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Food and Agriculture Organization of the United Nations

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The Forest Resources Assessment Programme

Sustainably managed forests have multiple environmental and socio-economic functions important at the global, national and local scales, and play a vital part in sustainable development. Reliable and up-to-date information on the state of forest resources - not only on area and area change, but also on such variables as growing stock, wood and non-wood products, carbon, protected areas, use of forests for recreation and other services, biological diversity and forests' contribution to national economies - is crucial to support decision-making for policies and programmes in forestry and sustainable development at all levels.

FAO, at the request of its member countries, regularly monitors the world's forests and their management and uses through the Forest Resources Assessment Programme. This country report forms part of the Global Forest Resources Assessment 2010 (FRA 2010).

The reporting framework for FRA 2010 is based on the thematic elements of sustainable forest management acknowledged in intergovernmental forest-related fora and includes variables related to the extent, condition, uses and values of forest resources, as well as the policy, legal and institutional framework related to forests. More information on the FRA 2010 process and the results - including all the country reports - is available on the FRA Web site www.fao.org/forestry/fra.

The Global Forest Resources Assessment process is coordinated by the Forestry Department at FAO headquarters in Rome. The contact person for matters related to FRA 2010 is:

Mette Løyche Wilkie
Senior Forestry Officer
FAO Forestry Department
Viale delle Terme di Caracalla
Rome 00153, Italy

E-mail: Mette.LoycheWilkie@fao.org

Readers can also use the following e-mail address: fra@fao.org

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The Global Forest Resources Assessment Country Report Series is designed to document and make available the information forming the basis for the FRA reports. The Country Reports have been compiled by officially nominated country correspondents in collaboration with FAO staff. Prior to finalisation, these reports were subject to validation by forestry authorities in the respective countries.

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Report preparation and contact persons

The present report was prepared by the following person(s):

Name (FAMILY NAME, First name)	Institution / address	E-mail	Fax	Tables
STEPHAN, Jean	Ministry of Agriculture, Furn el Chebbak, main street, Lebanon	jeanstephan@hotmail.com	+961-1289747	

Introduction

Since 2005, forestry and forest resources topics in Lebanon are evolving distinctly. The first national forest resources assessment was realized in close collaboration with FAO. This assessment was the first in the country, since the last inventory was achieved in 1964. The results were striking, putting Lebanon outside the list of countries with low forest cover. Forests occupy more than 13% of the total area of the country, in addition to 10% of other wooded land.

Accordingly, forestry sector evolved towards reemitting the exploitation of fuel wood and charcoal in broadleaved forests after a decade of prohibition. This change which was partly demand driven, was followed in parallel by the reinforcement of the number of forest guards in order to better control forest exploitation. These decisions enabled the ministry of agriculture to increase the public revenues from forestry sector, as well as the increase of job opportunities related to this field.

On the other hand, coniferous forests exploitation remains far-off due to law restrictions. Consequently, the absence of management resulted into the increase of disturbances in these forests. Insects and fungi outbreaks, winter storms damages and forest fires are more frequent, and more aggressive, thus reducing the biomass and carbon stock of coniferous species.

July war in 2006 was also a major millstone that hampered forestry activities (forest fire fighting, forest management and reforestation), namely in southern Lebanon. Nevertheless, several recovery projects and funds following July war, and enabled Lebanon to restore to certain extent its infrastructure in relation to forest fire fighting and reforestation activities. These joined efforts between concerned ministries, donors and NGOs lead to the proposal of a forest fire fighting strategy and a reforestation plan.

The socio-economical conditions had a direct impact on the natural resources (including fuel wood and non-wood forest products), with a higher pressure on these resources coupled with lower public revenues.

The next decade (2010-2020) should witness the execution of the second national forest resources assessment, in the light of which, a national forest plan should be carried out, and forest legislation should be reviewed.

1 Table T1 – Extent of Forest and Other wooded land

1.1 FRA 2010 Categories and definitions

Category	Definition
Forest	Land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds <i>in situ</i> . It does not include land that is predominantly under agricultural or urban land use.
Other wooded land	Land not classified as “Forest”, spanning more than 0.5 hectares; with trees higher than 5 meters and a canopy cover of 5-10 percent, or trees able to reach these thresholds <i>in situ</i> ; or with a combined cover of shrubs, bushes and trees above 10 percent. It does not include land that is predominantly under agricultural or urban land use.
Other land	All land that is not classified as “Forest” or “Other wooded land”.
Other land with tree cover (Subordinated to “Other land”)	Land classified as “Other land”, spanning more than 0.5 hectares with a canopy cover of more than 10 percent of trees able to reach a height of 5 meters at maturity.
Inland water bodies	Inland water bodies generally include major rivers, lakes and water reservoirs.

1.2 National data

1.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
National Forest and Tree Resources Assessment and Monitoring (FAO, TCP/LEB/2903)	H	Forests and OWL	2004	
Land Cover – Land Use Project (FAO, MOA 2002); based on satellite image 1998	M	Forests and Other Wooded Lands	1998	

1.2.2 Classification and definitions

National class	Definition
Forests	Same as FRA.
Other Wooded Lands	Same as FRA
Other Lands	Same as FRA

1.2.3 Original data

Data year: 2004 - Source: National Forest and Tree Resources Assessment 2003-2005 (FAO, FRA WP 95)

Data year: 1998 – Source: Land Cover-Land Use Programme (FAO - MOA, 2002, satellite image). This source was also used for estimating Other Land with trees.

Data year 2004- 2008: Reforestation activities done by the Ministry of Environment, Ministry of Agriculture, NGOs and CBOs.

The total information of the land use area classes are expected and estimated based on the total area of the national area country, which is equivalent to 1,045,200 hectares.

LAND USE CLASS	1998 (hectares)	2004 (hectares)
Forest	133 712	139 959
Other Wooded Land	119 605	108 378
Other Land	791 589	797 152
...of which with trees (olives and fruit trees)	116 210	116 210
Inland Water	294	294
TOTAL	1 045 200	1 045 200
...of which land area	1 044 906	1 044 906

1.3 Analysis and processing of national data

1.3.1 Calibration

	1000 ha
FAOSTAT Land Area	1023
FAOSTAT Country Area	1040
FAOSTAT Inland Water Area (calculated)	17

Calibration done by land area in order to align with FAOSTAT figures:

Calibration factor: $1\ 023\ 000 / 1\ 044\ 906 = 0.9790354$

1.3.2 Estimation and forecasting

Data for 1998 was used for 2000 and the data for 2004 used for 2005 and 2010. Burned forest area is still considered as a forest. We assume that most of the urbanization occurs in OWL (mainly in fragmented forests of less than 0.5ha) and OL with trees, rather than forests. Besides, no data exists on the recent land cover/land use changes. Reforestation and afforestation reports show an increase of about 400ha of forests on private lands (communal lands).

