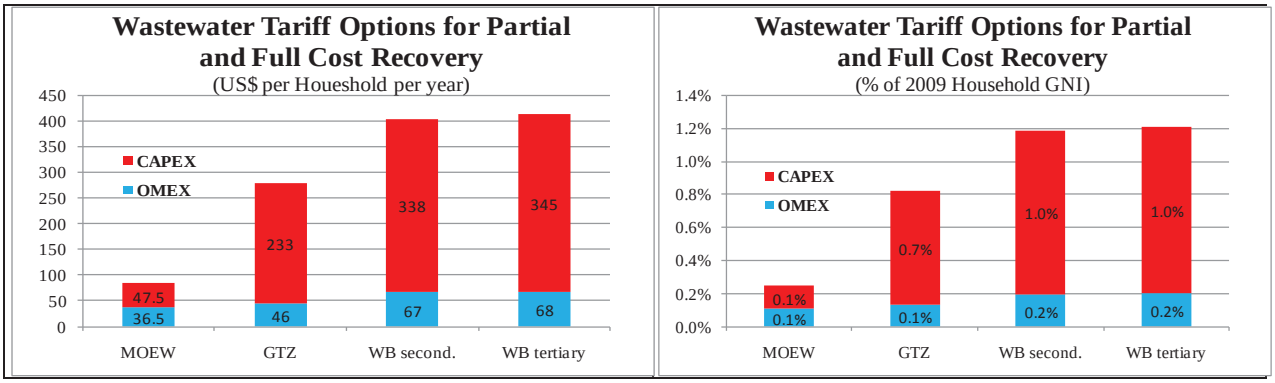
US$/household	2009	2010	2011	2015	Source
OMEX and CAPEX			36.5	84	MOEW
OMEX	46				GTZ
OMEX		68			World Bank CEA
CAPEX	233				GTZ
CAPEX		345			World Bank CEA
OMEX and CAPEX			36.5	84	MOEW
OMEX and CAPEX	279				GTZ
OMEX and CAPEX		413			World Bank CEA
GNI per capita	*8,060*				World Bank
GNI per household	*34,094*				World Bank
Household member number	*4.23*				CAS

Note: Tariffs and GNI are considered constant over the period.
Sources: CAS (2007); Hassib (2009); MOEW (2010); World Bank (2010c); and authors.

128. **Starting 2011, the draft MOEW National Water Sector Strategy calls for the selective introduction of a wastewater tariff that could be generalized with service coverage, and will not exceed US$ 36.5 per household per year**. The tariff, which is lower than the suggested GIZ figure, will be increased to US$ 84 per household per year by 2015 (based on 1 m^3 water consumption per household per day). When trying to recoup the full chain

of wastewater operations as illustrated in Table 6.7, which includes the tertiary treatment, outfall, disposal of sludge, and the incinerator cost, the suggested average tariffs reach about US$ 68 per household per year for O&M and US$ 345 for investments. A recap of the various wastewater tariffs suggested in US$ and in percentage of the 2009 Gross National Income per household is illustrated in Table 6.8 and Figure 6.5: (i) the MOEW covers WWTPs and networks, and suggests a full OMEX recovery and a partial CAPEX recovery by 2015; (ii) GIZ covers WWTPs and networks, and suggests a gradual full OMEX and CAPEX cost recovery; and (iii) the current CEA covers WWTPs, networks, outfall, sludge disposal, and sludge incineration and suggests a gradual full OMEX and CAPEX cost recovery for secondary and tertiary treatment.

Figure 6.4: Suggested Wastewater Tariffs, US$ per household and % of GNI household, 2009



Note: Tariffs and GNI are considered constant over the period. Household number is based on 4.23 members.
Sources: CAS (2007); GTZ (2009); MOEW (2010); World Bank (2010c); and authors.

6.8 Conclusions and Recommendations

129. **The water and wastewater policy and institutional reform should be speeded up and address some of the shortcomings** such as: definition of clear institutional responsibilities between RWEs and municipalities and forms of cooperation and procedures as agreed by MOEW; involvement of all the wastewater stakeholders and promoting Public-Private Partnerships in Wastewater Management wherever it can enhance the quality or cost effectiveness of services to customers, while maintaining public sector involvement in policy and compliance monitoring; and regulating water reuse.

130. **The new MOEW water sector strategy should be adopted by the GOL**. Total investment needs by 2030 for the wastewater chain, when the constructed or under construction 18 WWTPs are not accounted for, are estimated at US$ 436 million. Currently, only 6 percent of total discharge is being treated. Nevertheless, the strategy aims at having full secondary treatment coverage for the entire territories but does not consider tertiary treatments in areas where the reuse of clean water could be economically justified (water scarcity/dedicated hill lakes for forest fire, industrial zones, aquifer recharge, etc.).

131. **Wastewater treatment cost recovery remains a challenging and crucial issue where wastewater tariffs are difficult to introduce in areas where water services are poor**. An improvement of water services is a prerequisite for any gradual introduction of a waste tariff that could be considered in Tripoli, for instance, where water services have dramatically improved

further to ONDEO's 4-year management contract. Nevertheless, the introduction of a sustainable water tariff structure for water supply and wastewater treatment (how much) should consider social and regional related components to provide competitive tariff structures for reuse.

132. **The proper operation of wastewater treatment plants will necessitate the pre-treatment of hospital and industrial effluents before being released into the sewer network**. A preliminary industrial assessment is being conducted by GIZ for Kesrwan and the Litani/Qaraoun Lake, and proper incentives and enforcement measures should be put in place before running any of the wastewater treatment plants serving large urban/industrial areas.

Chapter 7: Policies and Institutions

133. **The aim of this chapter is to assess Lebanon's policies and institutions in terms of achievements and challenges, and assess whether they are appropriate for ensuring the integration of economic and environmental policies at macroeconomic and sectoral levels**.[58] This evaluation covers: (a) the environmental policy and the supporting incentive tools; (b) the legal framework for the implementation of this policy; (c) the investment programs and their relationship to strategic priorities; (d) the degree of participation and intervention by civil society and access to information; and (e) the Lebanese realities in enhancing environmental sustainability in Lebanon. It also benchmarks Lebanon's environmental impact assessment system *vis-à-vis* the World Bank and the EU EIA system and provides recommendations for improving the effectiveness of the national EIA system and strengthening the institutional capacity as needed.

134. **The methodology for conducting the institutional assessment included reviewing key documents and legislation, holding interviews, questionnaires, and follow-up with brainstorming sessions to draw up conclusions and recommendations**.

7.1 The Environment Context in Lebanon

135. **In understanding and trying to improve the environmental policies and institutions in Lebanon it will be useful to take into consideration the following realities**:

a) **Political economy**. As in all sectors, environment is not immune to the political dynamics prevailing in Lebanon, though it was supposed to be less vulnerable and politically neutral. There is a general consensus among all parties and confessions that environmental protection and preservation in Lebanon is crucial to its economic growth. However, when it comes to the ownership or management of natural assets and resources (water, coastal areas and land), special interest groups prevail and preempt or delay the equitable use of these public goods.

b) **Decision-making process limited to the COM.** There is no effective mechanism, other than the COM, for coordinating the policy formulation processes. In all cases, environmental policy decisions are made at the highest levels of the government. The COM is the only political body capable to reach consensual decisions. Trade-offs form the crux of decision-making, and typically, environmental considerations carry less weight than social, economic, and political factors. When making decisions, those responsible rely upon the advice of their officials and advisors, whose views are likely to be shaped by their political mandates and responsibilities. The general receptivity of decision-making will also depend upon the perceived acceptance by other parties. In this regard, perseverance is needed to build up consensus on environment-related decisions over time, as this was witnessed in the case of the issuance of the Law establishing the MOE. The Parliamentary Committee for Environment, which was established in 2000, includes 12 parliamentarians as its permanent members. Although its role is advisory in nature, the Committee has held several debates on water, wastewater, and solid waste

[58] This Section builds on the: Lebanon CEA Institution Assessment Background Document (2010); Lebanon CEA ERS Background Document (2010); and CEA Aide Memoire (March, 2010).

management, calling on experts from different parties and affiliations, but falling short of providing parliamentary oversight on policy implementation.

c) **Private sector-led approach to environmental services**. There can be little doubt that the Lebanese private sector has played a major role in providing environmental services during the last 15 years. Project design, management, and supervision of national projects financed by the State budget and Development Partners through the CDR are all outsourced to the private sector. The MOE, as stated above, is outsourcing its project management of grants to individual consultants, private universities, and consulting firms. There is clear evidence that the private sector does possess the characteristics for continuing to provide effective environmental services; however, the lack of transparency and sometimes competition constitute a barrier to providing these services at efficient or reasonable costs.

7.2 Achievements

136. **Despite overall political instability, sluggish economic performance, and frequent ministerial changes, there have been substantial achievements in Lebanon's institutional and legal framework since the establishment of the first MOE in 1993 that are summarized below.**

137. **Lebanon has prepared a series of strategic documents that guided the environmental policies, highlighted in successive COM Policy Statements.** The Environment Strategy Framework (1996); SOER (1995 and 2002); the United Nations Johannesburg Summit Lebanon Country Profile (2002), and the draft NEAP (2006) have all articulated Lebanon's major environmental issues and challenges which were further exacerbated by weak policies and institutions and the inadequacy of governance structures. With the exception of the Lebanon Country Profile, none of the aforementioned environmental strategies or actions plans were fully endorsed by the Government. The strategic and priority activities proposed in these documents remained quite ambitious and did not take sufficiently into account the absorptive capacity and the fragmentation of local institutions. Nevertheless, the MOE has proposed the new vision that was used as a rationale of the Law 690 of 2005 for reorganizing the MOE (Box 7.1). The vision was based on the five major pillars: Sustainable Ecological Development, Protection through Prevention, Polluter Pays Principle, National Equitable Development, and Mainstreaming of Environmental Policy.

138. **In an effort to quantify the impacts resulting from these issues, the major environmental themes were anchored in a (macro) economic analysis of the cost of environmental degradation (COED) in 2004, its rapid update in 2010, as well as the cost of hostilities of the war of 2006 and the cost of coastal zone environmental degradation in northern Lebanon in 2009.** These analyses, which by nature—given assumptions, data and methodology limitations—produce only useful orders of magnitude of the true value of environmental damages and the benefits of remediation, have been instrumental in getting the environmental debate in Lebanon over the past eight years to focus on fundamental issues (such as wastewater, solid waste, land degradation, water quality), and to bring to the discussion table stakeholders of different persuasions, including ministries of Finance and Economy, Members of Parliament, the banking sector, the media, civil society, and agencies like the MOF, among

others. Today, COED is considered as a performance indicator for environment sustainability and is the most quoted among all other strategic documents.

Box 7.1: The Ministry of Environment Policies and Strategy

The MOE prerogatives revolve along the following four general policy principles:

1. Regionally balanced development (*al inmaa' al moutawazen*);
2. Protection through prevention (*al himaya min khilal al wikaya*);
3. The Polluter pays principle; and
4. Integration of environmental policies into other sectoral development policies.

The MOE strategy builds on the four policy principles around the following objectives:

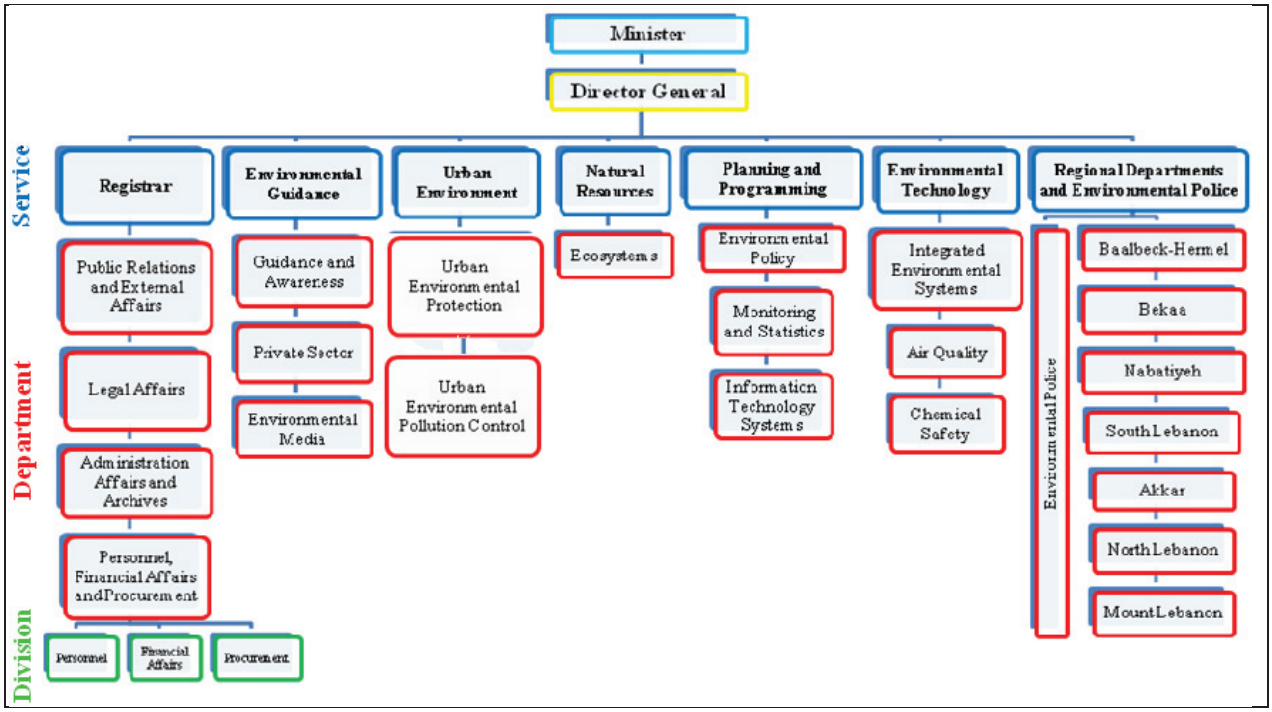
1. Strengthen decentralization in environmental management;
2. Reinvigorate the environmental legislative process at the national, regional and international levels;
3. Adopt scientific and practical guidelines in developing environmental policies, strategies, plans, and programs;
4. Develop specialized human resources in both the public and private sectors, and particularly at the MOE;
5. Establish a partnership with the public and private sectors, in particular educational institutions, media, civil society, and international organizations;
6. Promote institutional approaches to public administration activities;
7. Provide environmental guidance through extension and awareness raising, civil society empowerment, and the media; and
8. Plan and program for pro-active environmental management.

Source: SOER (2002).

139. **Lebanon has developed also a number of sectoral strategies, programs, and action plans in line with its global commitments,** such as: (a) The National Biodiversity Strategy and Action Plan (1998); the Work Plan for the Treatment of Hazardous Wastes in Lebanon (2001-2002); the National Implementation Plan for the management of Persistent Organic Pollutants (2003-2005); the National Action Plan for Protected Areas (2004-2005); and the National Plan for Quarries Rehabilitation (2005-2008). Prioritization across the different issues included in the strategies and action plans remains yet to be worked out.

140. **The MOE developed opportunities and strengths that enhanced its ability to assess environmental needs, setting strategies and action plans, and implementing/supervising national and regional projects and program.** The MOE was reorganized in 2005 (Figure 7.1), and its staff was increased to 54 technical staff, supplemented by another 23 contracting employees. Such increase in the number of personnel was accompanied by a diversification of the specializations in environmental management, health, economics, and environmental law. In accordance with the recent MOE organizational decree 2275 that was issued in 15/06/2009, it is expected that the number of MOE personnel should be increased to a total number of 182, of which 23 will be joining the Ministry in the year 2010-2011. The new organizational chart included services such as the service of planning and programming that include the department of environmental policies and the observatory of environmental statistics, institutionalizing the unit of policy and planning financed by METAP and the Lebanese Environment and Development Observatory (LEDO) which was financed by the EC-life third countries. The chart also included a new private sector department as well as a service of Regional Departments and Environmental Police. These services, which are not yet operational, are supposed to create regional environmental departments in seven governorates and is expected to improve the environmental management at sub-national level.

Figure 7.1: Organizational Structure of MOE as Per Law 690/2005 and Decree 2275/2009



Source: Authors.

141. **Lebanon also has capacity on environment outside the MOE.** A growing number of sector ministries, research centers, universities, and consulting firms have been instrumental in promoting environmental concerns in Lebanon. The National Council for Scientific Research (NCSR) is the umbrella public research institution in Lebanon with advisory and executive functions on national science policy including the environment and policy program in environment. The Industrial Research Institute under the Ministry of Industry and its Lebanese Cleaner Production Center is providing assistance to SMEs to improve their competiveness which is based on their ability to use cleaner technology in addition to offering quality products at competitive prices (IRI, 2009). Eleven major universities[59] offer an environment or environment-related curriculum and perform research. Twenty-two national consulting firms are registered at CDR; these have sharpened their environmental knowledge over the years and were involved in a large spectrum of environmental activities from training to evaluation.

142. **Lebanon has achieved improvements in its environmental legal framework mainly** through: the enactment of the Framework law for the Protection of Environment 444 (2002), the health care waste management decree, the yet-to-be enacted EIA decree developed with the assistance of the World Bank/Mediterranean Environmental Technical Assistance Program (METAP) and several environmental standards developed under Strengthening The Permitting & Auditing System for Industries (SPASI).[60] Based on a command and control approach, law 444 has included, in its article 4, the principles of the Rio Declaration on Environment and Development (1992) on public participation (principle 10), enacting effective environmental

[59] American University of Beirut, Université St Joseph, University of Balamand, University St Esprit de Kaslik, Notre Dame University, the Lebanese American University, American University of Technology, Beirut Arab University, Beirut University Online and Lebanese University.
[60] Financed under EC-Life Third countries Program.

standards (principle 11), compensation for pollution and environmental damage (principle 13), precautionary principle (principle 15), internalization of environmental costs (principle 16), and environmental impact assessment (principle 17). In addition, Law 690/2005, and the decree 2275/2009, enabled the reorganization of the MOE functions and the introduction of the provisions to create an environment police that would allow enforcing environmental law and penalizing contraveners. Law No. 444/2002 calls for 25 decrees to be implemented, including the Environment Impact Assessment decree, which has not been enacted yet. Lebanon has also signed more international agreements on environmental issues than in any other countries in the MNA countries and ranked second in signing regional conventions, reflecting Lebanon keen interest in joining the world community on environmental matters.[61] Lebanon is also the first MNA country to have prepared a draft decree on strategic environmental assessment which is still under examination.

