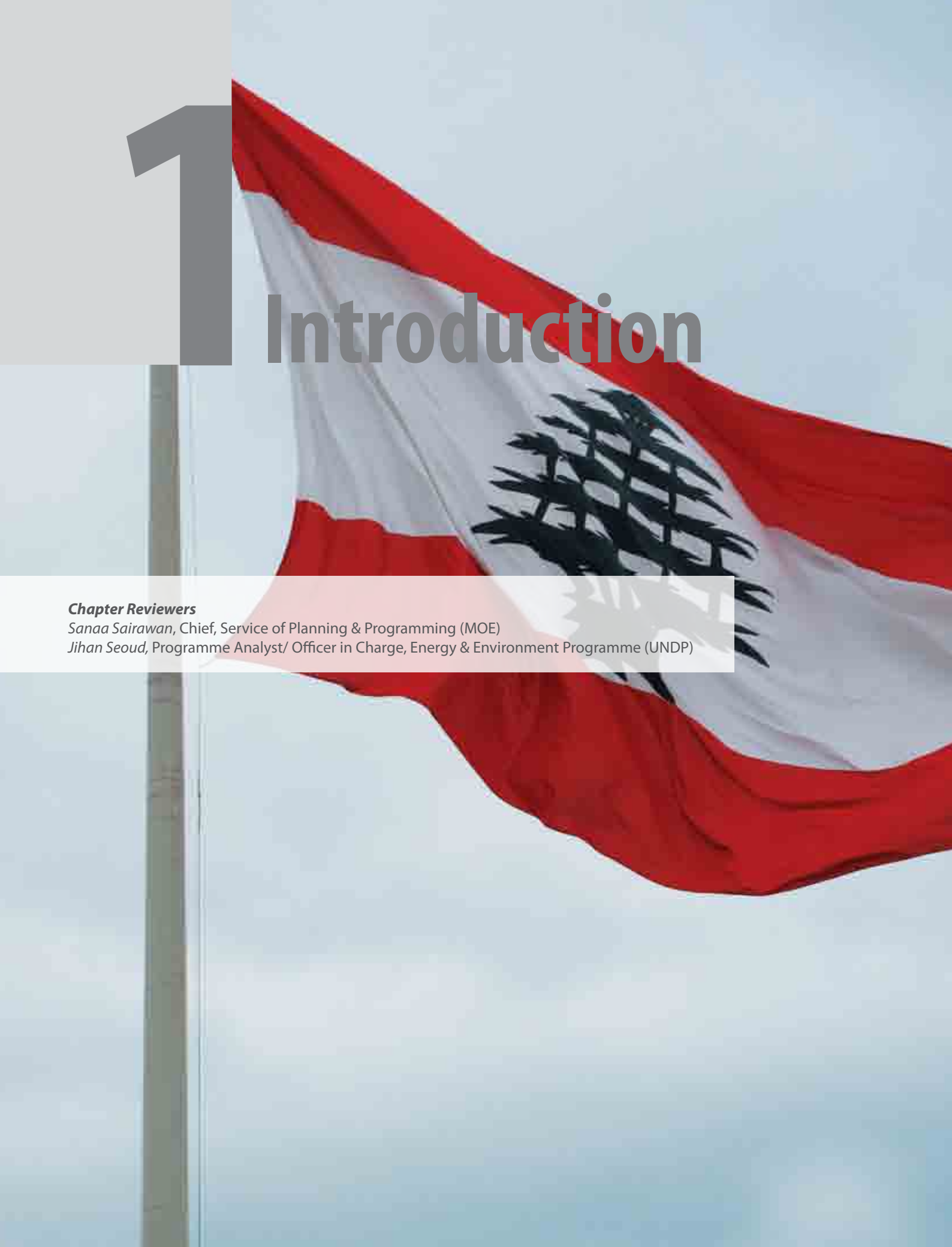
Section I: Introduction

1 Introduction



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With funding from the Lebanese Ministry of Environment (MOE), the United Nations Development Program (UNDP) contracted ECODIT, a Lebanese environmental consulting and management firm, to prepare the 2010 State of the Environment Report (SOER). Two versions of the SOER were prepared previously; in 1995, with grant funding from the World Bank / METAP, and in 2001 with MOE funding and in coordination with the Lebanese Environment and Development Observatory project[1]. The report seeks to provide a comprehensive, reliable and scientifically credible, policy-relevant, up-to-date assessment of, and outlook for, the state of the Lebanese environment. *See Box 1.1 on how the Arab people perceive the state of the environment.*

Box 1.1 How do Arab people perceive the state of the environment?