1.3.3 Reclassification into FRA 2010 categories

Land classification for FRA 2010 remains the same as for 2005.

1.4 Data for Table T1

FRA 2010 categories	Area (1000 hectares)			
	1990	2000	2005	2010
Forest	131	131	136.5	136.9
Other wooded land	117	117	106	106
Other land	775	775	780.5	780.1
...of which with tree cover	114	114	114	114
Inland water bodies	17	17	17	17
TOTAL	1040	1040	1040	1040

1.5 Comments to Table T1

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Forest	The forest definition and data source remain as those of 2004 Forest resources assessment.	The slight increase in forest area is due to the reforestation activities by municipalities in communal lands
Other wooded land	idem	
Other land	idem	Other land is calculated by the difference
Other land with tree cover	The ministry of agriculture annual statistical reports are used to estimate the variation in the area of this category.	No changes in the area of this sub-category
Inland water bodies		No changes

Other general comments to the table

The FAO National Forest and Tree Resources Assessment 2003-2005 (FAO, FRA WP 95) project has resulted in precise data that is used for FRA 2010 reporting processes. Another assessment is expected in 2009, which would be used for further FRA reporting process.

Expected year for completion of ongoing/planned national forest inventory and/or RS survey / mapping

Field inventory	2009
Remote sensing survey / mapping	2009

2 Table T2 – Forest ownership and management rights

2.1 FRA 2010 Categories and definitions

Category	Definition
Public ownership	Forest owned by the State; or administrative units of the public administration; or by institutions or corporations owned by the public administration.
Private ownership	Forest owned by individuals, families, communities, private co-operatives, corporations and other business entities, private religious and educational institutions, pension or investment funds, NGOs, nature conservation associations and other private institutions.
Individuals (<i>sub-category of Private ownership</i>)	Forest owned by individuals and families.
Private business entities and institutions (<i>sub-category of Private ownership</i>)	Forest owned by private corporations, co-operatives, companies and other business entities, as well as private non-profit organizations such as NGOs, nature conservation associations, and private religious and educational institutions, etc.
Local communities (<i>sub-category of Private ownership</i>)	Forest owned by a group of individuals belonging to the same community residing within or in the vicinity of a forest area. The community members are co-owners that share exclusive rights and duties, and benefits contribute to the community development.
Indigenous / tribal communities (<i>sub-category of Private ownership</i>)	Forest owned by communities of indigenous or tribal people.
Other types of ownership	Other kind of ownership arrangements not covered by the categories above. Also includes areas where ownership is unclear or disputed.
Categories related to the holder of management rights of public forest resources	
Public Administration	The Public Administration (or institutions or corporations owned by the Public Administration) retains management rights and responsibilities within the limits specified by the legislation.
Individuals/households	Forest management rights and responsibilities are transferred from the Public Administration to individuals or households through long-term leases or management agreements.
Private institutions	Forest management rights and responsibilities are transferred from the Public Administration to corporations, other business entities, private co-operatives, private non-profit institutions and associations, etc., through long-term leases or management agreements.
Communities	Forest management rights and responsibilities are transferred from the Public Administration to local communities (including indigenous and tribal communities) through long-term leases or management agreements.
Other form of management rights	Forests for which the transfer of management rights does not belong to any of the categories mentioned above.

2.2 National data

2.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
National Forest and Tree Resources Assessment and Monitoring (FAO, TCP/LEB/2903)	H	Ownership and management rights	2004	

2.2.2 Classification and definitions

National class	Definition
Private	Forest owned by individuals, private co-operatives, corporations and other business entities, private religious institutions (waqf)
State	Forest owned by the Republic of Lebanon, in all its institutions including the government cabinet, the ministries, the public institutions, the army...etc. It includes also forests where the local community has a historical or legal right of using this forest.
municipality	Forest owned by the municipality, union of municipalities, or the population (community) of the concerned villages or towns (machaa)
community	Forest owned by a tribe, or a family without having a clear share of its members (waqf thurri)
Not Known	Areas where the owner of the forest could not be known.

2.2.3 Original data

National Forest and Tree Resources Assessment and Monitoring (FAO, TCP/LEB/2903) final report p.13 as well as the reforestation plans added to these figures (in municipality or communal lands).

Land tenure	(ha)
Private	84,183
State	38,189
Municipality	14521
Community	1,672
Not Known	1,394
Total	139,959

2.3 Analysis and processing of national data

2.3.1 Calibration

Calibration factor (as explained in Table 1): 0.9790354

2.3.2 Estimation and forecasting

Data for 2004 was used for 2005 and 2010 with no change. The category “unknown” was integrated with the private ownership, since the private sector is the major land owner. The

religions institutions (Waqf) own a significant part of private forests. Their estimation is rough and reaches about 35% of the total private forests.

2.3.3 Reclassification into FRA 2010 categories

National category	Corresponding FRA 2010 Category	Surface
State	Public ownership	37388
Private, Not Known	Private ownership	99636
	...of which Individuals	47745
	... of which Private business entities and institutions	34673
Municipality	of which Local communities	14216
Community	... of which Indigenous / tribal communities	1637
	Other types of ownership	

2.4 Data for Table T2

Table 2a - Forest ownership

FRA 2010 Categories	Forest area (1000 hectares)		
	1990	2000	2005
Public ownership	na	35.9	37.4
Private ownership	na	93.7	97.6
...of which owned by individuals	na	45.8	47.7
...of which owned by private business entities and institutions	na	33.3	34.7
...of which owned by local communities	na	13.1	13.6
...of which owned by indigenous / tribal communities	na	1.5	1.6
Other types of ownership	na	1.4	1.5
TOTAL	n.a.	131	136.5

Note: If other types of ownership is reported, please specify details in comment to the table.