143. **Lebanon is the only country in the MNA countries that has analyzed comprehensively its environmental legislations through its SELDAS** (*Strengthening the Environmental Legislation Development and Application System in Lebanon).*[62] The SELDAS assessment highlighted problems related to clear property rights, a lack of coherence in the texts, overlapping functions, and uneven/antiquated safeguarding processes in the areas of planning, policy regulation, application, management (of financial issues such as the granting of permits), and enforcement (in the form of penalties) for most public as well as private activities. SELDAS assessed the current environmental legislative framework from 1913 up till 2003 by linking sectors (land use, construction, industry, transport, energy and tourism) with each transmission medium (air, water, and soil), and other environmental categories (noise, biodiversity, and global externalities) to gauge legislative and institutional gaps as well as overlaps (see below).[63] SELDAS also suggested improvements to greening all legal texts including new or revised ones being drafted, proved invaluable for the current analysis of laws governing various economic activities, and enhanced the capacity of the judiciary system in environmental legislation. Yet, the Parliamentarian Committee for Environment has not considered the SELDAS as a road map for legislative change.

144. **Complementary to these important activities is a joint World Bank-UNDP-Ministry of Justice *Supporting the Judiciary System in the Enforcement of Environmental Legislation*** (SEEL, 2007-10)[64] project aimed to review and put online 400 environmental jurisprudence cases that would enable the Judiciary to enforce the environmental protection law, provide cross-country comparative analyses and good practice, raise awareness as well as build environmental judicial capacity. SEEL has issued an excellent book on the "Environment Situation in the Lebanese Courts of Justice."

145. **Lebanon also has a vibrant civil society that supports environmental protection**. Environmental activism in Lebanon started to burgeon at the grassroots level, noting that the State was absent at that time. This environmental activism was accompanied by the spread of environmental awareness and the establishment of environmental programs and degrees at universities, the emergence of environmental topics in Lebanese newspapers, and emergence of

[61] Djoundourian (2007).
[62] Financed under EC-Life Third countries Program.
[63] METAP (2009).
[64] Financed by the World Bank and the UNDP Development Grant Fund.

two green parties' post in 2006. There are currently around 450 NGOs with environmental objectives, the highest in MNA, compared to Tunisia with 160 NGOs, Egypt with 120 NGOs, and Jordan with 18 NGOs. Most of these NGOs are small; however, many have worked towards raising environmental awareness, mobilizing funds and providing technical assistance to communities, and to the protection on natural sites. NGOs have also contributed to influencing policy making, especially in the protection of natural sites (such as Tannourine) and forests. NGOs are part of several committees and councils such as the protected areas committees, the small grants program's committee, and the higher council for wild hunting. Though positive, any such relationship with NGOs should be institutionalized in order to ensure its sustainability.

146. **Aside from environmental NGOs, there are a strong media and two green political parties in Lebanon:** The daily newspapers such as *Al Anwar, Al Balad,* the *Daily Star, Al Akhbar, Al Kifah al Arabi, Al Mustakbal, An Nahar, As Safir, and L'Orient le Jour* as well as magazines such as the *Commerce du Levant* regularly publish articles pertaining to environmental issues. The most prominent topics are water, pollution, biodiversity, and quarries. Local TV, radios, and the blogosphere have also reporting and educational programs, and there is an environment and development magazine *Al-Bia wal-Tanmia*. This pan-Arab magazine is distributed to all school libraries in Lebanon, and students participate in the contests that it organizes. The Lebanese environment party[65] was established in 2006 with more than 50 activists, and the Green party was established in 2008.[66] These parties are not yet represented in the Parliament, and their activities are mainly focusing on advocacy and lobbying to influence policy, situation analysis, and awareness raising.

147. **In parallel, there has been also some success in implementing a number of national programs and projects that had an impact on the quality life of the Lebanese people.** To cite only a few, the Government decision to provide substantial investments since 1996 for addressing municipal waste collection and disposal in Greater Beirut has led, despite its prohibitive cost (see Chapter 4), to a Clean Capital City. Municipal waste collection has also substantially improved in urban and rural areas, reaching a collection rate of 100 percent and 99 percent, respectively, the highest rates among the MNA countries. The banning in 2002 of lead in gasoline as well as the use of diesel in taxis have substantially improved the air quality in Lebanese cities and resulted in the decrease of the cost of degradation due to air pollution by 0.3 percent of GDP. The cleaning up of the oil spills as a result of the hostility of 2006 has enabled several beaches to reopen for access to ordinary citizens. Managing such a disaster under the war, with a very committed and capable staff, was a real breakthrough. The national reforestation program of 584 hectares in 51 municipalities has contributed to the greening of mountain hills through a five-year LP 25 billion (US$ 16.7 million) reforestation program financed by the Government.[67] Forging partnerships of NGOs and Universities with the MOE through the Government Appointed Committees enables the management and preservation of Lebanon's 6 (Bentael, Tannourine Cedars, Tyre, Ehden's forest, Palms Island and Chouf Cedars) out of 8 natural reserves.

148. **Development partners played a major role in providing technical and financial assistance to Lebanon to meet its environmental challenges**. Lebanon was assisted by 20

[65] Homestead website: <www.lep.homestead.com/lepeng.html>
[66] Green Party website: <www.greenpartylebanon.org/default_en.aspx#>
[67] MOE website: <www.moe.gov.lb/Reforestation/Pages/National%20Reforestation%20Plan.aspx>.

international organizations to move its environmental agenda forward. Of these organizations, eight were bilateral and included: Canada (CIDA and IDRC), France (AfD and French Cooperation), Germany (GIZ and KfW), Italy, Japan (JBIC), Norway, Spain, and the USA (USAID). The twelve multilaterals included: the Economic and Social Commission of West Asia (ESCWA), the European Investment Bank, the European Union (EC –Life and EC SMAP), the Food and Agricultural Organization (FAO), the Global Environmental Facility (GEF), the Mediterranean Action Plan (MAP), the Mediterranean Environmental Technical Assistance Program (METAP), the United Nations Development Program (UNDP), the United Nations Environment Program (UNEP), the United Nations Industrial Development Organization, the Ozone Multilateral Fund, and the World Bank. The most active partners to date are GIZ, the EU, GEF, the Italian Cooperation, UNDP, and the Ozone Multilateral Fund.

149. **With a level of assistance estimated at US$ 595.4 million over the 1999-2008 period at 2008 prices for water, wastewater, and waste, the Development Partners succeeded not only in putting the issue of environment on the GOL policy agenda, but in building the environmental infrastructure at the national level, as well as at the local level in the Mohafazat**. They have stimulated the participation of NGOs and local communities in addressing and solving their environmental issues. Without the injection of technical assistance, capacity building, and equipment, the environment-related agencies would not be now in a position to carry out their present functions of environmental management.

7.3 The Challenges

150. **In spite of these significant strides, considerable challenges remain.**

151. **Priority Settings.** Each of the 11 Ministers of the Environment had his own agenda and priorities. However, the GOL environmental priorities were reflected in the different COM statements for votes of confidence in the Parliament. A rapid review (Annex IV) indicated intentions of successive governments to establish a national environmental policy and action plans,[68] to mainstreaming environment in all sectors,[69] and to seek to achieve sustainable development, intra-generational equity, and integration of environmental principles in the policies and programs of all sectors.[70] None of these intentions were translated into actions that could be monitored and assessed.

152. **The policy statement of the National Unity Government sworn in November 2009 has identified environment among the eight priority focus areas.** The Government established its program "Progress and Development" (ESP) as a cornerstone for its policy statement to Parliament; it reflects a strong will to put Lebanon back on a steady and sustainable political and economic growth path through inter alia "improving the quality of Lebanese life through better safeguarding the environment" and "the need to pay special attention to the challenges posed by environmental degradation.[71] The Government envisages actions to encourage the use of clean energy and renewable energy, along with adopting sustainable management policies for solid waste, wastewater, water, and reforestation programs. In this

[68] Council of Ministers statement, No. 4 of December 4, 1998.
[69] Council of Ministers statement, Decree No. 4336 of 26 October 2000 and Decree No. 14953 of July 19, 2005.
[70] Council of Ministers statement, Decree No. 18 of July 11, 2008.
[71] World Bank (2010a).

regard the MOE has translated the Government statement into an ambitious 3-year program (2010-2012)[72], consisting of 10 themes with a total of 50 specific actions to be implemented in collaboration with sector ministries, public and private sectors, and civil society. In theme number 10, the MOE is committed to prepare the SOER (which already was initiated) as well as the sustainable development strategy and/or National Environmental Action Plan linked to the European Neighborhood Policy, the World Bank's CEA, and the Arab Environment Facility. It is quite remarkable that, despite past experience, Lebanon is nevertheless devoting extensive efforts to the issue of environmental sustainability while preparing its new economic reform program. However, based on past performance, it would be desirable to focus on an action plan, underscoring sustainable management policies in solid waste, wastewater, water, and reforestation programs that would have the highest demonstrable environment impact and for which a favorable enabling environment is put in place.

153. **Coordination and integration of sectoral policies**. Qualitative and quantitative assessments of impacts on the environment and natural resources are not generally well documented at a technical level. But "softer" (social and economic) fields such as the identification of financial instruments, capacity for analysis (perspective, cost-benefit, social and environmental studies, etc.), and public participation in the development, implementation, and monitoring of sectoral policies are weak. This "two-speed" progress should be a good indicator of what still needs to be done to reach sustainable development goals in Lebanon. The institutional and political framework should be modified so that it can adapt rapidly to the needs of a new period characterized by: (a) a competitive job-generating economy in which the private sector plays a principal role; (b) the initiation of the use of economic instruments as incentives, such as the ones that are being sponsored by the Banque du Liban and Kafalat for green development and SME respectively (see ERS section); (c) better definition of functions and responsibilities of the major institutes and research centers to reduce the high level of fragmentation; and (d) an increased role for municipalities, other local organizations, and civil society in the management of environmental problems, each at the appropriate level. The 10 themes proposed in the MOE program provide actions for mainstreaming environment into all major sectors of the economy. They are therefore ambitious in terms of scope and achievability and especially in terms of the proposed level of financing required. It would be advisable to have a "demand pull" rather a "supply push" strategy and concentrate primarily on a shorter work program of the government priorities, which municipalities, local leaders, and communities are capable to implement with technical and financial assistance from sector ministries and the environmental oversight from the MOE.

154. Law 444 in article 4 calls for the establishment of a 14-member National Environmental Council (NEC) which was not enacted yet by a decree from the COM. The NEC is required to recommend specifying the environmental objectives and priorities, evaluate the environmental results for every activity, coordinate the orientations of the institutions, administrations, and ministries concerned with the protection of environment and recommend the amendment of amending laws, regulations, specifications, criteria, and national quality measurements, related to environment protection.

155. **Experience of several higher committees such as the Industrial Licensing Committee, the Higher Council for Wild Hunting, Higher Council of Urban Planning, and**

[72] MOE website: <www.moe.gov.lb> accessed January 10, 2010.

National Council for Quarries showed that they have been set up to overcome overlapping, bridge institutional gaps, and increase coordination between stakeholders. However, the efficiency of such committees is compromised by the lack of institutional backing at the Government's highest hierarchical level, which allows for political interference. In order to avoid this, the NEC should be established at the highest level, supported by representatives of all parties and affiliations, and backed by an institution with intellectual leadership that would provide impartial studies and recommendations.

156. **Institutional Sustainability of the Ministry of the Environment**. Although the MOE organization chart covers the major functions of environmental management at the national and sub-national levels, it is highly optimistic that 54 technical staff, which will be supplemented by another 23 contracted staff, could fulfill all the services needed. Some departments or services consist of 1-2 staff involved in other departments and services. The MOE is and would remain clearly understaffed if it is expected to perform all the functions in the organizational chart. Its budget of US$ 2.0 million is the lowest among ministries and covers administrative expenses, leaving minimal resources to fund programs and projects. This has resulted in the MOE relying almost entirely on grants from Development Partners which, on many occasions, have driven their own agenda and priorities rather than the national development priorities. Since the amount of grants reached an average of US$ 2.4 million per year and exceeded the MOE budget, the MOE has to outsource contract management of these grants to individual consultants, consulting firm, and universities.

157. **Weak enforcement and monitoring regime:** The record in Lebanon for implementing and enforcing environmental laws is not very good. With limited exceptions, violations of environment-related laws went undetected, and requirements went often unendorsed, especially with public and private sector pollution. Article 43 of Law 444 requires the MOE "to take the necessary measures to protect the environment on the exploiter's expense" and to fix through a decree, that was not yet issued, "the criteria to each category of establishments as well as the conditions of stopping, closing, or striking off each establishment whenever it constitutes a danger on the environment which cannot be avoided by taking the measures provided for in this Law." Although self-monitoring and auto control are being required in article 42, these are not applied, with the exception of monitoring air emissions from cement industries and the treatment of infectious medical waste. Article 53 related to the provision of an insurance policy against all risks threatening the environment by "every person exploiting a classified institution or using chemical products, harmful and/or dangerous is not being applied or monitored". Penalties of infringement in accordance to the law (article s59-62) include one month to one year in prison and a fine ranging between LP 2.0 million (US$ 1,400) to 10 million (US$ 7,000) but are not being applied. It is expected that the European Union will allocate 8 million Euro in 2012 to strengthen the environment management capacity of the MOE.

158. **The main impediments to effective and meaningful implementation and enforcement of environmental and environment-related laws are due to the fragmentation among regulatory institutions, licensing agencies, police authorities, etc., at both the national and local levels of government, to the effect that no single institution can take enforcement actions effectively.** At MOE, for example, there are only 12 inspectors that perform thematic and spot check inspections with limited equipment and instrumentation. This lack of human resources and fragmentation of responsibilities necessitate the strengthening of monitoring and enforcement as a first institutional priority and ahigher degree of inter-agency

coordination for effective management; yet, few formal mechanisms for such coordination exist. In its 2008 statement, the Government has committed itself to moving towards the creation of the environmental police (which was not yet established) for better enforcement of laws and regulations and the dismantling of power relations.

159. **Specific thematic and environmental issues which are not adequately addressed include:**

a) **Lack of poverty-environment linkages.** As shown in the cost of environmental degradation (which is an expression of welfare loss of current and future generations), there is no clear attention to poverty–environment linkages in the allocations of resources, although there are significant disparities in regional poverty levels.

b) **Disconnect between development and environmental priorities.** The review of environmental expenditures showed that Lebanon has allocated substantial investments of **US$ 199.2 million per year over the 1999-2008 period at 2008 prices** of its budgetary and cofinancing resources for financing environment-related projects, equivalent **to 0.8 percent** of GDP. The expenditures in terms of percentage of GDP are higher than many countries in MNA; however, in looking at the details of these expenditures of the major institutions involved in the environment as shown in the previous chapter, it appears that there is a disconnect between environmental priorities set forth in the draft NEAP and COED and development priorities of the Government, undermining therefore the importance of mainstreaming the environment in the productive sector of the economy. The MOE, for example, has been opportunistic in implementing projects related primarily to meet Lebanon's commitment to global environment (ODS, Biodiversity, POPs), totaling US$ 16 million during the last ten years rather than implementing projects that focus on projects that would reduce water (for which no funds were allocated) or air pollution (US$ 1.34 million), since grant funding were mostly available for meeting the global changes. In CDR, the cost of outsourcing SWM O&M (US$ 126 million in ten years) was over 50 percent higher than the water and wastewater O&M combined (US$ 78.3 million and US$ 6.0 million, respectively). This questions the optimization of allocation efficiency, especially when the other environmental categories water and air, which top the rankings of both NEAP and COED methods, are taken into consideration.

c) **Institutional complexity of land and coastal management resources**. Except for zoning, there is no other regulatory instrument for land use management in Lebanon, and the unchecked urban sprawl is persisting. Agricultural land is not designated as such and could be coveted by land and real estate speculators. The National Physical Master Plan of the Lebanese Territories (NPMPLT), which was endorsed by the COM in 2009, has not been implemented yet. The reconstruction boom has exacerbated the quarry environmental disaster, which has been a persistent issue since 1996. Due to institutional fragmentation of the sector and poor institutional safeguarding, only a single quarry was rehabilitated according to acceptable standards after the end of the site exploitation contract. Violations of the public maritime domain are extensive along the coastal zone with resorts and beaches infringing upon the public maritime domain dating back to the civil war period and preventing public access. The coast is home to more than 87 percent of the Lebanese population and is

the site of many polluting industries. It is also regressing as a result of landfilling and dredging, especially in Greater Beirut. At the same time, the coast is a source of financial revenues, with more than one million tourists per year. The major concern is the protection and management of the coastal environment, whose fragility and degradation are the direct consequences of absence of law enforcement and incomplete control of the effects of increasing urbanization in coastal agglomerations.

7.4 The EIA system in Lebanon

160. **The legal basis for EIA and its 9 annexes is established in the Environmental Law no. 444/2002 and Law no. 690/2005.** It is being implemented even though the EIA application decree has not been issued by the COM as yet. The draft EIA and its annexes require that the project proponent hires a national consulting firm among the pre-qualified consulting firms of CDR (MOE decree No. 7/1 of 2003) to prepare either an EIA report or an Initial Environmental Examination (IEE) report. The law and the decree also assign full authority to the MOE through its service of Environmental Technology to arrange for screening, review, control, and follow-up of the EIA process and its implementation. The approval of an EIA is a pre-requisite for any subsequent license or permit by any or all other relevant authorities that may be required prior to construction. All development projects, regardless of EIA classification, must adhere the environment quality standards for air, water, and soil (MOE ministerial decision 52/1 of 1996) as well as air emission standards and wastewater discharge (MOE ministerial decision No 8/1 of 2001). The essential elements of the Lebanese draft EIA procedures are summarized in Table 7.1.