The Arab Forum for Environment and Development conducted in 2006 a public survey on environmental trends in the Arab World. According to the survey, 71% of the respondents in Lebanon said that the state of the environment in their country had deteriorated during the past ten years, and 53% of them attributed this to insufficient public expenditure on the environment (AFED, 2006).

1.1 BACKGROUND

Environmental reporting supports environmental management. While such assessments were practiced in one form or another long before the 1970s, it was at the United Nations Conference on the Human Environment (Stockholm, 1972) that environmental assessment entered the formal glossary of environmental stakeholders. Environmental assessments are today conducted by many stakeholders to meet disparate objectives as numerous as the stakeholders themselves.

There are different types of environmental assessment including State of the Environment (SOE), Integrated Environmental Assessment and Reporting (IEA), Environmental Impact Assessment (EIA), Strategic Environmental Assessment (SEA), and Corporate Environmental Assessment and Reporting. Common to these is the need for policy responses for effective environmental management and/or sustainable utilization of natural resources. Whereas State of the Environment reporting remains the most common type of reporting, SOERs have evolved in the last two decades, concomitantly with advances in global and regional environmental reporting. For example, UNEP has been compiling and publishing the Global Environment Outlook (a.k.a., GEO) leaning on the resources and expertise of hundreds of authors, contributors, reviewers and collaborating centers from around the world. Separately, the World Bank has been preparing so called *Country Environmental Analysis* reports to evaluate the state of key environment sectors and funding needs (see Box 1.2 on Lebanon's draft CEA report).

[1] LEDO was hosted at MOE, managed by UNDP, and implemented with EU funding (1999-2001)

Box 1.2 Country Environmental Analysis - Lebanon

The World Bank prepared a Country Environmental Analysis for Lebanon, concomitantly with the preparation of the Lebanon 2010 SOER. The two reports have different objectives but cover many common issues, including the state of solid waste and wastewater management. The CEA is a tool to determine the gap between the cost of mitigation (demand for funds) and government financing (supply of funds) and a platform for recommending policy reforms in priority sectors including institutional.

Source: World Bank CEA, draft Version 9, December 2010

Whereas SOER tends to provide an assessment that is predominantly static and unidirectional, Integrated Environmental Assessment approaches environmental reporting more holistically. IEA reporting integrates social, economic and environmental issues in the analyses, to support sustainable development needs around the world. IEA reporting acknowledges human-environment interactions and the impacts they have on each other over time. It incorporates environmental assessment into the whole process of environmental policy planning, pulling together the impact of policies from different sectors over time and the existing opportunities to promote sustainable livelihoods and options. Finally, it provides a baseline inventory of available resources which can be used to formulate sustainable development policies. IEA reporting encourages all stakeholders to ask whether enough is being done to conserve natural resources, promote sustainable development practices, reduce poverty, and improve the state of the environment.

1.2 METHODOLOGY

The MOE, UNDP and ECODIT worked hand in hand to prepare this report (July 2010 – June 2011). Under its contract with MOE/UNDP, ECODIT conducted the following tasks:

1) Reviewed published milestone reports and studies
2) Developed tentative SOER structure
3) Collected and reviewed other reports and databases
4) Analyzed the feasibility of integrating environmental indicators into SOE reporting

5) Prepared the draft SOER in consultation with MOE and UNDP
6) Revised and edited the draft SOER based on comments received from MOE and UNDP
7) Produced the final SOER in English
8) Translated the report into French and Arabic
9) Formatted and designed the SOER report in all three languages
10) Prepared concise and user-friendly presentations (three languages)
11) Submitted the FINAL SOER and PowerPoint Presentations (three languages)

The SOER team included the following nine subject-matter specialists:

1) Karim El-Jisr, SOER Project Director
2) Zuhier El-Hassan, Water Expert
3) Capricia Chabarekh, Air Quality Specialist
4) Ghassan Jaradi, Biodiversity and Forests Expert
5) Rita Stephan, Environment and Land Management Specialist
6) Antoine Fischfisch, Urban Planning Specialist
7) Joy Jadam, Solid Waste Specialist
8) Naji Tannous, Energy Expert
9) Issam Bou Jaoude, Hydrogeology and Karst Specialist

As part of the review process, MOE, UNDP and ECODIT mobilized about 35 reviewers including ministry staff, UNDP project staff, and outside peer reviewers. The names of lead authors, contributors, and reviewers are listed at the beginning of every chapter. In total, the SOER team conducted more than 60 interviews and consulted more than 250 references and 50 websites to produce this report. For wider dissemination, the report is available in English, French and Arabic, as well as in PowerPoint presentation format.