Does ownership of trees coincide with ownership of the land on which they are situated?	<input checked="" type="checkbox"/>	Yes
	<input type="checkbox"/>	No
If No above, please describe below how the two differ:		

Table 2b - Holder of management rights of public forests

FRA 2010 Categories	Forest area (1000 hectares)		
	1990	2000	2005
Public Administration	na	35.9	37.4
Individuals	na	0	0
Private corporations and institutions	na	0	0
Communities	na	0	0
Other	na	0	0
TOTAL	n.a.	35.9	37.4

2.5 Comments to Table T2

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Public ownership		
Private ownership	The communal land is accounted with the private sector.	Most of the reforestation and afforestation activities are accounted into communal land. Hence, forest surfaces tend to increase in communal lands and private lands.
Other types of ownership		
Management rights	<p>Definition of management rights of individuals, tribes and communities are similar to those of FRA however, they are not applied or estimated due to the absence of management plans and lack of law enforcement.</p> <p>No written evidence exists about these rights, and this issue remains a hot spot and a matter of litige and conflict between the government and local communities. The meaning of “historically managed” is actually “historically used” without any management plan...</p>	Law 85 prohibits cutting in all conifer forests, including juniper forests which in majority are state forests, NGOs in close collaboration with the concerned ministry are looking forward reactivating management rights in public land.

Other general comments to the table

In what concerns table 2b, there are no defined holders of management rights of public forests. Nevertheless, many public forests are historically exploited and sometimes illegally by individuals or communities. There is no clear data about the forest area managed under these conditions.

3 Table T3 – Forest designation and management

3.1 FRA 2010 Categories and definitions

Term	Definition
Primary designated function	The primary function or management objective assigned to a management unit either by legal prescription, documented decision of the landowner/manager, or evidence provided by documented studies of forest management practices and customary use.
Protected areas	Areas especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means.
Categories of primary designated functions	
Production	Forest area designated primarily for production of wood, fibre, bio-energy and/or non-wood forest products.
Protection of soil and water	Forest area designated primarily for protection of soil and water.
Conservation of biodiversity	Forest area designated primarily for conservation of biological diversity. Includes but is not limited to areas designated for biodiversity conservation within the protected areas.
Social services	Forest area designated primarily for social services.
Multiple use	Forest area designated primarily for more than one purpose and where none of these alone is considered as the predominant designated function.
Other	Forest areas designated primarily for a function other than production, protection, conservation, social services or multiple use.
No / unknown	No or unknown designation.
Special designation and management categories	
Area of permanent forest estate (PFE)	Forest area that is designated to be retained as forest and may not be converted to other land use.
Forest area within protected areas	Forest area within formally established protected areas independently of the purpose for which the protected areas were established.
Forest area under sustainable forest management	To be defined and documented by the country.
Forest area with management plan	Forest area that has a long-term (ten years or more) documented management plan, aiming at defined management goals, which is periodically revised.

3.2 National data

3.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
National Forest and Tree Resources Assessment and Monitoring (FAO, TCP/LEB/2903)	H	Designated functions	2004	

3.2.2 Classification and definitions

National class	Definition
Production	n.a.
Natural Reserve	Full protection by law, under the administration of the Ministry of Environment
Protection	Forests can be protected from grazing and cutting and any other disturbing activities under several laws related to the ministry of agriculture, However, this protection is periodical and demand driven (by land owners)
Coniferous protection	The law (code 85) prohibits tree cutting of coniferous species in forests, even in private forests and OWL. However, exclusions are allowed for urbanization, public works, public danger and insects' breakouts.

3.2.3 Original data

Designation/protection status	Forests (ha)	OWL (ha)
Production	123814	103717
Natural Reserve	3 624	3 360
Protection	12521	1301
Total	139 959	108 378

3.3 Analysis and processing of national data

3.3.1 Calibration

The areas are multiplied by the calibration factor: 0.9790354

3.3.2 Estimation and forecasting

The data for 2004 have been used for the reporting years 2005 and 2010. No data are available for 1990 and 2000.

3.3.3 Reclassification into FRA 2010 categories

Pinus pinea is reclassified as “production” forest. *Cedrus libani* and forests in natural reserves fits under “biodiversity conservation” category. The remaining protected coniferous species are reclassified in the category of “Protection of soil and water” since it is the major service provided by these stands. Broadleaved and mixed forests are reclassified under “the “multiple use” category.

3.4 Data for Table T3

Table 3a – Primary designated function

FRA 2010 Categories	Forest area (1000 hectares)			
	1990	2000	2005	2010
Production	n.a.	n.a.	7.8	8
Protection of soil and water	n.a.	n.a.	34.2	34.4
Conservation of biodiversity	n.a.	n.a.	3.5	3.5
Social services	n.a.	n.a.	0	0
Multiple use	n.a.	n.a.	91	91
Other (please specify in comments below the table)	n.a.	n.a.	0	0
No / unknown	n.a.	n.a.	0	0
TOTAL	n.a.	131	136.5	136.9

Table 3b – Special designation and management categories

FRA 2010 Categories	Forest area (1000 hectares)			
	1990	2000	2005	2010
Area of permanent forest estate	n.a.	20	20	20
Forest area within protected areas	3.5	3.5	3.5	3.5
Forest area under sustainable forest management	0	0	0	0
Forest area with management plan	0	0	0	0

3.5 Comments to Table T3

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Production	Concerns <i>Pinus pinea</i> stands dedicated to pine nut production.	
Protection of soil and water	Concerns forests of conifers, except <i>C. libani</i> and <i>P. pinea</i>	
Conservation of biodiversity	The protected forests under the ministry of Environment have a major scope the conservation of biodiversity. The remaining cedar stands are added to this category.	
Social services		
Multiple use	Includes mainly broadleaved and mixed forests where no clear primary designated function exists.	
Other		
No / unknown designation		
Area of permanent forest estate	See remark above are conifer forests protected by law (code 85), that are not included into natural reserves and protected areas, and are not subject to cutting for urbanization and land reclamation. If we consider the protected conifer forests and natural reserves all together, and do not take	The conifer forests are protected by law (code 85) since 1996, any law amendment can change the status of these forests, especially those that are not situated into natural reserves.