Table 7.1: Lebanon Draft EIA Procedures

Stage	Activity
Initial Filing and Screening	-The Project Proponent completes a Project Screening Form (PSF) of the intended project in accordance to Annex 4 of the EIA decree and submits it the Ministry of the Environment for screening. Screening is made through the Service of Environmental Technology based on significance/severity of impacts determined as a function of impacts magnitude, type, nature, extent, timing, duration, likelihood and reversibility as per the EIA Decree. The service determines if the project is among: 1. Annex I projects for which an EIA report is required 2. Annex II projects for which an Initial Environment Examination is only required 3. No further Environment Analysis is required. Duration of the MOE response is 12 working days
Scoping	-Scoping is required for projects in Annex I and the EIA report - The proponent is required to inform the stakeholders, concerned ministries and NGO of the preparation of an EIA report and the municipality should post on her bulletin board, an announcement to that effect during 18 working days and requesting comments from the public (article 7 section 30). Also MOE could also receive comments from the public or stakeholders during 25 days (article 7 section 4). -The project proponent is required to submit a report on any EIA consultations and meetings with stakeholders (article 7 section 5). - The scoping report is available for consultation at the MOE by the public or by the concerned institutions (article 7 section 9).

Stage	Activity
Technical Evaluation	A technical committee comprised of 3 to 5 members of various background and expertise from the different services of the MOE is responsible for the review of the EIA and IEE studies. If need be, experts not available at the MOE can be subcontracted to assist with the review of the EIA studies. The technical committee used the methodology described the "MNA Guide for the Preparation and Review of EA reports of the World Bank" is being used under section 4 part B "reviewing EA reports."[73] The methodology is based on 'Review Checklists' with corresponding scores (A-F). A total score of C is considered to be satisfactory despite omissions and/or adequacies.
Decision and Approval	-The Minister reviews the Committee's report and notifies its decision to the Proponent and publishes it within 50 working days. This decision is transmitted to the concerned institutions and should be published on the municipality bulletin board during 12 working days. The decision could be acceptance of the EIA report, conditional acceptance and rejection. In case of conditional acceptance or rejection, objections and complaints from the proponent can be submitted to the MOE within 12 days from the announcement of its decision and a reply should be provided within 12 days from receiving the complaints. -In case the objection is related to a public or private project that has been approved without it being subject to an EIA or an IEE although it requires such a study, article 77 of the Council of State by-laws applies. -In case the objection is from a public authority against MOE decisions of screening, scoping and EIA approval, the COM will decide.
Monitoring	The Ministry of the Environment is required to follow up on the implementation of the Environment Management Plan and reporting the results of monitoring.
Disclosure of EIA	Section 12 of the draft EIA regulations states that the EIA and IEE available for examination at the MOE.
Penalties	Article 58 of the Environmental Protection Law 444 dates that Shall be punishable by imprisonment from one month to a year and to a fine ranging between LP 50.0 million (US$ 34,000) and LP 200.0 million (US$ 134,000) or either of these two sanctions, every person who (a) did not prepare an EIA or IEE; (b) implement a project contrary to the EIA or IEE approved by the MOE; (c) execute a project for which EIA/IEE is not required but is not conformed to the national standards; and/or (d) opposes or obstructs the measures of control, inspection and analysis provided in the environmental protection law.

Source: Annex V.

161. **In order to elevate the image of Lebanon in the international arena for environmental protection in general and for establishing a harmonized platform on EIA in particular to facilitate foreign direct investment and donor support, two mutually compatible assessments were undertaken**. The first one was to determine the similarities and differences between the national EIA system on one hand and the World Bank operational policy (OP 4.01) on environmental assessment and EIA guidelines in European Council Directive 97/11/EC, on the other. This was necessary in view of Lebanon's relationship with the EU, which requires several measures for harmonizing the national environmental management system with the one of the EU. The second assessment was a safeguard diagnostic review to assess the ability of the national EIA system to deliver the World Bank's requirements from the equivalence between the two systems (World Bank and Lebanon's EIA systems), and acceptability of the national EIA system to be applied on the ground. This assessment used the 11 operational principles approved by the World Bank Board of Directors in its Policy 4.0 for the

[73] Lee and Colley (1992).

use of country systems in EIA and in line with the Paris Declaration on Aid Effectiveness of March 2005.

162. **The comparison between the Lebanese draft EIA system and the system of the World Bank and the EC as detailed in Annex V used a set of 37 criteria under 8 sub-headings**. The results of the comparison showed that features of the Lebanese EIA system are compatible with the World Bank EA Policy (OP 4.01) and the European Commission (EC) EIA Regulations no. 97/11. These features are in: (i) screening; (ii) scoping; (iii) the EIA report content; (iv) the content of the environment management plan; (v) provisions for appeal; and (vi) requirements for monitoring and follow-up.

163. **The Lebanese EIA system was also analyzed and compared to that of the World Bank's 11 operational principles in its Policy 4.0 for the use of country systems.** The analysis showed:

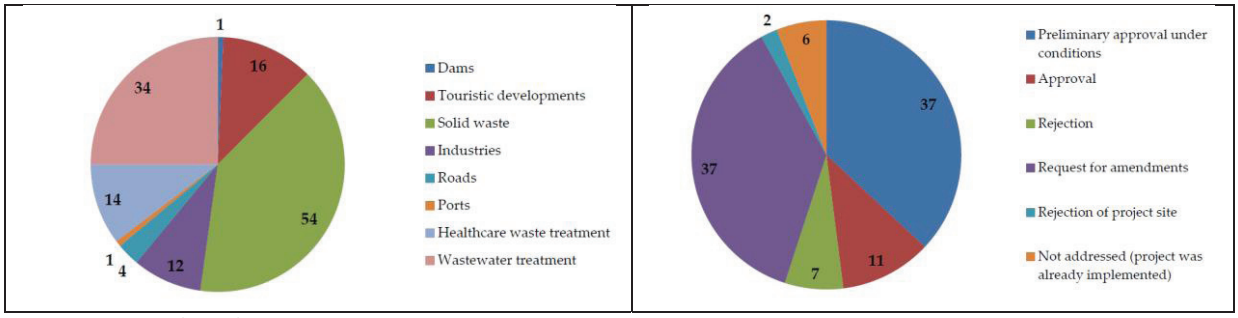
(1) Two significant gaps are the lack of standard TORs for specific sectors to be provided to the project proponent for the preparation of the EIA or IEE reports; and (b) the lack of disclosure of the EIA summary and Initial Environment Examination (IEE) to the public, as required by articles 13 and 14 of the Environment Protection Law.
(2) Three moderate gaps are: (a) consultation with stakeholders for infrastructure, irrigation /agriculture projects listed under Annex II (similar to category B projects in the World Bank guidelines); (b) explicit requirements in the draft environmental regulations that the cost of environmental measures should be included in the feasibility study of the project; and (c) National standards and guidelines do not explicitly reflect international good practice (such as the World Bank's Pollution Prevention and Abatement Handbook).

164. **The acceptability assessment showed that, despite the modest institutional and legal EIA infrastructure of the MOE, the quality of the EIA and IEE reports has substantially improved since enactment of the Law No. 444 and the Ministerial decisions 5/1 and 6/1 of 2002 regarding the procedures to be used for preparation and review of the EIA and IEE reports.** Since the EIA decree has not been issued, it is still not expected that a project proponent would conform to all the requirement of the EIA regulations and that MOE would improve the monitoring and enforcement of the EIA preparation and follow-up. Twenty staff serve as part-time environmental reviewers of the EIA and IEE reports, including team members from International Projects working at the MOE who also participate in the review process whenever necessary. The number of EIAs is quite limited. 136 EIA and IEE studies were prepared between 2001-2008 with a distribution as shown in Figure 7.2: 54 percent for solid waste, 34 percent for wastewater treatment, and 16 percent for touristic development. The review is quite thorough and is based on the WB/MNA guide for EIA review which is attached to the ministerial decisions 5/1 and 6/1; only 11 percent are approved and 37 percent are provided conditional approval as shown in Figure 7.2. However, there have been many instances in which MOE has requested additional information/examination based on the reviewer's general expertise rather than on requirements in standard Terms of References (TORs) or sectoral guidelines which are not available for large infrastructure projects (power plants, marinas, solid waste, wastewater, and water). The absence of a standard TOR is the weak link in the chain of the EIA preparation. The MOE, with METAP assistance, has prepared standard sectoral guidelines for wastewater, quarries, and marinas, but these were not officially used because they were not enacted by a

decision of the MOE. It is strongly recommended that these guidelines be issued as ministerial decisions and that sector guidelines and/or TORs be prepared for water and power plants.

165. **There are also 22 national consulting firms in accordance with the CDR General pre-qualification of Lebanese Consultants. However, only 5 of these firms pursue a full environmental consultation business rather a general engineering or multidisciplinary orientation.** Statistics by the Service of Environmental Technology show that out of the 136 EIA and IEE studies that have been submitted to the MOE during the past 8 years, the above-mentioned 5 environmental consultancy firms have prepared the EIA and IEE studies for for 65 percent of all the studies . Ministerial Decision number 7/1 of 2003 states that only Lebanese consultant companies, classified by the CDR, are allowed to conduct EIA or IEE studies. It is also important to note that, in very rare cases where foreign consultant companies are to take part in preparing an EIA or IEE study for some purpose, they may only do so in collaboration with a Lebanese one.

Figure 7.2: EIA per Sector and According to MOE Response, Percent



Source: MOE (2009).

166. **Monitoring and enforcement constitutes the weak chain in the EIA system. Article 11 (2) of the draft EIA states**: "The Ministry shall control the application of the environment management plan during the construction, operation and dismantling of the project". There have been cases in which the MOE established technical committees to follow up and monitor the implementation of the Environmental Management Plan (EMP) of 2 EIA studies, one being for the Construction of a Tourist Resort within the Arz El Shouf Natural Reserve, and one for the Construction of a Landfill within an Abandoned Quarry Site in the Sibline Area. Quality field reports were prepared and communicated to the concerned agencies. However, there is a lack of follow-up and implementation on the EMP for other sectors due to staff constraints, budget issues, and appropriate procedures for monitoring and follow-up on the EIA and IEE.

167. **The following actions are proposed to address the weaknesses (gaps) to achieve equivalence and acceptability for using the national EIA system for World Bank operations:**

- Issue the EIA decree.

- Develop EIA sector guidelines and generic TORs that will include the analysis of cumulative, indirect, trans-boundary, and global impacts, methods for public consultation, and the use of the World Bank Pollution Prevention Assessment Handbook

(PPAH). TORs should be developed first for the following sectors: solid waste, water and wastewater treatment, power plants, transport and industrial state, natural resources and biodiversity protection, quarries, marinas, and ports.

- Disclose the EIA and IEE reports after their approval on the MOE website based on the draft EIA decree.

- Require the project proponent after the EIA approval to: (a) submit to the MOE an environmental management plan (EMP); and (b) collaborate with a third party verification (to be contracted by MOE) for a spot check review of the EMP during construction, and an annual progress report during implementation.

- Improve compliance monitoring of the EIA and IEE reports through: (a) preparation of monitoring and follow-up manual for EMPs; (b) outsource to a national firm the inspection of large polluting industries as well as for monitoring the follow-up on the EMPs; and (c) develop a database on compliance status on: (i) EMP mitigating measures; (ii) implementation of agreed compliance actions; and (iii) actions taken against those who are not in compliance.

7.5 Conclusions and Recommendations

168. **Lebanon has made significant progress in strengthening up its institutional and legal infrastructure with the assistance from the international community**. However, the most important factor in managing the environment is a strong political will. This should be manifested not only by promulgated or documented statements but also by the performance record of the entire government to engage in environmental sustainability. Lebanon's commitment to sustainable development is documented in many government statements and vision. Such statements should, however, be translated into policy, institutional, and legal changes namely:

(a) **Increase inter-ministerial coordination on environmental sustainability** through the COM until a National Environment Council is formed at the highest level and backed by an institution with intellectual leadership.
(b) **Complement environmental strategies and national action plans** with a time-bound (2-3 years), realistic implementation program of 2-3 high impact priority sectors with potential for significant contributions to poverty outcomes. Particular attention should be given to understanding linkages between poverty and environment and the economic valuation of environmental externalities.
(c) **Delineate in the form of matrices, clear mandates and responsibilities** of selected environment-related institutions so that they could collectively focus their efforts on few priority sectors such as water, wastewater, solid waste management, and coastal zone management, that have an impact on the quality of life of Lebanese citizens and demonstrate economically sustainable results.
(d) **Strengthen and reinforce five major environmental functions** within MOE namely:

1) ***Policy and Planning*** by undertaking the appropriate policy and economic analyses based on costs and benefits, valuating the environmental implications of major economic and sectoral policies, and establishing performance indicators.
2) ***Environmental Assessment*** by addressing the weaknesses (gaps) to achieve equivalence and acceptability for using the Lebanese EIA system in projects, irrespective of their funding source, and use the EIA as a tool for environmental mainstreaming.
3) ***Monitoring and Enforcement*** by ensuring that polluting enterprises would comply with auto-control and self-monitoring as required by Law 444 and by outsourcing regular inspections to qualified laboratories or universities to enable the MOE take the necessary legal actions against polluters.
4) ***Decentralization to regional departments*** by piloting the establishment of 1-2 regional departments, nominating staff and provide training, and gradually transferring functions of coordination and monitoring activities.
5) ***Strengthen the private sector department in the service of environmental guidance*** by introducing environmental regulations that allow flexible market mechanisms to achieve environmental objectives and introduce good governance, increased transparency, and access to environmental information.

(e) **Expand the involvement of the private sector for environmental services in a transparent and competitive manner**. Priority should lie on a few "champion" sectors that are ready to move concurrently on catalyzing policy reform and leveraging private and public capital. The main criteria for the selection of sectors are: (i) where the results would be easiest to achieve; (ii) where there are financially feasible projects already available for attracting private capital; and (iii) where there can be partnerships and cost-sharing mechanisms between private and public capital, with possible support of development partners. With the right policies in place, the private sector should be able to invest or manage urban investments in the water, wastewater, solid waste, and reforestation.

Chapter 8: The Way Forward

169. **The aim of this chapter is to present the key points distilled from the CEA and propose selected priority recommendations to enhance short to medium (2 to 4 years) term overall effectiveness of Lebanon's environmental management across institutions (MOE or/and others) and environmental themes (single and cross-cutting).** The proposed priority recommendations are meant to represent the basis for discussion with the GOL and other stakeholders. However, the successful implementation of the recommendations will require the collaboration of all development partners in Lebanon; the World Bank intervention is meant to primarily have a catalytic effect. Nevertheless, since environmental sustainability requires a long-term, integrated approach, the major benefits will only accrue in the long run. In maintaining its commitment to sustainable development, the GOL must therefore develop a program that matches its ambitions and includes policy reforms and better targeted investments to reap sustainable outcomes.

8.1 Performance of Current Environmental Policies in Lebanon

170. Despite considerable progress in shaping its legal and institutional framework and providing substantial public funds for financing its infrastructure after the war, Lebanon is still at an early stage of its ***transition to sustainable development.*** An overview of Lebanon's performance towards sustainable development showed that:

- The intensive use of natural resources and the lack of addressing the environment-poverty nexus remain the weakest link in Lebanon, which is reflected in the $COED_{2005}$ results, especially in terms of water, coastal zones, and land use (quarries to supply construction materials) degradation that has increased in absolute terms as compared to the $COED_{2000}$. Moreover, the access of the poor to water and natural resources is increasingly being limited by the water and natural resource appropriation.
- Governance in terms of access to environmental information, community/stakeholders participation in the design and implementation of environmental services, and efficiency and transparency of public expenditures of environment-related expenditures is weak.
- There is still a disconnect between environmental and development priorities due primarily to: (a) successive governments that have not adopted any of the national environmental action plans/strategies prepared by the MOE in full consultation with stakeholders; and (b) except for the consensual decisions reached by the COM, there is still a lack of coordination in policy formulation across sectors for which environmental concerns carry less weight than political, economic, or social factors.
- The institutional framework needs to be streamlined, shared, and decentralized**.** New functions and responsibilities between the national and local government and civil society are important topics that many ministries individually or collectively should come to terms with. Coordinated actions between economic and sectoral ministries as well as local governments are irregular, but should be improved if inter-sectoral issues are to be resolved.
- There is still a strong emphasis on infrastructure development (water, roads and highways, construction on the costal zones, etc.) as a remediation for environmental problems, with less impressive progress on policy reforms. There are still implicit and

explicit subsidies in the water, wastewater, solid waste, and energy sectors that fluctuate with the price of oil, and there is almost no cost recovery in the wastewater and solid waste sectors.

- Large environment-related expenditures are leading to less impressive outcomes in terms of equity, efficiency, and effectiveness in the water, wastewater, and solid waste sectors. In the solid waste sectors, the bulk of investments and operations and maintenance expenditures are allocated in Beirut and Mount Lebanon (87 percent) to the detriment of other regions; and (ii) average yearly solid waste O&M expenditures were equivalent to water investments per year over the 1999-2008 period. In the water sector high water losses (40 percent) and the low continuity of supply (3 hours/day in the dry season) are still prevailing.
- Cost recovery for wastewater treatment and solid waste collection and treatment is quasi absent. The estimated cost for solid waste collection and disposal using the present CDR plan is US$ 75/ton/year or US$ 75 per household/year. The proposed wastewater tariff in the National Water, Wastewater and Irrigation Sector Strategy, to be introduced in 2011, is US$ 36.5/household/year, bringing the total water (to be increased to US$ 142 in 2011) and wastewater bill to US$ 178.5/household/year, or about US$ 15/month. This is equivalent to approximately 100-150 talking minutes on a mobile phone per month.

8.2 Priorities Emerging from the CEA

A. General Framework

171. The solutions aimed at remedying the constraints and limitations reflected above require first strong political will. This should be manifested not only by promulgated or documented statements but also by the performance record of the entire government to engage in policy reforms and improve governance and accountability that are considered the be cornerstones for Lebanon's transition to environmental sustainability. The CEA will limit its recommendations to three major pillars that focus on:

A. Strengthening environmental governance;
B. Managing environmental risks; and
C. Improving the programming and cost-efficiency and also maximizing the environmental benefits in the wastewater and solid waste sectors, with emphasis on poor areas.

172. The proposed recommendations under each pillar could be implemented within 2-4 years, subject to the political dynamics prevailing in Lebanon. The recommendations for each pillar are organized as a table below, indicating the timeframe (short or medium term) and the responsible entities at the central and local government levels.

B. Strengthening Environmental Governance

173. Lebanon has a vibrant private sector, civil society, and active NGOs which form the backbone of governance improvement. Experience in Lebanon (e.g. Municipal Development Project) showed that, when projects are implemented at the local level and with the collaboration of the community, it led to long-lasting results. Building bridges with NGOs, civil society, and the private sector will reinforce the bottom-up approach for environmental sustainability. So far,

many NGOs were vocal but not influential in changing behavior and policies. Unless both the civil society and NGOs take initiative and strengthen their advocacy role, limited progress will be achieved towards the transition to sustainable development. Civil society and academia should be able to advocate the importance of environment sustainability in Lebanon, rooted in proper valuation and accounting for natural resources and externalities, including health impacts and climate change.