The title of this report was revised from *State of the Environment Report* to *State **and Trends** of the Lebanese Environment,* in line with global calls to not only understand the current situation but also assess current trends and future environmental change. Appreciating the state of the environment is important but falls short of providing an overall assessment of where the country is heading. For example

- *Environmental Governance*: What is preventing enforcement of environmental laws and regulations? Why does non-compliance persist for so long without accountability?
- *Water:* Is Lebanon's water balance critical? What is the extent of groundwater depletion and how will current abstraction rates affect water availability in the next decade? How will climate change affect water availability in the coming decades?
- *Air Quality:* Why is it so difficult to assess air quality and how far has Lebanon come in terms of air quality monitoring and the dissemination of air quality data? Is such data impacting policy formulation?
- *Biodiversity and Forests:* How many plant species did we lose in recent years and how many will be lost in the coming years if the current state continues, if current pressures are not mitigated? Are we doing enough to protected biodiversity and forests?
- *Land Resources:* Is Lebanon depleting its natural resources? How can the country better manage and control quarries? How severe is soil erosion and what can be done to minimize abuses of the coastal zone?
- *Haphazard Urbanization:* How much construction is going on and what will happen to our mountains and other natural areas if the current rate of construction continues unimpeded? Are urban planning and construction laws compatible with environmental conservation?
- *Solid Waste Crisis:* How much trash do we produce everyday and where will this all go if we do not curb generation, improve waste recovery, and incentivize waste recycling? Is Lebanon's handling of hazardous waste improving?
- *Energy Crisis:* How is economic growth affecting energy consumption and, by extension, greenhouse gas emissions? How is the market responding to advances in renewable energy technologies and how can Lebanon overcome barriers to harvesting renewable energy?

These are difficult questions that the current report seeks to address.

1.3 POPULATION DATA

As explained in the 2001 SOER, Lebanon's last population census was conducted in 1932. All population estimates have since been based on surveys and extrapolations. The most reliable source of population data in Lebanon therefore remains the Central Administration of Statistics (CAS). CAS conducted in 1996 a national survey (not a *census*) of population data and living conditions and revised their data in 2008. According to the 2008 update, Lebanon's resident population in 2007 was 3.7 million,

excluding an estimated 425,000 Palestinian refugees (CAS, 2008 and UNRWA, 2008). The total population in 2008 including refugees was therefore about 4.2 million. Compared to the year 1996, the total population (including refugees) increased by about 170,000, which is equivalent to an annual growth rate of about 0.4 percent. In reality, the real growth rate is probably higher but it is inhibited by concurrent emigration. See population distribution by mohafaza in Table 1.1.

Population growth in Lebanon, as with many of the other demographic parameters, is uncertain. The World Bank quotes a current rate of 1.2 percent per annum (WB, 2009a). In the National Land Use Master Plan (SDATL), the population will grow from 4,005,025 in 1997 to 5,230,000 in 2030, or 0.92 percent per annum (CDR-NLUMP, 2004). The Ministry of Energy and Water (MOEW) assumes a growth rate of 1.75 percent between 2007 and 2009 (MOEW, 2010). All these estimates remain significantly lower than the region (2.5% in Syria and 2.4% in Jordan in 2009). Real growth is difficult to determine with a higher level of certainty due to Lebanese emigration which is rooted in its history, during peace time as well as during conflict.