	<p>into account the illegal cuttings, and forest fires we can have as permanent estate forests about 20000ha:</p> <ul style="list-style-type: none"> - 11000ha of fir and junipers (outside natural reserves) - 7000ha of stone pine for production - 2000 Other forests (mainly mixed forests but outside natural reserves) 	<p>Otherwise we can have a total area of permanent estate forests of about 20000ha, starting year 2000 (in 1990 this law didn't exist)</p>
Forest area within protected areas		
Forest area under sustainable forest management		
Forest area with management plan		

Other general comments to the table

In addition to being productive, forests and OWL play all the functions of protection of soil and water and social services. However, the primary designated function remains unclear in Lebanon, since it varies with time period, and multiple uses are often seen in forests. Ministerial decrees and code 85 hamper timber exploitation. Besides conservation of biodiversity, the protected forests and reserves play a multiple function as well, since they cover services such as protection of soil and water and social services. Area of permanent forest estate, management plans and sustainable forest management are still absent.

4 Table T4 – Forest characteristics

4.1 FRA 2010 Categories and definitions

Term / category	Definition
Naturally regenerated forest	Forest predominantly composed of trees established through natural regeneration.
Introduced species	A species, subspecies or lower taxon, occurring <u>outside</u> its natural range (past or present) and dispersal potential (i.e. outside the range it occupies naturally or could occupy without direct or indirect introduction or care by humans).
Characteristics categories	
Primary forest	Naturally regenerated forest of native species, where there are no clearly visible indications of human activities and the ecological processes are not significantly disturbed.
Other naturally regenerated forest	Naturally regenerated forest where there are clearly visible indications of human activities.
Other naturally regenerated forest of introduced species (<i>sub-category</i>)	Other naturally regenerated forest where the trees are predominantly of introduced species.
Planted forest	Forest predominantly composed of trees established through planting and/or deliberate seeding.
Planted forest of introduced species (<i>sub-category</i>)	Planted forest, where the planted/seeded trees are predominantly of introduced species.
Special categories	
Rubber plantations	Forest area with rubber tree plantations.
Mangroves	Area of forest and other wooded land with mangrove vegetation.
Bamboo	Area of forest and other wooded land with predominant bamboo vegetation.

4.2 National data

4.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
National Forest and Tree Resources Assessment and Monitoring (FAO, TCP/LEB/2903)	H	All Categories	2004	
Ministry of Environment	H	Planted forest	2008	

4.2.2 Classification and definitions

There are no national definitions or classification.

4.2.3 Original data

National Forest and Tree Resources Assessment and Monitoring (FAO, TCP/LEB/2903) for Stone pine stands, and Ministry environment reports on the reforestation plans (www.moe.org.lb). Field survey following the National Forest and Tree Resources Assessment in 2005 and the derived forest map enabled us to estimate former artificial plantations surface. *Pinus pinea* forests are all planted and cover 7776ha. Other artificial plantations realized by MoA Green Plan activities (mainly local conifer species) occupy about 1990ha. MoE reforestation program has already an area of 400ha.

4.3 Analysis and processing of national data

4.3.1 Calibration

The areas are multiplied by the calibration factor: 0.9790354

4.3.2 Estimation and forecasting

Except stone pine stands and other artificial plantations all the forests fall under the naturally regenerated forests. Besides the data showing the area of artificial plantations cited above, we estimate that NGOs, CBOs and municipalities plantations (after 2005) cover about 150ha.

4.3.3 Reclassification into FRA 2010 categories

There is no need for reclassification, since there are no national categories.

4.4 Data for Table T4

Table 4a

FRA 2010 Categories	Forest area (1000 hectares)			
	1990	2000	2005	2010
Primary forest	n.a	n.a	0	0
Other naturally regenerated forest	n.a	n.a	126.4	126.4
...of which of introduced species	n.a	n.a	0	0
Planted forest	n.a	n.a	10.1	10.5
...of which of introduced species	n.a	n.a	7.7	7.8
TOTAL	n.a	131	136.5	136.9

Table 4b

FRA 2010 Categories	Area (1000 hectares)			
	1990	2000	2005	2010
Rubber plantations (Forest)	0	0	0	0
Mangroves (Forest and OWL)	0	0	0	0
Bamboo (Forest and OWL)	0	0	0	0

4.5 Comments to Table T4

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Primary forest		
Other naturally regenerating forest		
Planted forest	Includes the reforestation and afforestation plans and added to the areas as derived from the forest map (FRA, 2005) and field surveys.	Slightly increasing, due to the efforts of the government, municipalities, NGOs, CBOs and individuals...
Rubber plantations		
Mangroves		
Bamboo		

Other general comments to the table

All forests have been historically subject to human intervention in Lebanon, which is resumed in the absence of primary forests. For instance all broadleaved forests are classified as Other naturally regenerated forests. Local coniferous species (*Pinus brutia*, *P. halepensis*, *Cedrus libani*, *Abies ciliciqua*, *Juniperus spp.* and *Cupressus sempervirens*) are either naturally regenerated or planted. Introduced species like *Pinus pinea*, *P. nigra*, *P. canariensis*, *C. arizonica*...etc. are all planted. However, except for *P. Pinea* which was introduced centuries ago, and planted on a large scale, the other species remain insignificant inside forests. Natural regeneration of introduced species is not observed.

5 Table T5 – Forest establishment and reforestation

5.1 FRA 2010 Categories and definitions

Term	Definition
Afforestation	Establishment of forest through planting and/or deliberate seeding on land that, until then, was not classified as forest.
Reforestation	Re-establishment of forest through planting and/or deliberate seeding on land classified as forest.
Natural expansion of forest	Expansion of forests through natural succession on land that, until then, was under another land use (e.g. forest succession on land previously used for agriculture).

5.2 National data

5.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Ministry of Environment	H	Reforestation/Afforestation	2004/2007	MoE official website and personal communication
Ministry of Agriculture	L	idem	2005-2008	Personal communication
NGOs	L	idem	2005-2008	Personal communication

5.2.2 Classification and definitions

National class	Definition
Reforestation and Afforestation	Artificial plantation of forests in any site, regardless of its previous land use. The site can be already a forest, and reforestation can be an artificial expansion of the original forest, or enrichment into the same area.

5.2.3 Original data

The reforestation plans achieved by the ministry of environment are reported (305ha between 2002 and 2004, and 278ha between 2004 and 2006). Data from NGOs, CBOs and municipalities cannot be accounted in areas.