174. The main objective of this pillar is to empower stakeholders and the civil society with the knowledge and tools necessary to play a more active and participatory role in environmental monitoring and governance. Under this major aim are the following specific objectives:

- Providing stakeholders and interest groups with tools that would enable them to be actively involved in decision-making, particularly in the wastewater and solid waste sector at the Mohafaza levels.
- Improving the level of public awareness on environmental issues in general and wastewater-related issues in particular, especially among rural women.
- Creating partnerships in development among policy makers, civil society, and local communities in ways that enhance their mutual trust and collaboration.
- Activating the role of media by developing accessible-to-locals media messages.
- Enhancing capacities of all concerned parties and equipping NGOs with tools and methodologies that would help them to effectively carry out awareness raising work.

C. Management of Environmental Risks

175. The CEA pointed out that problem of wastewater pollution, and to a lesser extent industrial pollution and solid waste, is prominent and visible, especially in the absence of strong monitoring and enforcement. This environment risk is likely to be further aggravated because of potential intensity and frequency of the effects of the natural disaster-climate change continuum (droughts, higher temperatures, forest fires, etc.) and the environment governance system. The climate change model projections for Lebanon suggest a more rapid warm-up than the global average and an annual reduction of precipitation, leading to less runoff, more evapotranspiration, and increased periods of drought.

176. The purpose of this pillar is to manage environmental risks by reducing environmental threats due to pollution and natural resources degradation and adapt to potential environmental perils due to climate change.

D. Improvement of the Programming and Cost-efficiency and also Maximizing the Environmental Benefits in the Wastewater and Solid Waste Sectors, with Emphasis on Poor Areas

177. The CEA provided a series of “cradle to grave” options based on cost-benefit analysis for the solid and wastewater management in Lebanon. The eleven options proposed for solid waste management investments were finalized after that the MOE, in collaboration with CDR, had submitted for the COM’s approval the revised solid waste management plan which calls for the selection of WTE notably in cities, though a number of institutional, legal, and financial constraints (described in the SWM chapter of the CEA) were not fully addressed. Also, the four options proposed for comprehensive wastewater management investments were not considered

by the MOEW, which is in the process of completing the water management plan to be submitted also for the COM's approval. Since both national plans for solid waste and water are not yet approved, it would be important that the options and recommendations be reconsidered again by the MOE, the MOEW, and CDR before a final decision is taken at the policy level.

178. The CEA also reflected on the disparity in terms of provision of wastewater services and solid waste collection and disposal services, the disproportionate expenditures of these investments in favor of Greater Beirut and secondary cities, and the uneven geographical distribution of these services, particularly in governorates where poverty is concentrated. There is a need to address issues of improved wastewater and solid waste management in terms of institutional and financing mechanisms, public expenditures, and cost-effectiveness. The main objective of this pillar is to strengthen solid waste and wastewater management planning and implementation and improve their service delivery with preference given to the poor areas of Lebanon.

Table 8.1: Recommended Actions, Time Frame, and Responsible Entities

Recommendation	Time Frame (Short term 1-3 years; Medium term 3-5 years)	Responsible Entities
A. Strengthening Environmental Governance		
Improving the environmental guidance service at the MOE for carrying out the collection, analysis, and dissemination of environmental information to the public and the media, particularly the disclosure of information on water and air quality, the EIA, and environmental audit reports.	Medium term	MOE
Strengthening/establishing environmental management units in sector ministries of Water and Energy, and Industry.	Short term for Ministry of Industry (MOI) Medium term for Ministry of Water and Energy (MOWE)	MOE, MOI MOE, MOWE
Starting the decentralization process at the MOE by establishing 1-2 regional departments with the primary objective of fostering community participation in designing and managing their own environmental plans and projects in solid waste, and sanitation services.	Short term	MOE and Cazas of Mount Lebanon and North Lebanon
Supporting the NGOs and the business community to organize and participate in consultations on all environmental assessments and provide access, through the Government and other channels, to environmental information, analyzing and publishing environmental data and trends, and using the media to provide facts and solutions on the major environmental issues, and organizing national campaigns.	Short term	MOE, NGOs
Strengthening the role of the media to improve environmental accountability and transparency. Such strengthening will be further enhanced by: (i) Developing a communication strategy and campaign to address the major environmental issues related to wastewater, solid waste, natural resources, and coastal zones; and (ii) Supporting the media and the press through training and technical support for developing an outreach and mobilization program for different audiences, such as the public at large, the decision makers and the investors, and regularly update the communication and the information based on actual facts.	Short term Medium term	MOE, NGOs, and media MOE and media

Recommendation	Time Frame (Short term 1-3 years; Medium term 3-5 years)	Responsible Entities
B. Managing of Environmental Risks		
Strengthen the Environmental Assessment System in Lebanon at two levels: (i) At the Policy and Program level by issuing, by the COM, the strategic environment assessment decree (SEA). (ii) At the Project level by issuing the EIA decree by the COM, and subsequently addressing the weaknesses (gaps), namely: (1) preparing sector guidelines for projects in water, wastewater, solid waste, and coastal zone and make them available to the public; (2) submitting all EIAs for public consultation; and (3) disclosing the EIA reports and results to the public through the MOE website.	Short term Short term	COM, MOE COM, MOE
Ratify the Barcelona Convention's Integrated Coastal Zone Management Protocol (2008) by Parliament to help curb the rapid urbanization of the coast due to the construction boom as it represents a serious risk of coastal zone degradation, especially those areas which are still untouched by development.	Medium term	COM, MOE, and Ministry of Public Works
Reinforce the monitoring, enforcement, and compliance system by: (a) Ensuring that polluting enterprises comply with auto-control and self-monitoring as required by Law 444; and (b) Outsourcing regular inspections to certified laboratories or universities to enable the MOE to take the necessary legal actions against polluters in conjunction with the Ministry of Health.	Short term, medium term Short term, medium term	MOE MOE, universities, and Ministries of Industry and Health
Design and implement an incentive system with national banks and financial institutions to award polluters that: (i) Mitigate negative impacts of point sources of pollution; (ii) Enhance positive impacts by using clean technologies; and (iii) Build an environment management system at the plant level that would entail reducing environment and social risks.	 Short term Short term Medium term	Ministry of Finance. Union of Lebanese Banks, Central Bank of Lebanon, Kefalat MOE, Union of Lebanese Industries,
Provide assistance to the Lebanese universities and research centers to develop a climate change action plan that assesses the impacts and vulnerability of climate	Medium term	MOE, Universities,

Recommendation	Time Frame (Short term 1-3 years; Medium term 3-5 years)	Responsible Entities
change in the water, agriculture, and infrastructure sectors on the basis of the UNDP/MOE study on climate risk, vulnerability, and adaptation assessment; and propose adequate measures to adapt to or mitigate climate change risks, and provide incentives to encourage green development.		National Center for Scientific Research
C. Improving the programming, and cost-efficiency and also maximizing the environmental benefits in the wastewater and solid waste sectors with emphasis on poor areas		
i. Solid waste management services		
Involve all stakeholders, including political parties and local leaders, to reach consensus and ensure transparency on the revised MOE plan and provide the opportunity to present also the cost-benefit analysis provided in the CEA.	Short term	MOE, Ministry of Interior and Municipalities, Ministry of Finance CDR
Focus first on addressing the institutional and legal framework related to solid waste management by selecting a model that can be adapted to Lebanon for planning and implementing the solid waste management at a national and local scale, and enacting in parallel the integrated solid waste management law.	Short term	MOE, Ministry of the Interior and municipalities, COM and Lebanese Parliament
Design and implement a gradual cost recovery for Beirut and Mount Lebanon, which are taking full advantage of solid waste services at the cost of the Lebanese Treasury, and consider subsidizing the solid waste treatment in the governorates where poverty is prevalent, namely in the Cazas of Akkar, Hermel, and West Bekaa.	Medium term	Ministry of Finance, MOE, Ministry of Interior and Municipalities , CDR
Establish two sanitary landfills based on the least-cost options proposed in the CEA for energy cells in two Cazas, such as in North and South Lebanon where poverty exists.	Medium term	CDR. Municipalities in North and South Lebanon
Proceed with a sustained awareness and education campaign to bring to public attention, accurate and reliable information, provide a forum for conflict resolution, increase public awareness, and suggest practical alternatives to waste minimization and disposal.	Short term	MOE, Ministry of Interior and Municipalities

Recommendation	Time Frame (Short term 1-3 years; Medium term 3-5 years)	Responsible Entities
ii. Wastewater management services		
Address shortcomings related to the strategy namely the definition of clear institutional responsibilities between RWE and municipalities and forms of cooperation and procedures as agreed by MOEW.	Short term	MOEW and RWE
Improve the wastewater chain (pre-treatment, treatment, and post-treatment) planning, coordination, and O&M, fostering community participation, and empowering the RWE in devising, financing, implementing, and overseeing such undertakings.	Short term	MOEW and RWE
Explore the opportunity cost of tertiary treatment in the light of the climate change-related effects on water resource availability in the future.	Medium term	Ministry of Finance, MOEW and CDR
Improve sanitation and wastewater treatment in rural and poor urban areas through the adoption of low-cost technologies and subsidized capital costs.	Medium term	Ministry of Finance, MOEW and Union of Municipalities
Revise the proposed wastewater tariffs to be introduced in 2011 by reflecting also the post-treatment costs and O&M of wastewater treatment plants.	Short term	Ministry of Finance, MOEW, Union of municipalities

8.3 A Proposed Role of Development Partners

179. The World Bank, in partnership with international donors and financing institutions, could provide assistance in implementing the recommendations of the CEA, provided that the Government takes the lead in proceeding with the policy and institutional reforms for reaching its environmental objectives related to economic growth. The possible options for such assistance are organized in the table below, including the time frame for implementation (short term 1-3 years or medium term 3-5 years).

Table 8.2: Options for Assistance with the Implementation

Assistance	Time Frame (Short or medium term)
A. Strengthening Environmental Governance: by focusing on mainstreaming the environment (including global environment, if and when applicable) with the aim of encouraging policy and institutional reforms	
Support the national environmental management system and build capacity to strengthen the EIA systems for environmental management to better manage current and future pollution. In addition to EIA, review and provide tools for environmental standards and regulations for wastewater reuse, solid waste management, zoning regulations in coastal areas, licensing systems, and compliance practices.	Short term
Provide expertise in environmental policies and assessment of costs and benefits, as well as in environment economics; offering technical support regarding the methods and means of integrating this aspect into sectoral development strategies and programs, and establishing a sound analytical base for informing decision-making for policy making and for investment decisions on projects and programs.	Short and medium term
Provide expertise to develop quantitative and qualitative methods, tools and techniques to improve environmental governance and strengthen cross-ministerial coordination and participation in policy making in the solid waste and wastewater sectors.	Medium term
Provide expertise to develop sustainable development indicators and core indicators of environmental governance related to the institutional reforms, policies, and regulations in the solid waste and wastewater sectors.	Medium term
Strengthen knowledge on assessing of impacts of climate change on water resources, and water and wastewater infrastructure as follow-on to the UNDP/MOE study on climate risks, vulnerability, and adaptation assessment. Strengthen the understanding of how to design climate-proof operations in the wastewater and solid waste sectors, to identify low-cost mitigation opportunities; facilitate analysis of alternatives; and formulate policies to adapt and identify innovative sources of financing.	Medium term
B. Management of Environmental Risks: particularly in reducing water, wastewater, and soil pollution that could adversely affect public health and/or the Lebanese ecosystem.	

Providing a Pollution Abatement Technical Assistance Activity that could subsequently be designed as a project. This activity will be designed to mitigate environmental risks due to pollution, increase the environmental performance in point sources/polluting enterprises, and introduce cleaner production and green investments. This will be achieved through an established market-based instrument, using the national banking sector, and through a combination of technical assistance as well as output-based aid intervention at the level of Small and Medium Enterprises (SMEs).	Short term
The reduction/elimination of Persistent Organic Pollutants (POPs) in Lebanon through a GEF project to strengthen the GOL technical and management capacity for minimizing exposure to POPs as well as ensuring the safe storage and disposal of obsolete PCBs.	Short term
The enhancement of the Operations Effectiveness in Lebanon by relying gradually on the national environmental impact assessment system after the enactment of the EIA decree. This enhancement will consist of: (i) Adopting a more efficient safeguard system based on upstream considerations in the planning of policies, programs, and projects and on predictable environmental guidelines for private sector development; and (ii) Testing (on a pilot basis) the simplification procedures in Lebanon by the harmonization of the national systems with the World Bank and EU policies in EA in the water, wastewater, and solid waste sectors.	Short term
The mobilization of concessional and innovative financing in managing and reducing environment and climate change risks, and bridging the gap between public expenditures and local resources generated from cost recovery in the solid waste and wastewater sectors.	Medium term
Help Lebanon access GEF-grants and Climate Change funds to cover incremental costs associated with green development in terms of climate change mitigation and adaptation.	Medium term
C. Improvement of the programming, and cost-efficiency and also maximizing the environmental benefits in the wastewater and solid waste sectors, with emphasis on poor areas	
Assist in the design and implementation of the institutional and legal framework for solid waste management and in the design of a fee for cost recovery, based on the options provided in the CEA.	Short term
Consider program support for the inducing the necessary institutional, legal, and technical reforms related to the solid waste sector.	Short term
Revisit the optimization of the investments and the tariffs to include post-wastewater treatment that will feed into the ongoing wastewater strategy of the MOEW.	Short term
Establish performance indicators for the monitoring of services delivery of solid waste and wastewater.	Medium term

8.4 General Conclusions

180. The success of implementing the CEA will require more than the proposed Bank assistance, which is quite modest compared to the magnitude and severity in the solid waste and wastewater sectors, public expenditures, and environmental management. Through the Bank's association in the CEA process, significant outcomes can be achieved, including: (a) an improved public expenditure efficiency and environmental governance, through better planning and priority setting of environment-related institutions based on sound cost-benefit analysis and participation of civil society; (b) lower environmental health risks through the development of activities for managing environmental risks; and (c) adopting a more efficient environmental assessment system based on upstream considerations in the planning of policies, programs, and projects and on predictable environmental guidelines for private sector development. Bank assistance would therefore continue to be a forward-looking program that would help build Lebanon's capacity to engaging in policy and institutional reforms to help achieve environmental sustainability.

ANNEX I: PUBLIC EXPENDITURE REVIEW FOR THE ENVIRONMENT METHODOLOGY

Table A1.1. PERE TORs and ERS Suggested Methodology

PERE TORs	Suggested Methodology
Survey available data and develop a methodology to estimate the volume and sectoral distribution of public expenditure for environmental protection in Lebanon over the last 10-15 years. The methodology should be based to the extent that data permit, on the conventions established within the UN System of Integrated Environmental and Economic Accounting (SEEA) 2003, and CEPA (2000). The methodology should: • Provide an acceptable definition of environmental protection activities, and explanation of how the adopted classification compares to the CEPA. • Present and analyze the categories that are common to both classifications and justify the differences between them. The similarities and differences between the classifications will be illustrated through a table/matrix. • Clearly identify the scope of the review, indicating the government entities covered at central and local levels and the share of the overall public budget covered by the review.	The SEEA system will require few years to be fully implemented in Lebanon by ESCWA. Moreover, it is clearly beyond the scope of this report to produce a PERE following the SEEA approach. Therefore, an environment-related spending (ERS) was retained. The $COED_{2000}$ exercise was able to set a preliminary baseline for environmental degradation and its possible future update could help decision makers assess the net effects of policies and investments on the environment. Nevertheless, the COED was not regionally-driven but rather nationally and the cost of remediation was "guestimated" and covers few sub-environmental categories: these two aspects make it difficult to adequately delve into (regional/social) equity and efficiency aspects when it comes to expenditures. Nevertheless, the ERS produces a rapid update of the COED to 2005, will adopt the COED categorization and a series of entry points, which has some bearing on the environment, to assess the expenditures and compare it to environmental degradation priorities. *Table A1.2. Alternative Classification Matrix by Environmental Category and Entry Point*, which builds on CEPA and RUM respectively, will be used as the alternative matrix for the ERS since the annual "flow" of natural resource degradation and/or depletion is inadequately monitored in Lebanon. However, protection activities will be spelled out when quantitative data and literature on the subject matter are available. Moreover, some entry points are similar to CEPA's and RUM's in *Table A1.2.* Main actors will be identified as a first step.
Collect data on the environmental protection expenditures of central government, municipalities, and independent institutions. Coordinate with the ongoing public expenditure review of the water sector activity currently undertaken by MNSSD: • Collect data from the MOE, MOF, BDL, private banks, Kafalat and the CDR on environmental protection expenditures linked to grants and loans. • To the extent possible, collect data on environmental protection expenditures incurred by the private sector on environmental protection activities / investments.	The method suggested for the ERS on the classification of environment-related expenditures is to gather and analyze budgetary spending (general budget, CDR, and when possible public entities like municipalities, water establishments, etc.) over the last 10 years. The method will also attempt when possible to determine pervasive spending (subsidies, etc.) or revenues (user fee, quarry fee, maritime domain violation penalties and compensations, etc.) that could have had a direct or indirect effect on the environment.
Examine the expenditures based on the agreed methodology for PERE, including the extent to which environmental expenditures are aligned with identified environmental priorities set forth on the cost of environment degradation study by the World Bank and in the draft National Environment Action Plan, and to which environmental revenues are re-assigned to environmental expenditures. Assess issues pertaining to resources flow between national and sub-national levels.	See Table A1.2. There are no environmental revenues per se, except very low entrance fee collected for certain protected areas (Chouf Cedar Forest). There are environment-related revenues as the GOL does not collect any green taxes.
Develop recommendations to better match the identified environmental priorities and the allocation of resources and to build in country capacity for follow up PERE reviews. Present the results as excel file and summary in word document.	See Table A1.2

Source: Lebanon CEA ERS Background Paper (2010).