Table 1.1 Lebanon's resident population in 2007

Mohafaza	*Percent of Total*	*2007*
Beirut	9.61%	361,366
Mount Lebanon*	39.49%	1,484,474
North Lebanon	20.32%	763,712
South Lebanon	17.55%	659,718
Beqaa	13.03%	489,865
Lebanon	100%	3,759,135

Source: CAS, 2008

*Includes the southern suburbs of Beirut that are administratively part of Mt Lebanon

**Excludes Palestinian refugees (approximately 425,000 (UNRWA 2008)

1.4 LEBANON'S ADMINISTRATIVE REGIONS

Lebanon is divided into six administrative regions (called *Mohafaza*) and 25 sub-regions (called *Caza*), not including Beirut. Each *Caza* is made up of many cadastral zones (called *Manateq iikarieh*). There are about 1,500 cadastral zones in Lebanon. The largest Mohafaza is the Bekaa and the smallest is the capital Beirut. In 2003, the Parliament approved Law 522 (dated 16/07/2003) to establish two new Mohafazas by splitting the Mohafaza of the North into North and *Akkar* and the Bekaa into Bekaa and *Hermel*, bringing the total number of Mohafazas to eight. The corresponding application decrees however were never developed and the political will to implement the administrative division seems lacking.

See current administrative regions and surface areas in ***Map 1***.

1.5 READER'S GUIDE

The 2010 SOER is organized in four sections and 10 chapters, as follows:

SECTION I Introduction	Chapter 1 Introduction
	Chapter 2 Environmental Governance
SECTION II State of the Environment	Chapter 3 Water Resources
	Chapter 4 Air Quality
	Chapter 5 Biodiversity and Forests
	Chapter 6 Land Resources
SECTION III Environmental Priorities	Chapter 7 Haphazard Urbanization
	Chapter 8 Solid Waste
	Chapter 9 Energy Crisis
SECTION IV The Outlook - Towards 2020	Chapter 10 The Future Today

Each chapter may be consulted as a stand-alone document. It contains unique indicators, a full list of relevant laws and regulations, and cited references. To minimize redundancies, the SOER team has used cross-referencing extensively. Tables, figures, boxes and original photos were used to diversify the text and produce a user-friendly report. In an effort to mainstream a short list of indicators, the SOER team have selected indicators in consultation with MOE and CAS. For ease of reference, these indicators are consolidated in ***Annex 1*** at the end of this chapter.

To facilitate navigation in this report, Table 1.2 provides a crosswalk between the 2001 and 2010 SOER. In particular, the table presents the outline of the 2001 SOER (left column) and shows the corresponding location of that chapter in the 2010 SOER (right column). Noteworthy improvements include the integration of environmental pressures (described under "Economic Sectors" in 2001) with the state of the environment (presented under "State of the Environment" in 2010). Also, the current chapter on water resources approaches water issues from "source to sink", and therefore integrates wastewater issues and opportunities for water reuse into one chapter (by contrast, the 2001 SOER described water resources and wastewater separately).

Table 1.2 Crosswalk between the 2001 SOER and the 2010 SOER

Structure of 2001 SOER	*Location in 2010 SOER*
I. Introduction	Chap 1. Introduction
II. Economic Sectors (Pressures)	
1. Population	Chap 1. Introduction and Chap 3. Water
2. Agriculture	Chap 5. Biodiversity and Chap 6. Land Resources
3. Industry	Chap 3. Water Resources Chap 4. Air Quality and Chap 8. Solid Waste
4. Construction	Chap 6. Land Resources and Chap 7. Haphazard Urbanization
5. Transport	Chap 4. Air Quality and Chap 9. Energy Crisis
6. Tourism and Recreation	Chap 3. Water and Chap 5. Biodiversity and Forests
7. Energy	Chap 9. Energy
III. State of the Environment (State)	
8. Water	Chap 3. Water Resources
9. Air	Chap 4. Air Quality
10. Biodiversity and Natural Heritage	Chap 5. Biodiversity and Forests
11. Land and Soil	Chap 6. Land Resources
III. Environmental Management (Response)	
12. Land Management	Chap 6. Land Resources and Chap 7. Haphazard Urbanization
13. Solid Waste Management	Chap 8. Solid Waste
14. Wastewater Management	Chap 4. Water Resources