5.3 Analysis and processing of national data

5.3.1 Calibration

No calibration was done.

5.3.2 Estimation and forecasting

Natural expansion as well as recent artificial plantations of forests cannot be assessed before a second National Resources Assessment or another Remote sensing interpretation.

5.3.3 Reclassification into FRA 2010 categories

We considered that in most cases, plantation activities occur in areas where forests were absent for at least 50 years. Thus, artificial plantations are mostly considered as afforestation activities.

5.4 Data for Table T5

FRA 2010 Categories	Annual forest establishment (hectares/year)			...of which of introduced species ¹⁾ (hectares/year)		
	1990	2000	2005	1990	2000	2005
Afforestation	n.a.	305	278	0	0	0
Reforestation	0	0	0	0	0	0
...of which on areas previously planted	0	0	0	0	0	0
Natural expansion of forest	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Note: The figures for the reporting years refer to the averages for the 5-year periods 1988-1992, 1998-2002 and 2003-2007 respectively.

5.5 Comments to Table T5

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Afforestation	Afforestation and Reforestation are merged in one definition in Lebanon. However all plantation activities can be considered as afforestation, since plantations occur in land that have not been classified as forest for more than 50 years	Reforestation programs are funded by several projects, the government and municipalities.
Reforestation		
Natural expansion of forest		Natural expansion of forest increased for the last decades as forests expanded due to abandon of agricultural land, war or displacement of people.

Other general comments to the table

Despite the changes that affected forests and other wooded lands' definitions, it is estimated that natural expansions contributed along with early afforestation programs realized by MoA (2000ha approx.), in increasing the forest cover in Lebanon from 7% (1964) to 13.4% (2005) of the total area of the country

6 Table T6 – Growing stock

6.1 FRA 2010 Categories and definitions

Category	Definition
Growing stock	Volume over bark of all living trees more than X cm in diameter at breast height (or above buttress if these are higher). Includes the stem from ground level or stump height up to a top diameter of Y cm, and may also include branches to a minimum diameter of W cm.
Growing stock of commercial species	Growing stock (see def. above) of commercial species.

6.2 National data

6.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
National Forest and Tree Resources Assessment and Monitoring (FAO, TCP/LEB/2903)	H	Volume Growing stock of tree species	2004	

6.2.2 Classification and definitions

National class	Definition
Growing stock	Volume over bark of all living trees more than 10 cm in diameter at breast height (or above buttress if these are higher). Includes the stem from ground level or stump height up to top of bole.

6.2.3 Original data

The national forest assessment gives the following data for 2004

Land Use	Volume (m ³ /ha)	Total volume (m ³)
Forest	35.6	4,967,361
Other Wooded Lands	5.1	550,777
Other Lands	3.7	2,984,537
Total		

Note: The following form factors were used to calculate the volume of the tree trunks. Default values of 0.5 for broadleaves, 0.7 for conifers and 0.55 for fruit trees.

6.3 Analysis and processing of national data

6.3.1 Calibration

The values of growing stock composition are multiplied by the calibration factor: 0.9790354 for area correction.

6.3.2 Estimation and forecasting

The data for 2004 have been used for the reporting year 2005. No data are available for 1990 and 2000. The forecasting for 2010 takes into consideration the trend as observed in neighbouring countries (Syria) or countries having comparable conditions (Tunisia). A biomass increase of about 5% in forests and 3% in OWL for the past five years is estimated. We estimated that wood removal is counterparted by the increase in forest areas.

6.3.3 Reclassification into FRA 2010 categories

The national data is already according to FRA 2010 categories.

6.4 Data for Table T6

Table 6a – Growing stock

FRA 2010 category	Volume (million cubic meters over bark)							
	Forest				Other wooded land			
	1990	2000	2005	2010	1990	2000	2005	2010
Total growing stock	n.a.	n.a.	4.863	5.097	n.a.	n.a.	0.533	0.548
... of which coniferous	n.a.	n.a.	3.466	3.639	n.a.	n.a.	0.382	0.394
... of which broadleaved	n.a.	n.a.	1.397	1.458	n.a.	n.a.	0.151	0.154
Growing stock of commercial species	n.a.	n.a.	1.397	1.458	n.a.	n.a.	0.151	0.154

Table 6b – Growing stock of the 10 most common species

FRA 2010 category / Species name			Growing stock in forest (million cubic meters)		
Rank	Scientific name	Common name	1990	2000	2005
1 st	<i>Pinus pinea</i>	Snawbar mothmer (stone pine)	n.a.	n.a.	1.518
2 nd	<i>Pinus brutia</i>	Yarz (Brutia pine)	n.a.	n.a.	1.273
3 rd	<i>Quercus cerris</i>	Azr (Turkish oak)	n.a.	n.a.	0.940
4 th	<i>Cedrus libani</i>	Arz (Cedar of Lebanon)	n.a.	n.a.	0.304
5 th	<i>Juniperus excelsa</i>	Lezzab (Juniper)	n.a.	n.a.	0.284
6 th	<i>Quercus infectoria</i>	Aafs (oak)	n.a.	n.a.	0.182
7 th	<i>Quercus calliprinos</i>	Sendian (Live oak)	n.a.	n.a.	0.173
8 th	<i>Juniperus drupacea</i>	Defran (Juniper)	n.a.	n.a.	0.088
9 th	<i>Platanus orientalis</i>	Delb (Oriental plane)	n.a.	n.a.	0.019
10 th	<i>Ostrya carpinifolia</i>	Shrekk (Hope horn bean)	n.a.	n.a.	0.016
Remaining			n.a.	n.a.	0.066
TOTAL			n.a.	n.a.	4.863

Note: Rank refers to the order of importance in terms of growing stock, i.e. 1st is the species with the highest growing stock. Year 2005 is the reference year for defining the species list and the order of the species.