Table A1.2. Alternative Classification Matrix by Environmental Category and Entry Point

Entry point	$COED_{2000}$ Environmental Category Ranking					
	1	2	3	4	5	6
	Water	**Air, Odor, Radiation, Noise & Vibration**	**Coastal Zones & Cultural Heritage**	**Land use, Soil & Wildlife**	**Natural Disasters & Global Environment**	**Solid Waste**
Legal and Institutional Framework and Environment Management Cross-cutting Role	Rapid overview of MOE legal texts and institutional actors and review of the upstream and downstream prevention process: from prevention to public complaints and environmental rights					
Policy, Strategy, Planning and Program	Policy and planning participation, current state and responsibilities					
Ministry of Environment Budget and Leveraging	Administrative budgets and development partner grants					
Research, Academia, Training and Awareness Activities	Field and funding when possible of these activities					
Investment, Intermediation and Guarantees (Central/Local-PPP)	Sector and region: Budget, CDR, Municipalities, micro-credit, etc.					
Analysis of GOL Environmental Priorities vs. Expenditures	Comparison of aggregate expenditures and COED/NEAP ranking					
Selected Good and Bad Practices	Public utilities cost recovery, subsidy, tax, fee, rights, etc.					
Recommendations	Recommendations in terms of equity, efficiency and effectiveness					

Source: Lebanon CEA ERS Background Paper (2010).

ANNEX II: WASTE TO ENERGY OPTION

1. In terms of the SWM hierarchy principles, recycling/composting is the first priority for managing solid wastes but in many cases, recycling is practically more costly than using first hand materials, therefore, the new priority in developed countries, especially European countries, after recycling, is the recovery of energy and metals by controlled combustion such as waste-to-energy (WTE) processes. The newest generation of WTE allows to: use waste as a *supposedly* clean renewable energy fuel to generate electricity (new generation with at least 30 percent efficiency); optimize land use by reducing the use for landfills (as low as 1 percent residual landfilling of total waste); maximize the use of recyclables by turning the waste into recycled-grade metal, gypsum and salt (iron, non ferrous, precious metals, limestone bricks and concrete for construction); and drastically reduce the carbon footprint (0.366 kg of CO_2/Kwh of electricity generated) when compared to power plants (0.594 kg of CO_2/Kwh) or landfill cells (1.037 kg of CO_2/Kwh). It is important to note that the plant should be located within a 500 meter radius away from inhabited areas. Moreover, the smoke depollution system usually accounts for 30 to 50 percent of the cost of a whole waste-to-energy unit and its operations and maintenance (O&M) account for about 40 percent with dioxin being the most dangerous and complicated compound to abate. Also, improperly considering *crude waste fuel* as a *renewable resource* could give the wrong signals when it comes to the 4 Rs hierarchy principles as the reduction and recycling principles could be negatively affected by the WTE as the latter relies on the generation of organic matter and especially on plastic and wood. The investment and O&M costs associated with the most recent Amsterdam AEB WTE were considered to derive the options for Lebanon because the figures were readily available.

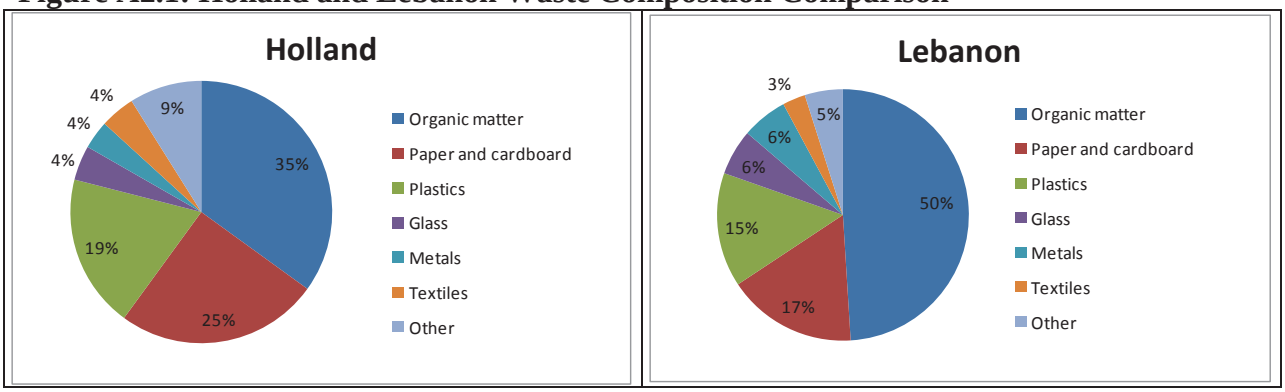
2. On the benefit side, cross-sector synergies could be explored as the wastewater sludge for the various wastewater treatment plants under construction in Lebanon could be used as crude waste fuel so are a number of residues from agro-industrial processes (excreta from cattle and chicken farms) including olive oil production residues (pomace). This will need further investigations: if feasible, the WTE would help forgo a number of planned investments for treatment of sludge, pomace, and possibly other hazardous and medical wastes. For instance, with a capacity of 3 ton/hour that transforms dry sewage into a third of its weight in ash, the Tripoli wastewater plant incinerator (Thermylis) required an investment cost of € 10 million in 2004 with an O&M contract of € 2.3 for 3 years.[74]

3. On the cost side, the investment cost of the Amsterdam AEB WTE remains unclear as prior investments were executed at the site before the most recent WTE was installed between 2004 and 2006 that complemented an existing WTE plant. Moreover, the investment does not include the cost of land as the Amsterdam AEB plant is owned by the municipality of Amsterdam. Yet, the stated electric efficiency is 30 percent, which compares quite favorably to oil (50 percent) and gas (55 percent) fired power plants whereas the installed capacity of 800,000 tons of waste per year had a price tag of € 400 million. However, the various Amsterdam AEB publications give a different waste capacity treated per year for the initial 800,000-ton-WTE to which is added some 75,000 tons of sludge, which suggests that the original capacity could be increased. For Lebanon's calculations, the 800,000 ton capacity with a € 400 million price tag was used as a base price with a gross O&M of about € 65-70 per ton processed although the

[74] Degremont website: www.degremont.com; and CDR (2009).

technology transfer will be a lengthy process as the plant O&M will require foreign managerial and engineering skills for a while. Only the electricity generation (US$ 0.109 per kW/h produced in 2009 prices) and the avoided CO_2 (a net of 0.671 kg of CO_2 per kW/h averted as compared to landfill emissions) were considered in the analysis. In other words, every ton of waste processed in the WTE could generate US$ 85 worth of electricity and benefit from about US$ 2 of carbon funding bringing a total of US$ 87 of extra revenues.[75] Although all the recyclables could also add significant value to the benefit flow, they were not however taken into account as they were not initially internalized in the 7 waste processing options. A number of social benefits could also accrue and could be taken into consideration in a full-fledge feasibility study such as the opportunity cost of land, real estate price differential with/without actual landfills (hedonic pricing method), etc.

Figure A2.1: Holland and Lebanon Waste Composition Comparison



Sources: World Bank Lebanon CEA ERS (2010); and AEB website: www.afvalenergiebedrijf.nl> as well as presentation in Lebanon, March 2010.

4. Three WTE capacity options were analyzed: 300,000, 900,000 and 1,200,000 tons per year. Initial capital costs are quite expensive as compared to other alternatives including incinerators: One x 900,000 and 3 x 300,000 ton capacity WTE that would cover the needs of Lebanon over the next 20 years would cost US$ 1.42 billion with a yearly O&M of US$ 102 million in 2009 prices. However, the sale of electricity[76] significantly reduces O&M when compared to the incinerator options whereas carbon funding is marginal (US$ 2.2 million per year on average). On the cost side, the figures include 10 percent VAT and 10 percent contingencies but no profit margin and depreciation are accounted for. Dependent on interest rate, the preliminary disposal cost varies between US$ 66-125 per ton (Table A2.1). Nevertheless, after performing a financial analysis, the average disposal fee based on a financial internal rate of return equal to 10 percent coupled with a positive net present value reaches about US$ 78 per ton for full capital and O&M cost recovery. The disposal of residual heavy ashes is included in the calculations and a 10 percent of the waste generation is assumed to be recycled upstream. All these figures are based on the hypothesis that Lebanon's waste mix will only need little calibration to reach optimal capacity (Figure A2.1).

[75] Based on US$ 0.1 kW/h and US$ 12.5 per ton of carbon.
[76] Benchmark of the combined-cycle natural gas cost is between US$ 0.07 and US$ 0.10 per kWh and a US$ 0.9 was used for the calculations. ACEEE website: <www.aceee.org>.

Table A2.1: WTE Investment and O&M Cost, US$ million in 2009 prices

Inv. /O&M Capacity	Invest. Cost US$ million	Average Financial Cost/year US$ million		Annual Operating Cost US$ million		Total Financial and Operating Cost US$ million		Revenues from sale of electr. US$ million	Net cost US$ million		Net cost US$ per ton of waste	
ton per year		5%	10%	5%	10%	5%	10%		5%	10%	5%	10%
300,000	258.5	24.1	31.0	42.1	42.1	66.2	73.1	23.0	-43.3	-50.2	-108.2	-125.4
900,000	646.3	60.3	77.6	74.6	74.6	134.9	152.1	68.9	-66.0	-83.3	-82.5	-104.1
1,200,000	825.0	77.0	99.0	94.4	94.4	171.4	193.4	91.8	-79.6	-101.6	-66.3	-84.7

*Sources: AEB website: **www.afvalenergiebedrijf.nl**> as well as presentation in Lebanon, March 2010; Lebanon CEA Cost of Mitigation Background Paper (2010).*

ANNEX III: WASTEWATER OPTIONS

1. The WWTP analysis builds on the GIZ report, a literature review as well as documents provided by CDR to derive the marginal cost of the treatment chain in Lebanon and try to determine the needs for about 20 percent of the population that requires improved sanitation coverage as well as derive the cost of increasing the treatment level: from pre-treatment to secondary for the Ghadir and Saida WWTPs and from secondary to tertiary for the 16 others.

2. Table A3.1 illustrates the wastewater chain marginal cost average results by region that could be extrapolated to determine the WWTP gap. Obviously, these results could be further refined but they give an order of magnitude to determine the number of options to improve the water resource and marine quality improvements. Still, some figures such as the BML population equivalent in 2030 suggest than the CDR planned capacity extends till 2040. Nevertheless, all the wastewater chain costs are denominated per m^3 discharged, except for the incinerator and outfall capital cost (fixed cost were converted back to cost/volume). Moreover, household connection costs to the network are not included in the analysis.

Table A3.1. Lebanon Wastewater Treatment Chain Marginal Dynamic Cost per US$/$m^3$

Region Average Cost/Volume of 18 WWTPs	BML	SL	NL	BB	Total
1. Population equivalent 2010-30 of the 18 WWTPs	3.6	0.7	0.8	0.4	5.5
2. Capacity of 18 WWPTs (million m^3/year)	200	46	51	19	316
3. Investment (US$ million) (18 treatment plants only)	325.5	61.8	119.4	76.0	793.1
4. Population equivalent 2030	3.7	1.3	1.5	1.0	7.6
5. Population to be connected (4 - 1)	0.0	0.6	0.7	0.6	1.9
6. Wastewater gap by 2030 in million m^3 (based on 175 liters/day)	11.2	111.4	122.0	110.5	355.2
GIZ Wastewater and Sewer Actual Cost/Volume $FIRR_{5\%}$ US$/$m^3$	0.78	0.95	0.99	1.54	0.89
Investment for 18 WWTPs	0.64	0.78	0.82	1.28	0.73
O&M for 18 WWTPs	0.14	0.17	0.18	0.26	0.16
Marginal Cost/Volume: $FIRR_{5\%}$ US$/$m^3$ in 2010 prices					
Sewer	0.81	1.41	1.00	1.47	0.93
Investment	0.67	1.21	0.84	1.27	0.80
O&M	0.14	0.20	0.16	0.20	0.13
Treatment Primary (pre-treatment)	0.36	0.27			0.33
Investment	0.19	0.10			0.16
O&M	0.17	0.17			0.17
Treatment Secondary (net of incinerator)	0.33	0.89	0.67	0.96	0.60
Investment	0.23	0.73	0.47	0.76	0.44
O&M	0.10	0.16	0.20	0.20	0.16
Treatment Tertiary	0.43	0.30	0.21	0.28	0.44
Investment	0.17	0.17	0.12	0.08	0.19
O&M	0.26	0.13	0.09	0.20	0.25
Outfall (fixed based on an average US$ 3 million)	0.01	0.01	0.01		0.01
Investment	0.01	0.01	0.01		0.01
O&M	0.00	0.00	0.00		0.00
Incinerator (fixed based on an average US$ 7.5 million)	0.05	0.05	0.05	0.05	0.05
Investment	0.03	0.03	0.03	0.03	0.03
O&M	0.02	0.02	0.02	0.02	0.02

Average Cost/Volume of 18 WWTPs	Region BML	SL	NL	BB	Total
Sludge Disposal (net of incinerator)	0.04	0.15	0.06	0.09	0.08
Investment	0.01	0.05	0.01	0.03	0.02
O&M	0.03	0.10	0.05	0.06	0.06
Water Reuse Benefits: 90% m^3 tertiary treated					
Valued at 1/2 the current subsidized tap tariff	0.19	0.19	0.19	0.19	0.19
Valued at 1/4 the current subsidized tap tariff	0.10	0.10	0.10	0.10	0.10

Source: Lebanon CEA Cost of Mitigation Background Paper (2010).

Table A3.2: Selected Option Costs to Improve the Wastewater Chain in Lebanon

Selected Options / Cost	Capital Cost over 20 years		Operating Cost per year		Full Cost Recovery for Investment and O&M per year based on FIRR	
	US$ million	US$/$m^3$	US$ million	US$/$m^3$	US$ million	US$/$m^3$
Upgrading Saida to secondary	14.00	0.75	2.66	0.15	16.66	0.90
Upgrading Ghadir to secondary	60.00	0.76	4.56	0.14	64.56	0.90
Incinerators for 2 coastal WWTPs by 2030	15.00	0.03	2.00	0.02	17.0	0.05
Total sludge disposal of 18 WWTPs	11.05	0.03	19.61	0.06	30.66	0.09
Sewer network coverage gap by 2030	269.40	0.80	56.69	0.13	326.09	0.93
Secondary treatment coverage gap by 2030	119.55	0.44	49.77	0.16	169.32	0.49
Outfalls for 2 coastal WWTPs by 2030	6.00	0.01	0.02	0.00	6.02	0.01
Sludge disposal gap by 2030	11.55	0.03	22.82	0.06	34.37	0.09
Upgrading 10 Coastal WWTPs to tertiary	44.69	0.09	61.04	0.10	105.73	0.19
Tertiary treatment coverage gap by 2030	31.03	0.07	30.94	0.09	61.97	0.16

Note: Except for sludge incineration cost that is included in the 18 WWTPs, the disposal of sludge is not. Treatment coverage gap for tertiary includes the cumulative secondary and tertiary treatment cost. The World Bank GDP/capita is estimated at US$ 8,156 in 2009. The incinerator and outfall costs are based on constructed ones.
Source: Lebanon CEA Cost of Mitigation Background Paper (2010).

ANNEX IV: CABINET STATEMENTS

Table A4.1. Environment in the different Council of Ministers' Statements for the Vote of Confidence in Parliament since 1998

Council of Ministers (Period, Decree)	***Environmental Statement***	***Accomplishments***
4/12/1998-26/10/2000 Decree No. 4 dated 4/12/1998	- Setting a national environmental policy based on the cooperation between the public and private sectors.	- Environment strategy framework prepared but not adopted by the COM. - Laws of protected areas (Tannourine, Bentael and Yammouneh) - Law No. 221 dated May 21, 2000 (Organization of the water sector) corrected by Law No. 241 dated 7/8/2000.
	- Developing a plan of action depending on a scale of priorities.	- Action plan prepared and submitted to the parliament.
	- Finding a mechanism for coordination between different public institutions and municipalities concerning the decisions and projects with environmental impact.	- Started drafting the EIA decree and training municipalities.
26/10/2000-17/4/2003 Decree No. 4336 dated 26/10/2000	- Setting a modern management system for water and rationalization of its use, and the cooperation with the Ministry of Environment for this purpose. - Setting a strategy to valorize water and benefit from it through: - Conservation of groundwater and its protection from pollution. - Establishing projects for the use of surface water such as dams, lakes, and completing the Litani River project and its implementation in the best way, as part of protocols for the transfer facilitator held with friendly countries and institutions. - Developing a plan to expand and upgrade water networks in the framework of cooperation with the private sector to provide water to all areas and neighborhoods of Lebanon.	- Law No. 377 dated 14/12/2001 (amendment of Law No. 221 and 241) - Decree No. 8122 dated 3/7/2002 (specifications of some details related to the application of Law No. 221 dated 29/5/2000) - The ten-year national strategic plan for the water sector (2000-2010) - Law No. 263 dated 30/12/2000 (Loan Agreement between the Republic of Lebanon and the OPEC Fund for International Development to finance a project to supply drinking water in Akkar) - Law No. 292 dated 3/4/2001 (Loan agreement between Lebanon and the Saudi Development Fund to help finance drinking water projects for rural areas in Akkar) - Law No. 337 dated 2/8/2001 (Loan agreement between the Lebanese Republic and the Kuwaiti Fund for Arab Economic Development in relation to the provision of drinking water in the area of Metn and Aley and the completion of other projects for drinking water) - Law No. 415 dated 5/6/2002 (Loan agreement between Lebanon and the Kuwaiti Fund for Development for a project to transfer water from the Litani river to South Lebanon for the purpose of irrigation and drinking) - Law No. 416 dated 5/6/2002 (loan agreement between the Republic of Lebanon and the Arab Fund for Economic and Social