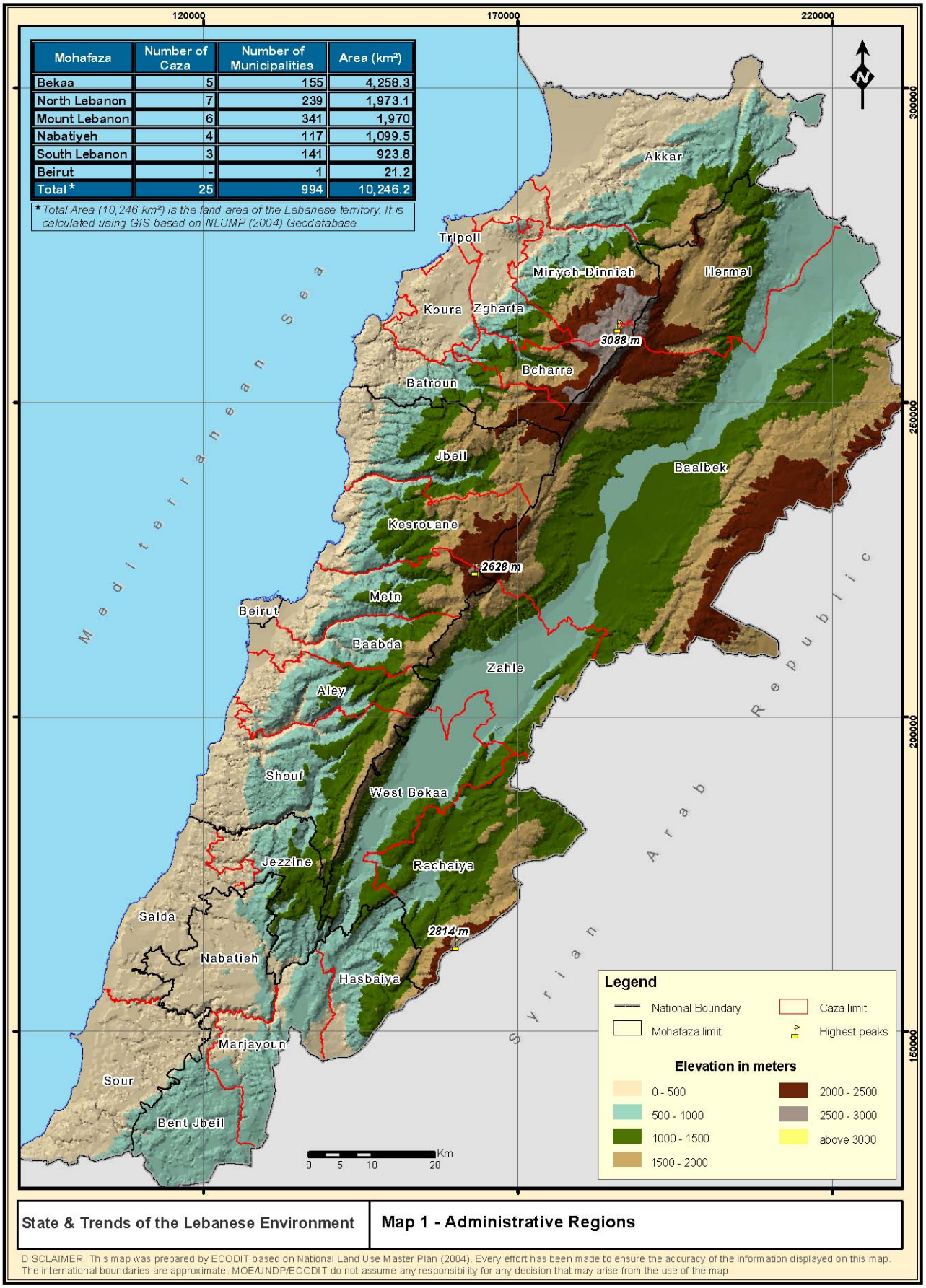
In line with UNEP guidelines for integrated environmental reports, the 2010 SOER includes a chapter on The Future Today. It provides a snapshot of the overall state of the environment, contains valuable reference numbers, and a glimpse of the future based on two outlook scenarios: Market First (business as usual) and Sustainability First. The two scenarios attempt to predict the future state of the environment if current trends in resource depletion, pollution, urbanization, etc. continue over the time horizon 2011-2020. Finally, this report presents nine maps and 15 annexes.

The SOER is a public document that must be shared with various audience groups, in Arabic, English and French as needed. There is sufficient information and analysis in this report to inform and engage schools and universities, other research centres, business groups and banks, lawmakers, international development organizations, non-governmental organizations and other professionals.

Happy Reading!