Table 6c – Specification of threshold values

Item	Value	Complementary information
Minimum diameter (cm) at breast height ¹ of trees included in growing stock (X)	10 cm	
Minimum diameter (cm) at the top end of stem for calculation of growing stock (Y)		to the top of bole
Minimum diameter (cm) of branches included in growing stock (W)		branches not included
Volume refers to “above ground” (AG) or “above stump” (AS)	AS	

6.5 Comments to Table T6

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Total growing stock	There was an error in the calculation in 2005. Figures do not include trees with diameters lesser than 10cm, which also integrates the expansion in forest areas due to reforestation/afforestation activities since 2003.	The forecasting for 2010 takes into consideration the trend as observed in neighbouring countries (Syria) or countries having comparable conditions (Tunisia). A biomass increase of about 5% in forests and 3% in OWL for the past five years is estimated.
Growing stock of broadleaved / coniferous		
Growing stock of commercial species	Commercial species in Lebanon include all broadleaved species that are used for fuel wood and charcoal production. Coniferous species wood is still unexploited due to law restrictions.	
Growing stock composition		

Other general comments to the table

Empirical factors are still used for all species. A first study is being conducted on *P. brutia* in order to define its wood density, volume mass, correction factor and so forth, for better estimation of the volume, growing stock, biomass and carbon. Only a second National Forest Resources assessment can give an acute idea about volume increment in forests and OWL.

¹ Diameter at breast height (DBH) refers to diameter over bark measured at a height of 1.30 m above ground level or 30 cm above buttresses if these are higher than 1 m.

7 Table T7 – Biomass stock

7.1 FRA 2010 Categories and definitions

Category	Definition
Above-ground biomass	All living biomass above the soil including stem, stump, branches, bark, seeds, and foliage.
Below-ground biomass	All biomass of live roots. Fine roots of less than 2mm diameter are excluded because these often cannot be distinguished empirically from soil organic matter or litter.
Dead wood	All non-living woody biomass not contained in the litter, either standing, lying on the ground, or in the soil. Dead wood includes wood lying on the surface, dead roots, and stumps larger than or equal to 10 cm in diameter or any other diameter used by the country.

7.2 National data

7.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
National Forest and Tree Resources Assessment and Monitoring (FAO, TCP/LEB/2903)	H	Biomass stock of tree species	2004	

7.2.2 Classification and definitions

National class	Definition
Above Ground Biomass	All living biomass above the soil including stem, stump, branches, bark, seeds and foliage
Below Ground Biomass	All living biomass of live roots (root diameter above 2mm).
Dead wood	All non living woody biomass, not contained in the litter, either standing, lying on the ground or in the soil. It includes dead roots lying on the surface and stumps larger than 10cm of diameter.

7.2.3 Original data

Tables 1 and 6 were used for the calculation of biomass.

7.3 Analysis and processing of national data

7.3.1 Calibration

No calibration needed since surface areas are not needed for the calculation.

7.3.2 Estimation and forecasting

The growing stock data and wood density were used to obtain the stem biomass. Wood density has been obtained from FAO and neighbouring countries for some specific species. For the remaining coniferous and broad-leaved are taken respectively equal to 0.4 and 0.5. A biomass expansion factor has been applied to the stem biomass to calculate the above ground biomass. For this factor, the value of 1.3 is used for the coniferous, and the value of 1.4 is applied for the broad-leaved. The Root-shoot ratio is equal to 0.27, as we consider Lebanon as the subtropical dry forest. By multiplying the above ground biomass by this ratio we obtain the below ground biomass.

Growing stock of years 1990 and 2000 are not available. For the year 2010, the calculation will be the same as for 2005, and adjusted only to the changes in surface area.

There are no available data or estimated about dead wood weight in Lebanon.

7.3.3 Reclassification into FRA 2010 categories

The national data is already according to FRA 2010 categories.

7.4 Data for Table T7

FRA 2010 category	Biomass (million metric tonnes oven-dry weight)							
	Forest				Other wooded land			
	1990	2000	2005	2010	1990	2000	2005	2010
Above-ground biomass	n.a	n.a	2.780	2.913	n.a	n.a	0.304	0.313
Below-ground biomass	n.a	n.a	0.751	0.775	n.a	n.a	0.082	0.084
Dead wood	n.a	n.a	0	0	n.a	n.a	0	0
TOTAL			3.531	3.688			0.386	0.397

7.5 Comments to Table T7

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Above-ground biomass		Biomass increasing due to increment in diameter and height of trees,
Below-ground biomass		
Dead wood	Dead wood is estimated about 1.5 tons per hectare from an ongoing study in <i>P. brutia</i> stands. FRA 2005 showed that 1-4% of tree individuals are dead inside forests. However, there are no estimates about the weight of dead trees.	Dead wood would increase due to the increasing frequency and amplitude of forest fires.

Other general comments to the table

The formula was reviewed in accordance with the technical advice provided in Alexandria; estimate was made about the increase of the growing stock due to height and diameter growth of trees (paragraph 6.3.2).

8 Table T8 – Carbon stock

8.1 FRA 2010 Categories and definitions

Category	Definition
Carbon in above-ground biomass	Carbon in all living biomass above the soil, including stem, stump, branches, bark, seeds, and foliage.
Carbon in below-ground biomass	Carbon in all biomass of live roots. Fine roots of less than 2 mm diameter are excluded, because these often cannot be distinguished empirically from soil organic matter or litter.
Carbon in dead wood	Carbon in all non-living woody biomass not contained in the litter, either standing, lying on the ground, or in the soil. Dead wood includes wood lying on the surface, dead roots, and stumps larger than or equal to 10 cm in diameter or any other diameter used by the country.
Carbon in litter	Carbon in all non-living biomass with a diameter less than the minimum diameter for dead wood (e.g. 10 cm), lying dead in various states of decomposition above the mineral or organic soil.
Soil carbon	Organic carbon in mineral and organic soils (including peat) to a specified depth chosen by the country and applied consistently through the time series.

8.2 National data

8.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
National Forest and Tree Resources Assessment and Monitoring (FAO, TCP/LEB/2903)	H	Carbon stock	2004	

8.2.2 Classification and definitions

National class	Definition
Carbon in above-ground biomass	Carbon in all living biomass above the soil including stem, stump, branches, bark, seeds and foliage
Carbon in below-ground biomass	Carbon in all living biomass of live roots (root diameter above 2mm).

8.2.3 Original data

Tables 1, 6 and 7 were used for the calculation of carbon stock. Data is only available for 2005 and 2010.

8.3 Analysis and processing of national data

8.3.1 Calibration

No calibration is needed since the original data for surface has been calibrated (Table 1).