Council of Ministers (Period, Decree)	*Environmental Statement*	*Accomplishments*
		Development for a project to transfer water from the Litani river to South Lebanon for the purpose of irrigation and drinking) - Decree No. 8138 dated 3/7/2002 (Cooperation agreement between MOEW and the Japanese International Cooperation Agency for water resources management). - Law No. 466 dated 12/12/2002 (Loan agreement between Lebanon and the French Development Agency to contribute to financing an emergency project to draw water to southern Lebanon)
	- Expanding public transport over the entire Lebanese territory, including trains, which contributes to improve the economic cycle and reduce fuel bills and reduce environmental pollution.	- Draft Land Transport Policy prepared in September 2001 by the Ministry of Public Works and Transport. - A Draft Transport Policy submitted to the Government of Lebanon in 2002. - Loan No. 7213 dated 26/9/2002 (Loan agreement between CDR and World Bank for the urban transport development project). This loan agreement was issued by Law No. 505 dated 16/7/2003.
	- Encouraging investment in the tourism sector and preserve our touristic and environmental wealth - Developing an explicit environmental policy and an action plan bound with a timeframe.	- Some work on eco-tourism was done by the Ministry of Tourism. - National reforestation plan. - Decree No. 7964 dated 5/6/2002 (Cooperation agreement between the Government of Lebanon and FAO to protect the Cedar Forests). - Not accomplished.
	-Establishing a national scientific environmental institution, aiming at conducting research and specialized studies and setting standards. This will facilitate informed decision making in setting environmental policies rather than devising reactive and first aid policies the impact of which does not exceed, at best, postponing the problem, or moving it from one place to another.	-Not accomplished but MOE worked with Universities instead.
	Implementing a comprehensive public awareness plan aiming at providing our generations with the environmental principles based on informative, educational and civil programs.	- Decree No. 7854/2002 (Grant from EU to implement a project for the Enhancement of The Permanent Environmental Awareness Unit at the Ministry of Environment In Lebanon) - Decree No. 9745 dated 6/3/2003 (Cooperation agreement between the Government of Lebanon represented by MOE and Hans Zeidel Foundation)
	- Mainstreaming environmental management in all sectors.	- A series of workshops were undertaken by MOE to green the public sector. - Decree No. 10254/2003 (EC-Life Grant for the Strengthening the Environmental Legislation Development and Application System in

Council of Ministers (Period, Decree)	*Environmental Statement*	*Accomplishments*
		Lebanon (SELDAS)
	- The coordination between the Ministry of Environment and other ministries will ensure finding proven solutions to the quarries	- Decree No.7749 dated 10/4/2002 (Referring draft organizational law of MOE to the parliament)- the law was issued in 26/8/2005 (Law No. 690) - Decree No. 8803 dated 4/10/2002 (organization of quarries and crushers) and its amendments - Decree No. 9222 dated 9/12/2002 (Rules of procedure for the national council of quarries).
	The operational measures of the environmental policy to which we aspire should not be limited to sanctions and deterrence of offenders. It is essential to use incentives as a key part of any modern policy to encourage individuals and institutions to adopt environmental protection measures giving them financial support and tax breaks, in addition to fining polluters.	- Decree No. 4577/2000 (Development of existing equipment in the factories using ODS under Montreal Protocol) - Assistance to industries to phase out ODS. - Decree No. 6769/2001 (MLF Grant to Phase out of Methyl Bromide for Soil Fumigation in Strawberry Production)- Assistance to farmers to phase out methyl bromide. - Law No. 444 dated 29/7/2002 (Protection of the environment) introducing the polluter pays principle.
17/4/2003-26/10/2004 Decree No. 10057 dated 17/4/2003	- The Government will work to activate and strengthen the role of the Ministry of the Environment by working on issuing laws and implementing decrees relating to its planning, executing and oversight role and issuing laws with regard to quarries, beaches, parks and protection of springs, and others. - The Government will pay special attention to this matter in order to preserve the health of citizens and water resources and to protect our touristic, agricultural and industrial economy.	- Decree No. 13389 dated 18/9/2004 (Determines the types of healthcare wastes and their disposal) - Decision No. 8/1 dated 10/3/2004 (Classification of the site known as Balou' Baatara located in Tannourine as a natural site). - Decree No. 580 dated 25/2/2004 (The system of wild hunting in Lebanon)
	- The Government will seek to benefit more of the surface and ground water wealth of Lebanon, and to seek construction of dams and lakes and establish a modern water management system for rationalization of water use, and upgrade and expand water networks in collaboration with the private sector.	- Draft water code was prepared
26/10/2004-19/4/2005 Decree No. 13621 dated 26/10/2004	- The Government would seek to encourage direct investments into rural areas, giving some incentive to preserve the environment and to stabilize the rural people in their areas.	- Not accomplished
	-The government will also work on re-designing policies on public services equipment and urban planning laws to be in line with the "national land use master plan" which established an evolving concept of Balanced Development and allocated functions for each of the Lebanese areas depending on the nature of their resources and in consultation with local	- Draft "national land use master plan" was prepared and was endorsed by the Higher Council of Urban Planning in 27/5/2005.

Council of Ministers (Period, Decree)	*Environmental Statement*	*Accomplishments*
	authorities and civil society organizations.	
	- The Government will address infringements on public coastal properties.	- Not accomplished
19/4/2005-19/7/2005 Decree No. 14233 dated 19/4/2005	Our government would not lavish promises of proposed projects for implementation during the short period of its mission.	- Decree No. 14865 dated 1/7/2005 (Defining the conditions and mechanism of the Ministry of Environment contributions to non-profit organizations to carry out environmental activities).
19/7/2005-11/7/2008 Decree No. 14953 dated 19/7/2005	- The government will work to develop a practical framework for cooperation between relevant ministries, including the Ministry of Environment on the one hand and civil society organizations and environmental NGOs on the other.	- Law No. 690 dated 26/8/2005 (Specifying the mandate of the Ministry of Environment and its organization). - COMs' decision No. 64 dated 12/9/2007 (Memorandum of understanding between the Directorate General of Civil Defense and the Association for Forest Development and Conservation concerning forest fires).
	- The government will give special importance to the reforestation of Lebanon and to stop desertification in parts of its land and maintain the water table.	- Council of Ministers' decision No. 105 dated 27/10/2007 (Forest fires action plan) - Reforestation project
	- The government will work on the one hand to develop a national plan to address the problem of solid waste in all its aspects, and to implement it on the basis of effective coordination between relevant ministries and in partnership with the municipalities.	- Council of Ministers' decision No. 1 dated 28/6/2006 (National solid waste management plan).
	- The government will work on addressing the issue of wastewater through a comprehensive scheme, based on what was implemented and what is required to connect wastewater networks and wastewater treatment plants benefiting from regional assistance and soft loans on the basis of scientific and international standards adopted in this regard.	- Decree No. 1431 dated 5/5/2008 (memorandum of understanding with the French state to finance a feasibility study to the adoption of an integrated policy for sanitation in Lebanon (Kadisha Valley)
	- The Government views that care for the environment and its protection requires planning, setting legislation, programming and implementation of policies aimed at integrating environmental policies in all development sectors.	- Not accomplished
	- It also requires the strict enforcement of laws and the implementation of decisions, and cessation of power relations and the dismantling of networks of interests that do not heed to the environment and the interests of the nation and the future of the citizens.	- Council of Ministers' decision No. 94 dated 27/10/2007 (Stopping the decree related to land acquisition for the expansion of Naameh landfill in the cadastral are of Ain Drafil)
11/7/2008- 9/11/2009 Decree No. 18	- The Government will commit, in cooperation between the Ministry of Public Health and the ministries concerned, to work on establishing a unified body to oversee this work in	- Not accomplished

Council of Ministers (Period, Decree)	*Environmental Statement*	*Accomplishments*
dated 11/7/2008	order to avoid duplication and chaos in the control of water, food and environment.	
	- The government will also prepare a number of privatization projects and partnership with the private sector, including preparation of draft laws needed in the sectors of transport, wastewater treatment, oil refining and public parking, and others.	- Not accomplished
	-The government will follow the ten-year plan and the "national land use master plan" to reinforce the concept of integrated water management aiming at taking advantage of rainwater, snow and springs and the prevention of water waste through surface storage in dams and mountain lakes, because of the limited availability of water resources in Lebanon and the ever-increasing water demand. - The Government will also work on replenishing groundwater aquifers and prevent their contamination and ensure water, social and food security and continue to establish wastewater networks and treatment plants to protect the environment and prevent pollution of surface water and groundwater. - The Government will complete the merger of the four water institutions and improve their performance through modernization of management tools and continuous training of human resources to secure the best water distribution services for citizens and provide irrigation water and dispose wastewater at the lowest cost.	- Decree 2366 dated 20/6/2009 (National Land Use Master Plan) - Decree No. 477 dated 9/10/2008 (financing agreement between the European Union and the Ministry of Energy and Water for the application of technical means in water management) - Not accomplished - Not accomplished
	- The Government will seek to achieve sustainable environmental development through strengthening the partnership between the public and private sectors locally, regionally and internationally, and the integration of environmental principles in the policies and programs of all development sectors, and activating the legislative, monitoring and guidance role of the Ministry of the Environment. - The Government would pursue the international application and the conclusion of treaties, environmental conventions and protocols, aiming at the same time at following up the implementation of international resolutions on the oil spill on Lebanese shores, and complementing the progressive and leading role played by Lebanon at the regional level in hosting	- Signing of the Arab Environment Facility Bylaws - UN resolutions on the oil spill - Decree No. 2604 dated 17/9/2009 (Control of Ozone depleting substances) - Law No. 31 dated 16/10/2010 (Accession to the Cartagena Protocol on Biosafety to the Convention on Biological Diversity) - Law No. 34 dated 16/10/2010 (Accession to the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean Sea are adjustments made to the Convention for the Protection of the Mediterranean Sea pollution) - Decision No. 48/1 dated 17/6/2009 (License mechanism for the rehabilitation of quarry sites) - Decision No. 12/1 dated 7/3/2009 (Mechanism to review projects

Council of Ministers (Period, Decree)	*Environmental Statement*	*Accomplishments*
	the Arab Environment Facility. - Locally, the government will push forward the implementation of the national integrated solid waste management plan and integrated sanitation projects, through better organization and increased spending on environmental services in those sectors in addition to the encouragement of clean development mechanisms projects in these two sectors and in the industry, energy, transport and agriculture sectors as a contribution in economic development. - The Government will seek to expand green areas through the activation of disaster management and fire prevention and control, and through afforestation, land rehabilitation, and protection of the national water wealth which is an essential economic resource. - The Government will support the Ministry of the Environment by seeking the issuance of laws and regulatory decrees that will develop their specialized human resources and ensure sustainability of their experience, and activation of proliferation in all governorates to promote decentralization for the service of the citizen, and moving towards the creation of the environmental police for better enforcement of laws and regulations and the dismantling of power relations, in addition to attracting international contributions to stimulate investment in the environmental sector. - The government will strengthen the bonds of communication between the Ministry of Environment and other departments and bodies in order to engage them all in environmental issues in order to achieve environmental reforms in the three pillars of sustainable development.	submitted under the Clean Development Mechanism of the Kyoto Protocol) - Draft budget law for the rehabilitation of Saida dump - Working with AFDC on forest fires plan - COM decision to recruit 23 MOE employees - Central Bank Decree - UNEP, EIA workshops - Workshops with social security and national audit bureau - CDM workshop (World Bank)
	In the transport sector: - The government will pursue efforts reached to adopt the policy of the road transport sector, passenger, cargo and maritime transport sector policy after it is discussed by the Council of Ministers. It will also work on the development and adoption of a similar policy for the air transport sector is based on the principle of open skies. The main objective of these policies is to define the general framework for the development of the transport sector in all its elements and	

Council of Ministers (Period, Decree)	*Environmental Statement*	*Accomplishments*
	components, and improve the reality and upgrading its services, particularly passenger transport sector, including ensuring citizens the means of transport safe, reliable and affordable, especially in light of the high prices of transport and the cost of fuel and the escalating risks of environmental pollution.	
	- **In the agricultural sector**: - Better utilization of agricultural resources of arable land, water and human efficiencies. - Enable the Green plan to play a more active role in the construction of agricultural roads and the establishment of mountain lakes, which contribute to the raise of the level of groundwater.	
	- **In the energy sector:** - Increase energy production, including the rehabilitation of Zouk, Jiyeh power plants and the establishment of new production plants and to study the potential for partnership with the private sector to ensure higher efficiency in operation and reduce waste resulting from the infringement of the distribution networks and billing and collection and treatment of pollution problems, particularly coming from Zouk power plant and secure the needed funds for this purpose.	- Arrival of gas to the Lebanese borders

ANNEX V: EIA HARMONIZATION PROCESS

		National EIA system	World Bank procedures	EU directive	changes for compatibility with WB	changes for consistency with EU
EIA LEGISLATION AND PROCEDURES						
1	Enabling legislation for EIA	-Environmental Protection Law # 444 for the year 2002 - MOE Organizational Law 690/2005 & Decree 2275/2009	Operational Policy OP 4.01	European Council Directive 97/11/EC/ of 3 March 1997	None	None
2	Detailed legislation for EIA	- MOE Ministerial decisions No 5/1 and 6/1 of the year 2002 for procedural review of EIA and Initial Environmental Examination (IEE) reports - MOE ministerial decision 7/1 of the year 2003 for the classification/ specification of firms entitled to prepare EIA/IEE reports -Draft EIA decree under legislative review by Council of State - Decree No. 8803/2002 related to quarries - Specific Decrees related to establishment of Marinas - Licensing Decrees for Industrial Establishments	BP/GP 4.10 of 1999	Defined by each member States	None	None

		National EIA system	World Bank procedures	EU directive	changes for compatibility with WB	changes for consistency with EU
3	Formal provisions for SEA	-Draft decree for SEA approved by the Council of State but not by the Council of Ministries yet - Draft procedures for the review of EIA studies to be issued by MOE ministerial decision - SEA manual -Regional Environmental Assessment for the coastal zone was undertaken in 1997 with assistance from the World Bank (WB) -Cost of environmental degradation in northern coast carried out with assistance from WB/METAP - Draft strategy for mainstreaming environment in spatial planning and draft guidelines for greening land use procedures (with pilot application to the development of the Balouh Balaa Area Tannourine)	There is no stand alone SEA policy. Definitions of sectoral and regional EA are provided. In OP 4.01 sectoral and/or regional EA is required when the project "is likely to have cumulative or regional impacts."	European Council Directive 2001/42/EC. The purpose of the SEA-Directive is to ensure that environmental consequences of certain plans and programs are identified and assessed during their preparation and before their adoption	None	The EC –LIFE third countries has financed a EURO 430,000 project for Strategic Environmental Assessment & Land Use Planning in Lebanon
4	Local government EIA legislation or procedures	Not applicable	Not applicable	Optional		
5	Sectoral authority EIA legislation or procedures	None	-	Optional	None	None

		National EIA system	World Bank procedures	EU directive	changes for compatibility with WB	changes for consistency with EU
6	General and specific guidelines	-General Ministerial decisions regarding Guidelines for review of the EIA and IEE reports (5/1 and 6/1 – 2003) -Ministerial decree No 7/2003 for classification of EIA and IEE consulting firms -Decree for health care wastes -National Environmental Auditing Manual. -Environmental Auditing Manual for hospitals. -Environmental Auditing Manual for Hotels. - 14 Environmental Guidelines for the establishment &/or operation of several SME industries booklets - Draft Guidelines for marinas and specific licensing decrees which make EIA mandatory -Guidelines for the construction of small scale wastewater treatment plant Draft EIA guidelines for quarries Draft EIA guidelines for the water and wastewater sector	-EA source book and updates 1991-2000 -Pollution Prevention and Abatement Handbook (PPAH), 1999	Defined by each member state	-The World Bank/MNA "Guide for the Preparation and Review of EA reports" is being used especially the section on the review checklist for EIA reports which is attached to ministerial decrees no 5/1 and 6/1 -Specific sector guidelines for power plants, water wastewater and solid waste management, and should be adapted from the MNA guide.	Same as World Bank
ADMINISTRATION OF EIA						
7	Main administrative body for EIA	Ministry of Environment.	Regional Environment Unit	Defined by each member		

		National EIA system	World Bank procedures	EU directive	changes for compatibility with WB	changes for consistency with EU
8	Competent authority for environmental acceptability	Ministry of Environment.	Regional Environmental Advisor	Defined by each member state		
9	Review body for EIA	A three (or more) member technical review committee from MOE	Regional Environment Unit	Defined by each member state		
10	Sectoral authority responsibilities	- Sectoral ministries receive proponent applications and Issue permits, subject to EIA /IEE consent from MOE -MOE Service for the Prevention of Technological Impacts and Natural Hazards (referred to as Environmental Technology Service in the new organizational law)	N/A	N/A		
11	Local government responsibilities	Role for the municipalities in the scoping phase/ public participation (article 7 of the draft EIA decree)	N/A	N/A	N/A	N/A

		National EIA system	World Bank procedures	EU directive	changes for compatibility with WB	changes for consistency with EU
12	Other bodies responsible for planning/ approval of EIA	The following bodies are responsible for planning but not for approving EIA: -Council for Development and Reconstruction (CDR) - Higher Council for Urban Planning -Higher Council for Quarries -Ministry of Public Works and Transport (Article 31 of law 444) - Ministry of Interior and Municipalities - Ministry of Industry	- Internally with environment department anchor -Externally with national environmental agencies and concerned ministries/entities	Statutory Consultation, Article 6 states: Member States shall take the measures necessary to ensure that the authorities likely to be concerned by the project by reason of their specific environmental responsibilities are given an opportunity to express their opinion on the information supplied by the developer and on the request for development consent	*None*	*None*

		National EIA system	World Bank procedures	EU directive	changes for compatibility with WB	changes for consistency with EU
13	Method of co-ordination with other planning approval bodies	-Minister of MOE chairs the Council of Quarries and the Hunting Council -Director General of the MOE is member of the Higher Council of Urban Planning -MOE officers members in the industrial licensing committees of the various governorates (Mohafazat) - MOE officers members in the sanitary councils of the various governorates (Mohafazat) - Minutes of technical review committee meetings are sent officially from MOE DG to sector ministries and CDR as well as governorates / municipalities as appropriate - MOE Service of Prevention from Technological Impacts and Natural Disasters is responsible for EIA screening in coordination with other technical services at the Ministry, such as service of Urban Environment and service of Natural Resources	Formal decision meetings involving all sector and country departments to decide on all aspects of the project	Article 6 states that The information gathered pursuant to EIA (Article 5) shall be forwarded to those authorities. Detailed arrangements for consultation shall be laid down by the Member States.	*None*	Same as the World Bank

		National EIA system	World Bank procedures	EU directive	changes for compatibility with WB	changes for consistency with EU
14	Method of co-ordination with pollution control approval and regulation	- The IDAL one-stop shop committee for industrial licensing all types of investment Projects - The Councils in the Governorates (Mohafazat) for industrial licenses and sanitary councils, - The Board of Directors of LIBNOR (product standards)	Use of *Pollution Prevention and Abatement Handbook (PPAH)* Available as guidance. The EA may recommend alternative emission levels and approaches to pollution prevention and abatement of the project. Exceptions should be rare.	Directive 96/61/EC concerning integrated pollution prevention and control (the IPPC Directive), however procedure may be integrated as per Article 2(a) of the EIA directive 97/11	Sector guidelines for large infrastructure and industries should be developed and use the PPAH as reference and guidance	Same as the World Bank