REFERENCES

CAS, 2008	Statistical Yearbook 2007, Central Administration of Statistics, 2008
CDR-NLUMP, 2004	National Land Use Master Plan of Lebanon, Prepared by Dar Al Handasah and Institut d'Amenagement et d'Urbanisme de la Région d'Ile De France, for CDR 2004
MOEW, 2010	National Water Sector Strategy: Supply/Demand Forecasts, DRAFT, MOEW , November 2010
UNRWA, 2008	http://www.unrwa.org/etemplate.php?id=65
WB, 2009a	World Bank Water Sector Public Expenditure Report, Draft 2009



Mohafaza	Number of Caza	Number of Municipalities	Area (km²)
Bekaa	5	155	4,258.3
North Lebanon	7	239	1,973.1
Mount Lebanon	6	341	1,970
Nabatiyeh	4	117	1,099.5
South Lebanon	3	141	923.8
Beirut	-	1	21.2
Total *	25	994	10,246.2

* *Total Area (10,246 km²) is the land area of the Lebanese territory. It is calculated using GIS based on NLUMP (2004) Geodatabase.*

State & Trends of the Lebanese Environment | **Map 1 - Administrative Regions**

DISCLAIMER: This map was prepared by ECODIT based on National Land Use Master Plan (2004). Every effort has been made to ensure the accuracy of the information displayed on this map. The international boundaries are approximate. MOE/UNDP/ECODIT do not assume any responsibility for any decision that may arise from the use of the map.

ANNEX 1 ENVIRONMENTAL INDICATORS USED IN THE 2010 SOER

Chapter	*Indicators*	*Value*	*Year*	*Source*
Environmental Governance	Environmental Performance Index EPI	EPI Rank 90 EPI Score 57.0	2010	http://epi.yale.edu/
Water (incl. Wastewater)	Access to safe drinking water	67.0%	2004	Living Conditions, 2004, CAS
	Access to water networks	78%	2009	World Bank, Water Sector: Public Expenditure Report, Draft, 2009
	Annual water demand per sector (%)	Agriculture: 60% Domestic: 29% Industry: 11%	2010	Country Environmental Analysis, Draft, World Bank, 2010
	Expenditure on Wastewater Management	$27,446,518	2005	CDR Progress Report, 2007
	Connection to sewerage systems	36.6% 60%	1996 2010	CAS Census of Building and Households, 1996-1997 MOEW, 2010
Air Quality (incl. Climate Change)	Ambient Concentration of air pollutants in urban/rural areas (Air pollution Index / Public information)	*In GBA* NO_2 58µg/m³ SO_2 3.1 ppb O_3 - PM_{10} 63.38µg/m³ $PM_{2.5}$ 20.4µg/m³	2010 2006 - 2010 2010	AQRU Conference, 2011 Afif et al. 2008 - Saliba & co-researchers (in progress)
	Consumption of Ozone Depleting substances	CFCs 0 MT HCFC 826 MT Methyl Bromide 84 MT	2010 2009 2009	NOU, 2010
Biodiversity & Forests	Forest area	136,300 ha	2005	FAO, 2005
	Protected Areas as percent of territory	220 km² (2.1% of the Lebanese terrirtoy)	2010	ECODIT 2010
Land Resources	Land affected by desertification	59.3 %	2000	NRP for reforestation
	Land use	Roads: 0.09% Rivers: 0.05% Water Bodies: 0.12% Unproductive land: 4.79% Wetland: 0.05% Grassland: 30.98% Scrubland: 11.94% Woodland: 13.32% Agricultural Area: 32.5% Artificial area: 6.17%	1998	MOE/NCSR/CERMOC, 2002
	Number of rehabilitated quarries	2	2010	MOE and HAS
Urbanization	Population density (incl. refugees)	400 Inhabitants/Km²	2007	CAS 2008, UNRWA 2008
	Urbanization rate[2]	87%	2005	At a glance: Lebanon Statistics, UNICEF 2007
	Urban population growth rate	2.2%		
Solid Waste	Generation of Municipal Solid Waste	1.57 Million tons of waste per year	2010	SWEEP-NET 2010
	Destination of Household waste (%)	Landfill: 51%, Open dumps: 32%, Composting: 9%, Recycling: 8%	2010	
Energy	Annual primary energy consumption per capita	1.13 (TOE*)	2004	Statistical yearbook 2000-2005; CAS 2006
	Annual electricity consumption per capita	2,745 (KWh/capita)		
	Renewable energy of total energy production	2.7 %	2007	Annuaire Statistique, CAS 2008

[3] Percentage of the total population living in urban areas

[i] LEDO was hosted at MOE, managed by UNDP, and implemented with EU funding (1999-2001)

[ii] Percentage of the total population living in urban areas