8.3.2 Estimation and forecasting

It is calculated by multiplying respectively the above-ground biomass and the below ground biomass with the default value for carbon content in living biomass (47% = 0.47 ton carbon per ton dry weight (Biomass)). Carbon found in the litter and in the soil, as well as soil depth are estimated using the empirical factors as set by the IPCC guidelines for warm temperate dry climates and predominant HAC soils.

8.3.3 Reclassification into FRA 2010 categories

The national data is already according to FRA 2010 categories.

8.4 Data for Table T8

FRA 2010 Category	Carbon (Million metric tonnes)							
	Forest				Other wooded land			
	1990	2000	2005	2010	1990	2000	2005	2010
Carbon in above-ground biomass	n.a	n.a	1.307	1.369	n.a	n.a	0.143	0.147
Carbon in below-ground biomass	n.a	n.a	0.353	0.364	n.a	n.a	0.039	0.039
Sub-total: Living biomass			1.660	1.733			0.182	0.186
Carbon in dead wood	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a
Carbon in litter	n.a	n.a	2.933	2.941	n.a	n.a	2.109	2.109
Sub-total: Dead wood and litter			2.933	2.941			2.109	2.109
Soil carbon	n.a	n.a	5.078	5.093	n.a	n.a	3.944	3.944
TOTAL			9.671	9.767			6.235	6.239

Soil depth (cm) used for soil carbon estimates	30cm
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Comments to Table T8

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Carbon in above-ground biomass	The IPCC guidelines do not cover OWL. Therefore, we counted them as forests.	
Carbon in below-ground biomass	The IPCC guidelines do not cover OWL. Therefore, we counted them as forests.	
Carbon in dead wood		
Carbon in litter	The estimations using the IPCC guidelines could overestimate the stock, since soil depth average in Lebanon is less than 30cm in most forests.	
Soil carbon	We considered all soils as LAC, and all the country as warm temperate dry, which do not take into account the high variability of soil and climatic conditions of Lebanon.	

Other general comments to the table

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9 Table T9 – Forest fires

9.1 FRA 2010 Categories and definitions

Category	Definition
Number of fires	Average number of vegetation fires per year in the country.
Area affected by fire	Average area affected by vegetation fires per year in the country.
Vegetation fire (supplementary term)	Any vegetation fire regardless of ignition source, damage or benefit.
Wildfire	Any unplanned and/or uncontrolled vegetation fire.
Planned fire	A vegetation fire regardless of ignition source that burns according to management objectives and requires limited or no suppression action.

9.2 National data

9.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
National Forest and Tree Resources Assessment and Monitoring (FAO, TCP/LEB/2903)	H	Number of fires and total area affected by fires	2004	
State of Lebanon's forests, AFDC	H	Number of fires and total area affected by fires	2005-2008	

9.2.2 Classification and definitions

There are no national classification and definitions.

9.2.3 Original data

The data provided by the National Forest and Tree Resources Assessment and Monitoring (FAO, TCP/LEB/2903) could not be used for the purposes of this report, as it refers to levels of disturbances by number of trees affected. The only data that was used is that referring to forest fires in forests: 19,652 ha of forests disturbed by fire. Data for reporting year 2010 is retrieved from the Association for Forest Development and Conservation (AFDC) reports.

9.3 Analysis and processing of national data

9.3.1 Calibration

The values are multiplied by the calibration factor: 0.9790354

9.3.2 Estimation and forecasting

The data for 2004 have been used for the reporting year 2000. No data are available for 1990. Data for 2006-2007 are used for the reporting year 2005.

9.3.3 Reclassification into FRA 2010 categories

There is no need for reclassification.

9.4 Data for Table T9

Table 9a

FRA 2010 category	Annual average for 5-year period					
	1990		2000		2005	
	1000 hectares	number of fires	1000 hectares	number of fires	1000 hectares	number of fires
Total land area affected by fire	n.a	n.a	n.a	n.a	5.3	536
... of which on forest	n.a.	n.a	19.2	n.a.	2	120
... of which on other wooded land	n.a	n.a	n.a	n.a	n.a	n.a
... of which on other land	n.a	n.a	n.a	n.a	n.a	n.a

Table 9b

FRA 2010 category	Proportion of forest area affected by fire (%)		
	1990	2000	2005
Wildfire	na	na	100
Planned fire	na	na	0

Note: The figures for the reporting years refer to the averages of annually affected areas for the 5-year periods 1988-1992, 1998-2002 and 2003-2007 respectively

9.5 Comments to Table T9

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Area affected by fire	Data does not take always into consideration the type of land cover (i.e. forest, OWL, OL)	
Number of fires	Data does not take always into consideration the type of land cover (i.e. forest, OWL, OL)	
Wildfire / planned fire	Planned fires are often found in <i>Pinus pinea</i> stands as land owners or exploiters tend to clean the understory vegetation for better management of the stand for pine nut production. However, there is no clear data about these fires.	

Other general comments to the table

Fires occur mainly in *Pinus brutia* stands, in areas below 1200m of altitude where the forest is more prone to fire. The absence of management plans for *Pinus brutia* due to law restrictions is a major milestone to overcome.

10 Table T10 – Other disturbances affecting forest health and vitality

10.1 FRA 2010 Categories and definitions

Term	Definition
Disturbance	Damage caused by any factor (biotic or abiotic) that adversely affects the vigour and productivity of the forest and which is not a direct result of human activities.
Invasive species	Species that are non-native to a particular ecosystem and whose introduction and spread cause, or are likely to cause, socio-cultural, economic or environmental harm or harm to human health.
Category	Definition
Disturbance by insects	Disturbance caused by insect pests.
Disturbance by diseases	Disturbance caused by diseases attributable to pathogens, such as bacteria, fungi, phytoplasma or virus.
Disturbance by other biotic agents	Disturbance caused by biotic agents other than insects or diseases, such as wildlife browsing, grazing, physical damage by animals, etc.
Disturbance caused by abiotic factors	Disturbances caused by abiotic factors, such as air pollution, snow, storm, drought, etc.

10.2 National data

10.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
National Forest and Tree Resources Assessment and Monitoring (FAO, TCP/LEB/2903)	M	disturbance	2004	No sub-categories according to the kind of disturbance
State of Lebanon's forests, AFDC	M	disturbance	2007	

10.2.2 Original data

For 1990, no data is available, for 2000, the MoA and FAO reports concerning the outbreak of *Cephalosia tannouriniensis* that occurred in a cedar stand in Tannourine. For the year 2005, data provided by the National Forest and Tree Resources Assessment and Monitoring (FAO, TCP/LEB/2903) refers to levels of disturbances by number of trees affected. The number of affected trees was 4775 estimated as to be 4% of trees showing symptoms of disturbances (insects, fungi, bacteria, biotic or abiotic) No reports are available yet for 2010.