		National EIA system	World Bank procedures	EU directive	changes for compatibility with WB	changes for consistency with EU
	STAGES OF EIA					
	Screening					
15	Screening categories	**DRAFT Environmental regulations state in its preamble**: -The environmental impact assessment aims to identify, estimate and assess the impacts on the environment and identify the methods for limiting negative adverse impact on the Environment and increase the positive impacts on the environment and natural resources -Screening is made through the Service of Prevention from Technological Impacts and Natural Disasters based on significance/ severity of impacts determined as a function of impacts magnitude, type, nature, extent, timing, duration, likelihood and reversibility. A format in attachment 4 is provided - Two Categories in draft environmental regulations; Annex I : Full EIA Annex II: Initial Environmental Examination (IEE)	• EA is the process that is specific to each specific operation, both category A and category B projects. • Any report resulting from the process is an EA report. -Screening is made on the basis of magnitude, irreversibility and severity of impacts -Four screening: Category A: Full EIA; Category B: Environmental Management Plan (EMP); Category C: No EIA; and Category Financial Intermediary (FI): Institutional Assessment and EIA manual	Article 3 states: The environmental impact assessment shall identify, describe and assess in an appropriate manner, in the light of each individual case the direct and indirect effects of a project on the following factors:- human beings, fauna and flora;- soil, water, air, climate and the landscape;- material assets and the cultural heritage;- the interaction between the factors mentioned in the first, second and third indents One category for full EIA: Annex I – full EIA mandatory; Annex II – individual screening for significance, or standard significance criteria, based on criteria of characteristics of projects, location of projects and characteristic of the potential impacts as stated in Annex III of the Directive 97/11/EC	*None* Category for Financial Intermediaries can be considered	*None* *None*

		National EIA system	World Bank procedures	EU directive	changes for compatibility with WB	changes for consistency with EU
16	Screening method	**DRAFT Environmental regulations state** -Lists with thresholds and criteria for Annexes I and II -In case projects in Annexes II falls in environmentally sensitive areas (wetlands protected areas, historical and natural sites, river and water ways) or may have a significant/ sever impact on such areas, an EIA is required (Article 5 G) -In case projects are not described in Annexes I and II, but are in environmentally sensitive areas or may have a significant/ sever impact on such areas, an IEE is required (Article 5 D) - Minister of Environment upon recommendations from the Directorate General may require an EIA/IEE irrespective of projects screened in Annexes I or II (article 5 (3)	Screening on the basis of criteria of magnitude, severity and irreversibility of impacts. Illustrative lists are given for projects in Categories A, B, C, FI	Screening to be undertaken by concerned authorities and based on the list of Annex I	Projects in Annex 1 are very comprehensive and similar to illustrative projects in Category A of the World Bank Projects in Annex II are very comprehensive and similar to projects in category B of the World Bank	List of Annex 1 in draft environmental regulations is similar to Annex I of the EU directive

		National EIA system	World Bank procedures	EU directive	changes for compatibility with WB	changes for consistency with EU
Scoping						
17	Scoping method	Scoping mandatory to be undertaken by the operator for projects in Annex I (Article 7 a of draft EIA regulations). The operator is required to submit a report on the EIA consultations and meetings with stakeholders (attachment 7, article 6 (2) Draft EIA regulations are not explicit on whether the technical review committee approves the TOR before scoping.	- Based on EA TOR for category A projects - Approval of WB EA TOR after scoping -Scoping for Category B projects is not required	- Article 5 :Inform the developer on the scope of the examination, and the information to be supplied by him - Ensure that any authorities with relevant information in their possession make this information available to the developer	Approval of the TOR before and after scoping should be made explicit in the draft EIA regulations.	Scoping provision for Category I project is acceptable.

		National EIA system	World Bank procedures	EU directive	changes for compatibility with WB	changes for consistency with EU
Content of EIA study						
18	Content of EIA report	Non-Technical Summary - Framework policy legal and administrative - Project description -Baseline data -Environmental impacts -Analysis of Alternatives -Environmental Management Plan composed of: (1)Mitigation Plan, (2) Monitoring and Environmental post auditing plan, (3) Institutional Strengthening Plan -Appendices -contributors in preparing the EIA document (institutions, individuals). - List of references (the written materials that used in document preparing process). - Record of consultancy meetings between the relevant parties to the project and document all these meetings which held between the effected parties and the local NGOs.	Executive Summary: - Policy, legal and administrative framework - Project description - Baseline data - Prediction and assessment of environmental impacts and mitigation - Analysis of alternatives - Environmental management plan - List of EIA report preparers - Record of consultations - References and supporting data (Annex B)	A non-technical summary of the information mentioned in indents 1 to 3. - A description of the project comprising information on the site, design and size of the project; - A description of the measures envisaged in order to avoid, reduce and, if possible, remedy significant adverse effects; - The data required to identify and assess the main effects which the project is likely to have on the environment; -An outline of the main alternatives studied by the developer and an indication of the main reasons for his choice, taking into account the environmental effects	*None*	*None*
19	Requirements for non-technical summary	Mandatory	Mandatory	Mandatory	*None*	*None*

		National EIA system	World Bank procedures	EU directive	changes for compatibility with WB	changes for consistency with EU
20	Requirements for considering alternatives	Required in Attachments 7 and 8 of the DRAFT EIA Regulations which states that alternative should : "Include an economic and environmental comparison of the suggested alternatives for the project in Annex I"	Required for Category A projects only. EA evaluates a project's potential environmental risks and impacts in its area of influence, examines project alternatives….	Study required in accordance with Article 5	*None*	*None*
21	Requirements for environmental management plans	Mandatory for Annexes I and II projects. EMP consists of a mitigation plan, a monitoring and post auditing plan and an institutional strengthening plan	Mandatory for category A, and B projects. EMP consists of a mitigation plan, a monitoring and an institutional strengthening plan	A mitigation plan is only required	*None*	*None*
22	Requirements for trans-boundary impacts	Required in Attachment 7 section 6.5 of the EIA regulations which states to "determine the global and trans boundary impacts "	Compliance with all international treaties Specified. The Bank does not finance project activities that contravene country obligations under relevant international environmental treaties and agreements	Required in Article 7 of the EIA directive. Whenever a Member State is aware that a project is likely to have significant effect of the environment in another Member State, the Member State in whose territory the project is intended, shall send information, enter into consultations and inform its own public	*None*	Same as the World Bank

		National EIA system	World Bank procedures	EU directive	changes for compatibility with WB	changes for consistency with EU
23	Requirements for global impacts	See section 22.	Compliance with all international treaties Specified. The Bank does not finance project activities that contravene country obligations under relevant international environmental treaties and agreements	Unclear - cumulative impacts to be assessed, but not specifically global (Annex 4)	*None*	Same as the World Bank
Review, public participation and decision-making						

		National EIA system	World Bank procedures	EU directive	changes for compatibility with WB	changes for consistency with EU
24	Method for review of content and substance of EA reports submitted	-Technical review is made by a three (or more) member committee from the MOE. Outside expertise could also be considered - Methodology is described in the MNA Guide for the Preparation and Review of EA reports" is being used under section 4 part B "reviewing EA reports".[77] -The methodology is to assist reviewers in evaluating the completeness and suitability of the information from a technical and decision making viewpoint of 'Review Checklists' and corresponding scores (A-F), corresponding to the structure required in the completion of an EA report. A total score of C is considered to be satisfactory despite omissions and/or adequacies	-Comparison with TOR -Consistency with TOR as specified in the guide for preparation and review of EA reports for MNA region	Article 5 states: Relevance to the specific characteristics of the project, the environmental features likely to be affected, and developer should compile information having regard to current knowledge and methods of assessment	*None*	Same as World Bank

[77] Lee and Colley (1992).

		National EIA system	World Bank procedures	EU directive	changes for compatibility with WB	changes for consistency with EU
25	Requirements for public participation	-For projects in Annex I only Public participation is involved at the scoping stage and during the EIA preparation -In accordance with section 7 (5) of draft EIA regulations, the proponent is required to submit to the MOE in the scoping reports the comments and minutes of official and unofficial meetings. -Attachment 7 of the draft EIA regulations requires in section 6.2 written evidence for public consultations including NGOs with all stakeholders affected by the project -No requirements of public participation for projects listed in Annex II	For all category A and B projects, the borrower consults project-affected groups and local NGOs. • For category A projects, consultation occurs twice: i) shortly after screening and before EA TORs are finalized (scoping); and ii) once a draft EA report is prepared	Article 6 of the EIA directive requires public access to EIA report, and opportunity to comment	For certain categories of projects listed in Annex II, public participation should be considered before the submission of the draft IEE	Same as World Bank

		National EIA system	World Bank procedures	EU directive	changes for compatibility with WB	changes for consistency with EU
26	Arrangements for access to EIA reports	**DRAFT** EIA regulations states in attachment 7 (3) that: -For projects in Annex I, the municipality should announce for 18 consecutive days at the Municipality bulletin board and on the project site that an EIA is required for the project and the public can provide its comments. The Municipality is to inform the MOE of the date of the announcement - The scoping report is available for consultation at the MOE by the public or by the concerned institutions (article 7 section 9) - Decision of approval/ disapproval is available at the MOE for the public and concerned institutions and the municipality is to publish such decision in its bulletin board for 12 working days -Section 18 of the draft EIA regulations states that the EIA and IEE available for examination at the MOE	Mandatory for A and B projects. The borrower provides relevant materials in a form and language that are understandable….: 1) For Category A projects: prior to project appraisal: - Same as Operational Directive. - EA available at the Bank's InfoShop. 2) For category B projects - EMP report available in a suitable public location in the borrowing country. - Available at the Bank InfoShop when received. - Borrower's permission to release the EA report is still required.	Detailed arrangements must be specified by member states (Art 6)	-Disclosure of the EIA and IEE executive summary should be published on the MOE website -MOE should include mandatory disclosure requirements of the EIA under Annex I and specific IEE for infrastructure, industrial and agriculture/irrigation projects in Annex II (excluding those sensitive aspects related to trade, technology and security). Article 13 and 14 (2) of the Environment Protection Law No. 444 could be used to add such requirements	Same as World Bank

		National EIA system	World Bank procedures	EU directive	changes for compatibility with WB	changes for consistency with EU
27	Decision-making authority	-MOE Technical committee recommendation. -Minister of Environment is the decision maker for approving the EIA.	Recommendations made by the Regional Environment Unit. Decision meeting chaired by Country Director or the Regional Vice President	The results of consultations with other authorities and the public and information gathered must be taken into consideration in the development consent procedure (Article 6 and 8), publication of reasons for decision (Art 9)	*None*	*None*
28	Provisions for appeal	-Objections and complaints from the proponent can be submitted to the MOE within 12 days from the announcement of its decision and a reply should be provided within 12 days from receiving the complaints -In case the objection is related to a public or private project that has been approved without it being subject to an EIA or an IEE although it requires such a study, article 77 of the Council of State by-laws applies -In case the objection is from a public authority against MOE decisions of screening, scoping and EIA approval, the Council of Ministers will decide	The EIA report is the property of the borrower, no legal actions can be taken against the Bank	*None*	*None*	*None*
Follow-up						

		National EIA system	World Bank procedures	EU directive	changes for compatibility with WB	changes for consistency with EU
29	Requirements for follow-up and monitoring	Article 11 (2) of the draft EIA decree states: The Ministry shall control the application of the environment management plan during the construction, operation and dismantling of the project	Reports submitted to WB by borrower, supervision visits by World Bank staff	*None*	Clarify the procedures for monitoring and follow up	*None*
EIA CAPACITY						
30	Expertise for conducting EIA	In MOE: 5 staff in the Service of Prevention from Technological Impacts and Natural Disasters, 7 staff from the Service of Urban Environment, 6 staff from the Service of Natural Resources. Expertise available in national consulting firms and university professors	Approximately 300 Bank wide and 10 from the MNA region -Independent EA experts retained by proponent, independent international panel for major issues for category A (such as dams) -EA is the responsibility of borrower.	N/A	Additional human resources are required to implement the EIA regulations No. 37	
31	No. of EIAs conducted	136 EIA and IEE studies between 2001-2008, 39% for solid waste, 25% for water, 12% for tourism, 10% for medical waste, 9% from industry, 3% for road and highways, 1% for dams and 1% for ports,				
32	Approx. no. of EIA firms and individuals	27 national consulting firms in accordance with the CDR General prequalification of Lebanese Consultants.				
33	Use of foreign consultants	Often especially for projects financed by International Financing Institutions.				

		National EIA system	World Bank procedures	EU directive	changes for compatibility with WB	changes for consistency with EU
34	Universities/ institutes with EA technical expertise	AUB: American University of Beirut BAU: Beirut Arab University LAU: Lebanese American University NDU: Notre Dame University UOB: University of Balamand USJ: Université Saint-Joseph NCSR: National Council for Scientific Research				
35	Universities/Institute with Laboratories facilities	-The AUB Core Environmental Laboratory - The Lebanese American University - The Central Laboratory of the Ministry of Public Health - The Industrial Research Institute - Université Saint-Joseph CREEN Center (Centre régional de l'eau et de l'environnement)				
36	Other EIA capacity-building programs	EU, UNDP, UNEP, GIZ, METAP. The World Bank				

Operational principles for assessing the equivalence and application of the national EIA system in Lebanon

Summary Matrix on Environmental Assessment

Objective and Operational Principles	Government of Lebanon's Equivalent Requirements		Gaps and differences between WB policy and Government of Lebanon requirements.	Recommendation for improvement
	Objectives and Operational Principles as stated in Government of Lebanon corresponding laws, rules, regulations, procedures, and sectoral guidelines.	Government of Lebanon corresponding laws, rules, regulations, procedures, and sectoral guidelines.		

Objective and Operational Principles	Government of Lebanon's Equivalent Requirements		Gaps and differences between WB policy and Government of Lebanon requirements.	Recommendation for improvement
	Objectives and Operational Principles as stated in Government of Lebanon corresponding laws, rules, regulations, procedures, and sectoral guidelines.	**Government of Lebanon corresponding laws, rules, regulations, procedures, and sectoral guidelines.**		
Objective: To help ensure the environmental and social soundness and sustainability of investment projects. To support integration of environmental and social aspects of projects into the decision- making process.	The environmental impact assessment aims to identify, estimate and assess the impacts on the environment and identify the methods for limiting negative adverse impact on the Environment and increase the positive impacts on the environment and natural resources. Attachment 8 to the draft EIA regulations requires a social assessment as part of the EIA report. The environmental assessment shall be conducted during the preparation of the project and is part of the permitting and licensing for construction and operation of any facility listed in annexes I and II of the draft environmental regulations. The Government National Agenda for the next ten years indicates that sustainable environment theme will play a significant role in the formulation of plans and objectives of public institutions especially in the Ministry of the Environment. EIA is an important tool in the integrated environmental management approach.	Draft EIA Regulations should be issued by virtue of sub-paragraphs 21-23 of the Environment Protection Law (EPL) # 444 of 2002 Besides the above, Lebanon has other sector laws and regulations such as: -Decree No 8006, on hospital waste requires in Article 1 (10) that an EIA should be undertaken for collection and disposal of medical waste before any construction. - Article 31 of the Environment Protection Law # 444 requires that the Minister of Public works and Transport on the basis of an EIA or an Initial Environment Examination would allow disposal of materials in the marine environment. - Decree # 8803/2002 on the establishment and location of quarries requires in article states in article 7 that an environment study should be carried out to show the impact of the investment on the environment. -Decree No 8018/2002 concerning the procedures, and conditions of permits for industrial establishment requires that the MOE be member of the industrial licensing committee in the governorates in an advisory capacity -Specific decree for the establishment of marinas (7401/2002,9254/2002) requires the approval of an EIA by the MOE before issuing the permit Draft law for the protection of air quality (2005) requires the application of integrated pollution control for point and non point sources of air pollution	*No significant gaps* .	EIA regulations should be issued

Objective and Operational Principles	Government of Lebanon's Equivalent Requirements		Gaps and differences between WB policy and Government of Lebanon requirements.	Recommendation for improvement
	Objectives and Operational Principles as stated in Government of Lebanon corresponding laws, rules, regulations, procedures, and sectoral guidelines.	**Government of Lebanon corresponding laws, rules, regulations, procedures, and sectoral guidelines.**		
Operational Principles: 1. Use a screening process for each proposed project, as early as possible, to determine the appropriate extent and type of environmental assessment (EA) so that appropriate studies are undertaken proportional to potential risks and to direct, and, as relevant, indirect, cumulative, and associated impacts. .	A screening process is in place and consists of two categories : (a) for projects that require the preparation of a comprehensive EIA (Annex I); (b) project that require an Initial Environmental Examination (IEE) (Annex II) -In case projects in Annexes II falls in environmentally sensitive areas (wetlands protected areas, historical and natural sites, river and water ways), and EIA is required (Article 5 G) -In case projects are not described in Annexes I and II, but are in environmentally sensitive areas, an IEE is required (Article 5 D) - Minister of Environment upon recommendations from the DG may require an EIA/IEE irrespective of projects screened in Annexes I or II (Article 5 (3)) A screening report is prepared by the proponent and reviewed and approved by the MOE to for their determination of the need an EIA or an IEE	Article 5 of the Draft EIA Regulations and its attachments I concerning the list of projects that require EIA, in attachment 2 for projects that require an IEE and i n Attachment 8 related to the content of the EIA. Attachment 7 sections 6-5 have references to indirect, cumulative and associated impacts.	*No gaps* .	EIA regulations should be issued as a decree by the Council of Ministers

Objective and Operational Principles	Government of Lebanon's Equivalent Requirements		Gaps and differences between WB policy and Government of Lebanon requirements.	Recommendation for improvement
	Objectives and Operational Principles as stated in Government of Lebanon corresponding laws, rules, regulations, procedures, and sectoral guidelines.	**Government of Lebanon corresponding laws, rules, regulations, procedures, and sectoral guidelines.**		
Use sectoral or regional environmental	Draft decree for SEA under legislative review by Council of State SEA manual prepared	- The EC –LIFE third countries has financed a EURO 430,000 project for Strategic Environmental Assessment & Land Use Planning in Lebanon -Regional Environmental Assessment for the coastal zone was undertaken in 1997 with assistance from the World Bank (WB) -Cost of environmental degradation in northern coast carried out with assistance from WB/METAP - Draft strategy for mainstreaming environment in spatial planning and draft guidelines for greening land use procedures (with pilot application to the development of the Balouh Balaa Area Tannourine).	*No gaps*	SEA decree should be issued
2. Assess potential impacts of the proposed project on physical, biological, socio-economic and physical cultural resources, including trans boundary and global concerns and potential impacts on human health and safety.	Category I and II projects are required to assess impacts on human health, physical, biological, socio-economic and physical cultural resources. Trans boundary and global concerns are required to be included in the EIA.	Section 7 of Attachment 8 of the draft EIA regulations requires the assessment of environmental aspects affected by the proposed project as the public health, infrastructure, flora, fauna, soil, water, air, socio economic natural aspects and the Ancient monument and the interrelationships between these aspects. Lebanon is signatory to numerous international conventions on environmental matters related to biodiversity, wetlands, and cultural and natural heritages climate change etc. Section 4 Attachment 8 of the draft EIA regulations require that EIA report comply with these conventions.	*No gaps*	EIA draft regulations should be issued.

Objective and Operational Principles	Government of Lebanon's Equivalent Requirements		Gaps and differences between WB policy and Government of Lebanon requirements.	Recommendation for improvement
	Objectives and Operational Principles as stated in Government of Lebanon corresponding laws, rules, regulations, procedures, and sectoral guidelines.	**Government of Lebanon corresponding laws, rules, regulations, procedures, and sectoral guidelines.**		
3. Assess the adequacy of the applicable legal and institutional framework, including applicable international environmental agreements, and confirm that they provide that the cooperating government does not finance project activities that would contravene.	Draft EIA guidelines require project developers to assess the adequacy of applicable legal and institutional framework and include compliance with international conventions ratified by Lebanon.	Attachments 6 and 7 of the draft EIA requires the assessment of the applicable legal and administrative framework for annexes I and II respectively, including in Attachment 8 of compliance with international environmental agreements which relied on it to prepare the policy. .	*No gaps*	EIA regulations should be issued
4. Provide for assessment of feasible investment, technical, and siting alternatives, including the "no action" alternative, potential impacts, feasibility of mitigating these impacts, their capital and recurrent costs, their suitability under local conditions, and their institutional, training and monitoring requirements associated with them.	The "no project" alternative and project alternatives must be considered under the EIA for Annex I projects.	Ministerial decision 6/1 of 2002 requires in section 6.6 that for projects in Annex I, a full analysis of the alternatives be carried out including design alternatives, location alternatives. The used technology alternatives and its' environmental effects for every alternative. Capital and operation and maintenance cost for every alternative. The institutional, training and monitoring requirements and determining their costs as well the cost of environment and economic benefits with and without the project Draft EIA regulations in Attachment 7 section 6-6, has included the project alternatives set forth on the Ministerial decision 6/1 of 2002.	*No significant gaps*	

Objective and Operational Principles	Government of Lebanon's Equivalent Requirements		Gaps and differences between WB policy and Government of Lebanon requirements.	Recommendation for improvement
	Objectives and Operational Principles as stated in Government of Lebanon corresponding laws, rules, regulations, procedures, and sectoral guidelines.	**Government of Lebanon corresponding laws, rules, regulations, procedures, and sectoral guidelines.**		
5. Where applicable to the type of project being supported, normally apply the Pollution Prevention and Abatement Handbook (PPAH). Justify deviations when alternatives to measures set forth in the PPAH are selected.	National quality standards for air, water and soil were developed as well as the emission standards for air and wastewater were developed with the assistance of LIBNOR.	-MOE Ministerial decision no 52/1 dated July 1996 provided environment quality standards and criteria for air, water and soil. -MOE Ministerial 8/1 of March 2001 included e includes environment quality standards for discharge of wastewater into the sea, surface water and sewer systems mission standards for air and wastewater.	*Moderate gap* No reference to PPAH guidelines in the EPL or in the Draft EIA Regulations But it is unlikely to affect the outcome of projects as whenever national standards are not available the strictest standards available internationally are applied.	*None*
6. Prevent and, where not possible to prevent, at least minimize, or compensate for adverse project impacts and enhance positive impacts through environmental management and planning that includes the proposed mitigation measures, monitoring, institutional capacity development and training measures, an implementation schedule, and cost estimates.	The EIA emphasizes both positive and negative impacts with major focus on the mitigating measures for addressing negative impact as well as increasing the positive impacts. EIA and IEE procedural guidelines require the development of an EMP along the three components: Mitigation, Monitoring and post auditing and Institutional.	Ministerial decision 5/1 and 6/1 of 2002 describes the procedures for the preparation and review of the EIA and IEE reports. Ministerial decision # 5/1 related to the preparation of the Initial Environmental Examination (for Annex I projects) as well Ministerial decisions no 6/1 of 2002 for the preparation of the an EIA for Annex II projects requires the preparation of an Environment Management Plan as well as the delineation of responsibilities and costs for each of the three EMP components.	*No gaps*	*None*

Objective and Operational Principles	Government of Lebanon's Equivalent Requirements		Gaps and differences between WB policy and Government of Lebanon requirements.	Recommendation for improvement
	Objectives and Operational Principles as stated in Government of Lebanon corresponding laws, rules, regulations, procedures, and sectoral guidelines.	**Government of Lebanon corresponding laws, rules, regulations, procedures, and sectoral guidelines.**		
7. Involve stakeholders, including project-affected groups and local nongovernmental organizations, as early as possible, in the preparation process and ensure that their views and concerns are made known to decision makers and taken into account. Continue consultations throughout project implementation as necessary to address EA-related issues that affect them.	The Draft EIA regulations requires that for all projects in Annex I, the operator to carry out a scoping report with affected groups before submitting it to the MOE for review and approval The stakeholders are defined to be: -Sector Ministries, Councils (CDR, and NSRC) - Municipalities and local government -Local NGOs -Affected People -Universities and Research Centers The content of the EIA report for Annex I projects requires in its appendix to record meetings on the EIA with the above stakeholders	Ministerial decisions 6/1 requires public consultations with the stakeholders. This was further expanded in the draft EIA regulations which required for projects in Annex I a) Scoping with the stakeholders (attachment 7) b) Consultation with the stakeholders (attachment 8) c) Minutes and outcomes of meetings and contacts with stakeholders (attachment 8) **No provision of consultation is provided for projects listed in Annex II and for which an Initial Environmental Examination is Required**	*No gaps* *Moderate gaps* .	The draft EIA regulations should provide for consultations on infrastructure, agriculture/irrigation projects listed in Annex II.

Objective and Operational Principles	Government of Lebanon's Equivalent Requirements		Gaps and differences between WB policy and Government of Lebanon requirements.	Recommendation for improvement
	Objectives and Operational Principles as stated in Government of Lebanon corresponding laws, rules, regulations, procedures, and sectoral guidelines.	**Government of Lebanon corresponding laws, rules, regulations, procedures, and sectoral guidelines.**		
8. Use of independent expertise in the preparation of EIA where appropriate. Use independent advisory panels during preparation and implementation of projects that are highly risky or contentious or that involve serious and multi-dimensional environmental and/or social concerns.	Independent consultants and experts are required to prepare EIAs and IEE's, and their names should be provided in the appendix of the EIA and IEE reports The Technical Review Committee consists of experienced persons from MOE; however, the MOE can call on outside experts/ specialists for the review of EIA.	Ministerial decisions 5/1 and 6/ 1 of 2002 which are repeated in the draft EIA regulations requires that the names of individual consultants or consulting firms be provided as part of the EIA or IEE report and requires Ministerial decision No 6/1 section 2 allows the contracting of external experts for the review of the EIA before that the MOE receives the final copy of the EIA report With respect to the requirement to use independent advisory panels, such practice is not considered for multi-dimensional projects such as Dams.	*No gaps* *Moderate gap*	Article 2 of the Ministerial decision No 6/1 should be included in the draft EIA regulations. This will enable the MOE to contract advisory experts for multi dimensional projects
9. Provide measures to link the environmental assessment process and findings with studies of economic, financial, institutional, social and technical analyses of a proposed project.	There is no explicit reference to link the environment process to the feasibility study of the project. However the technical review committee has the practice to review consistency of EIA and other project design features such as i the solid waste management and in the recreational marina and chalets.	The approval of the EIA or IEE is a requirement for the concerned authorities to issue the permit of construction or operation. A construction permit is provided after the EIA/IEE report is approved by the MOE An operation permit is provided after the MOE is satisfied that the operator ahs implemented the EMP during the construction phase	*Moderate gaps*	Draft Environmental regulations should be explicit that the cost of environmental measures will be taken in consideration in the feasibility study of the project.

Objective and Operational Principles	Government of Lebanon's Equivalent Requirements		Gaps and differences between WB policy and Government of Lebanon requirements.	Recommendation for improvement
	Objectives and Operational Principles as stated in Government of Lebanon corresponding laws, rules, regulations, procedures, and sectoral guidelines.	**Government of Lebanon corresponding laws, rules, regulations, procedures, and sectoral guidelines.**		
10. Provide for application of the principles in this Table to subprojects under investment and financial intermediary activities.	Not applicable as there is no FI category in the Lebanese EIA system	Under article 22 of the EPL # 444 and its draft EIA regulations, the MOE is required to screen and review all new and rehabilitated projects, studies, and suggestions for their potential impacts. Attachment 7 of the draft EIA regulations provide detailed information to be included in the scoping report	*No significant gaps*	*None*

Objective and Operational Principles	Government of Lebanon's Equivalent Requirements		Gaps and differences between WB policy and Government of Lebanon requirements.	Recommendation for improvement
	Objectives and Operational Principles as stated in Government of Lebanon corresponding laws, rules, regulations, procedures, and sectoral guidelines.	**Government of Lebanon corresponding laws, rules, regulations, procedures, and sectoral guidelines.**		
11. Disclose draft EA in a timely manner, before appraisal formally begins, in an accessible place and in a form and language understandable to key stakeholders.	- For projects in Annex I, the municipality should announce for 18 consecutive days at the Municipality bulletin board and on the project site that an EIA is required for the project and the public can provide its comments. The Municipality is to inform the MOE of the date of the announcement - The scoping report is available for consultation at the MOE by the public or by the concerned institutions (article 7 section 9) - Decision of approval/disapproval is available at the MOE - Public and concerned institutions and the municipality is to publish such decision in its bulletin board for 12 working days -Section 18 of the draft EIA regulations states that the EIA and IEE available for examination at the MOE	Environment Protection Law # 44 4 states in Article 14 (2) that any moral or physical person has the right to have access to environmental information except the information related secrecy and national security. Such information should be provided with a month from the receipt of the request Draft EIA regulations in attachment 7 request the municipality to publish for 18 days that an EIA will be prepared in the project site Draft EIA regulations in article 7 section 9 allows access of the scoping report at the MOE Draft regulations in section 18 allows examination of the EIA and IEE at the MOE	*Significant gap.*	Disclosure of the EIA and IEE executive summary should be published on the MOE website -MOE should include mandatory disclosure requirements of the EIA under Annex I and specific IEE for infrastructure, industrial and agriculture/irrigation projects in Annex II (excluding those sensitive aspects related to trade, technology and security). Article 13 and 14 (2) of the Environment Protection Law # 444 could be used to add such requirements

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Climate Change: Issam Fares Institute for Public Policy and International Affairs: wwwlb.aub.edu.lb/~webifi/
Bureau Technique des Villes Libanaises: www.bt-villes.org
Carnegie Endowment for International Peace (Beirut): www.carnegie-mec.org
Centre de Ressources sur le Développement Local (Local Liban): www.localiban.org
5 Index website: www.5index.com
Lebanese American University: www.lau.edu.lb
The Lebanese Association for Energy Saving and for Environment: www.almee.org
The Lebanese Center for Policy Studies: www.lcps-lebanon.org
Lebanese Laws: www.lebaneselaws.com
Notre Dame University: www.ndu.edu.lb
Union of Northern Associations for Development and Patrimony: www.unadep.org
Université Libanaise: www.ul.edu.lb
Université Saint Joseph: Centre Régional pour l'Eau et l'Environnement www.usj.edu.lb
University of Balamand: www.balamand.edu.lb
University of Kaslik: www.usek.edu.lb
WHO Lebanon: www.emro.who.int/lebanon/

1.2 Lebanese Public Sector

Development Assistance Database: www.dadlebanon.org
Lebanese Army: www.lebarmy.gov.lb
    Directorate of Geographic Affairs: www.lebarmy.gov.lb/English/GeographicMain.asp
LIBNOR drinking water standards: www.mediafire.com/?lz89l9aj7gi36
Ministry of Agriculture: www.moa.gov.lb
    Green Plan: www.greenplan.gov.lb
    Lebanese Agricultural Research Institute: www.lari.gov.lb
Combating Desertification in Lebanon: www.codel-lb.org
Ministry of Culture: www.culture.gov.lb
Ministry of Economy and Trade: www.economy.gov.lb
Ministry of Energy and Water: www.energyandwater.gov.lb
    Electricité du Liban: www.edl.gov.lb
    Lebanese Center for Energy Conservation Project: www.lcecp.org.lb
    Euro-Med Water Information System (EMWIS --SEMIDE in French): www.emwis-lb.org
    CORAIL (Water Sector Capacity Building): www.corail-developpement.org
Ministry of Environment: www.moe.gov.lb
Ministry of Finance: www.finance.gov.lb
    Customs: www.customs.gov.lb
Ministry of Industry: www.industry.gov.lb
    LIBNOR: www.libnor.org
    Industrial Research Institute: www.iri.org.lb
Ministry of Interior and Municipalities: www.moim.gov.lb
Mécanique (Car Inspection): www.mecanique.com.lb

Information on Municipalities: www.moim.gov.lb/UI/guide.html#12
Tripoli Municipality: www.tripoli.gov.lb
Fayaa (Tripoli, Mina and Beddawi) Federation of Municipalities: www.urbcomfayhaa.gov.lb
TEDO Air Quality Project: www.airqualityproject.org/pagina.php?id_sec=103
Ministry of Public Health: www.public-health.gov.lb
Ministry of Public Works and Transportation: www.public-works.gov.lb
Ministry of Social Affairs: www.socialaffairs.gov.lb
Ministry of State for Administrative Reform: www.omsar.gov.lb
    Solid Waste: http://sas.omsar.gov.lb
Public Sector Studies: www.studies.gov.lb
Ministry of Tourism: www.destinationlebanon.gov.lb
Presidency of the Council of Ministers: www.pcm.gov.lb
    Central Administration of Statistics: www.cas.gov.lb
National Council for Scientific Research: www.cnrs.edu.lb
Council of Development and Reconstruction: www.cdr.gov.lb
Economic and Social Fund for Development: www.esfd.cdr.gov.lb
Investment Development Authority of Lebanon (IDAL): www.idal.com.lb
Higher Council for Privatization: www.hcp.gov.lb

2. Regional and International

Agence française de Développement: www.afd.org
Arab Decision (information on municipalities):
www.arabdecision.org/inst_brows_3_4_5_1_3_5.htm
Center for Environment and Development for the Arab Region and Europe: www.cedare.int
Cedre: www.cedre.fr
Cities Alliance: www.citiesalliance.org
CoLD project: www.coldproject.net
Conservatoire du Littoral: www.conservatoire-du-littoral.fr
Convention on Biological Diversity: www.cbd.int
Development Gateway: www.developmentgateway.org
Entri Data System (International laws): sedac.ciesin.org
European Investment Bank: www.eib.org
Euro-Mediterranean Information System on the know-how in the Water sector: www.emwis.net
FAO: www.fao.org
Fondazione Eni Enrico Mattei: www.ssrn.com
GEF: www.gef.org
GIZ (GTZ until 2011) Gesellschaft für Internationale Zusammenarbeit): www.giz.de
Global Facility for Disaster Reduction and Recovery: www.gfdrr.org
Global Water Partnership Mediterranean: www.gwpmed.org
IDRC: www.irdc.org
Institut français de recherche pour l'exploitation de la mer: www.ifremer.fr
Intergovernmental Panel on Climate Change: www.ipcc.org
International Association for Impact Assessment (IAIA): www.iaia.org
International Maritime Organisation: www.imo.org
International Monetary Fund: www.imf.org
Kyoto Protocol: www.unfccc.int
MAP: www.map.org

Medcities: www.medcities.org
METAP: www.metap.org
Millennium Development Goals: www.un.org/millenniumgoals/
National Capacity Self-Assessment GEF-UNDP-UNEP: www.ncsa.undp.org
Observatoire du Littoral: www.ifen.fr/littoral/
OECD: www.oecd.org
Ornithological Society for the Middle East: www.osme.org
PAHO: www.paho.org
PAPFAM: www.papfam.org
Plan Bleu: www.planbleu.org
Priority Action Programme: www.pap-sapei.org and www.pap-thecoastcentre.org
Public Expenditure and Financial Accountability: www.pefa.org
Ramoge: www.ramoge.org
Resources for the Future: www.rff.org
Sea Around Us: www.seaaroundus.org
SMAP: www.smaprms.net
SMAP Clearing House: www.smap.ew.eea.europa.eu
UNDP: www.undp.org
UNDP-POGAR: Programme on Governance in the Arab Region: www.undp-pogar.org
UNEP: www.unep.org
    UNEP MAP: www.unepmap.org
UNEP/IUCN World Database on Protected Areas for Marine Ecosystems: www.wdpa-marine.org
UNESCO: www.unesco.org
UN Millennium Ecosystem Assessment website: www.millenniumassessment.org
UNRWA: www.unrwa.org
UN University: www.unu.org
USAID: www.usaid.org
USEPA: www.epa.gov
Waste to Energy Research and Technology Council: www.wtert.org
WHO: www.who.int
    Centre for Environmental Health Activities**:** www.emro.who.int/ceha
Wikipedia Encyclopedia: www.wikipedia.org
WTO: www.wto.org
The World Bank Group: www.worldbank.org
    Carbon Funding: www.carbonfinance.org
    Water and Sanitation Program: www.wsp.org
World Resource Institute: www.wri.org
    Earth Trends: www.earthtrends.wri.org
World Wildlife Fund: www.wwf.org