10.3 Analysis and processing of national data

10.3.1 Calibration

There is no calibration needed for this section.

10.3.2 Estimation and forecasting

Most of the disturbance occurred in coniferous forest stands, precisely in pines (*P. pinea* and *P. brutia*) which showed symptoms of insect outbreaks or disturbances due to abiotic factors (mainly wind and snow). If we consider that percentage of trees affected is the same for surface area, and exclude human induced disturbances (including forest fires) we can estimate percentage of affected area.

10.3.3 Reclassification into FRA 2010 categories

There is no reclassification needed, since FRA categories are adopted.

10.4 Data for Table T10

Table 10a – Disturbances

FRA 2010 category	Affected forest area (1000 hectares)		
	1990	2000	2005
Disturbance by insects	n.a	0.6	1.0
Disturbance by diseases	n.a	n.a	1.0
Disturbance by other biotic agents	n.a	n.a	0
Disturbance caused by abiotic factors	n.a	n.a	1.53
Total area affected by disturbances	n.a	0.6	3.53

Notes: The figures for the reporting years refer to the averages of annually affected areas for the 5-year periods 1988-1992, 1998-2002 and 2003-2007 respectively.

The total area affected by disturbances is not necessarily the sum of the individual disturbances as these may be overlapping.

Table 10b – Major outbreaks of insects and diseases affecting forest health and vitality

Description / name	Tree species or genera affected (scientific name)	Year(s) of latest outbreak	Area affected (1000 hectares)	If cyclic, approx. cycle (years)
<i>Cephalcia tannourinensis</i>	<i>Cedrus libani</i>	1994-2002	0.6	n.a
<i>Thaumetopia wilkensoni</i>	<i>Pinus brutia</i> ; <i>P. halepensis</i>	yearly	n.a	n.a
<i>Ernobius sp.</i>	<i>Pinus pinea</i>	Increasing trend since 2000	n.a	n.a
<i>Tomicus piniperda</i>	<i>Pinus pinea</i>	Increasing trend since 2000	n.a	n.a
Snow, wind and strike	All species, mainly <i>P. brutia</i>	Increasing trend since 2007	n.a	n.a
Die back (unidentified origin)	<i>Juniperus drupacea</i>	Increasing trend since 2004	n.a	n.a
<i>Chalcophora detrita</i>	<i>Pinus pinea</i>	occasionally	n.a	n.a
<i>Phytoecia sp.</i>	<i>Pinus pinea</i>	occasionally	n.a	n.a
<i>Pitophtorus pubescens</i>	<i>Pinus pinea</i>	occasionally	n.a	n.a
<i>Lymantria dispar</i>	<i>Quercus sp.</i>	occasionally	n.a	n.a

Note: Area affected refers to the total area affected during the outbreak.

Table 10c – Area of forest affected by woody invasive species

Scientific name of woody invasive species	Forest area affected 2005 (1000 hectares)
n.a.	0
Total forest area affected by woody invasive species	0

Note: The total forest area affected by woody invasive species is not necessary the sum of the values above, as these may be overlapping.

10.5 Comments to Table T10

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Disturbance by insects	The area is deduced from the percentage of affected trees in the forest.	Increasing
Disturbance by diseases	The area is deduced from the percentage of affected trees in the forest.	Increasing mainly in non-managed coniferous forests.
Disturbance by other biotic agents	Mainly grazing and other human activities that is difficult to assess.	Decreasing in forests, but increasing in OWL
Disturbance caused by abiotic factors	The area is deduced from the percentage of affected trees in the forest.	
Major outbreaks	Reports mention only <i>Cephalcia tannourinensis</i>	
Invasive species	No invasive woody species exists in forests in Lebanon.	

Other general comments to the table

All kind of disturbances are estimated by a percentage of affected trees and not by surface area, except for the Tannourine cedar stands where 80% of the trees were affected between 1998 and 2002 by *Cephalcia tannourinensis*. Most other insects are mostly frequent near urban areas, in isolated old trees, and on forest boundaries.

11 Table T11 – Wood removals and value of removals

11.1 FRA 2010 Categories and definitions

Category	Definition
Industrial roundwood removals	The wood removed (volume of roundwood over bark) for production of goods and services other than energy production (woodfuel).
Woodfuel removals	The wood removed for energy production purposes, regardless whether for industrial, commercial or domestic use.

11.2 National data

11.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
MoA	M	Woodfuel removal	2006, 2007	Estimations are made from licensed wood removal and cutting, since illegal cutting cannot be assessed

11.2.2 Classification and definitions

National class	Definition
Fuelwood	Fuel wood collected from broadleaved species
Charcoal	Charcoal produced from broadleaved species wood
Other wood	Wood from conifers and ornamental trees that are not industrialized

11.2.3 Original data

Wood weight estimation, from tree cutting and exploitation licences as given by the ministry of agriculture since 2006. However, the licences estimations cover about 60% of the total removal. Conifer fuel wood is not licensed, and thus not accounted.

11.3 Analysis and processing of national data

11.3.1 Calibration

No calibration needed.

11.3.2 Estimation and forecasting

Wood removal is estimated in weight (kilograms and tons). In order to obtain it in cubic meters, we divide the weight by the density that is used in Lebanon (between 0.5 and 0.58) for broadleaved species. This estimation is divided also by 0.6 in order to take into consideration the illegal cutting and wood removal.

From the licenses delivered by the Ministry of Agriculture, we estimate that 70% of the wood removal occurs in Forests, the remaining in OWL and OL.

11.3.3 Reclassification into FRA 2010 categories

Charcoal and fuel wood are merged together, knowing that 4 tons of wood produce 1 ton of charcoal.

11.4 Data for Table T11

FRA 2010 Category	Industrial roundwood removals			Woodfuel removals		
	1990	2000	2005	1990	2000	2005
Total volume (1000 m ³ o.b.)	0	0	0	n.a	n.a	18.2
... of which from forest	0	0	0	n.a	n.a	12.7
Unit value (local currency / m ³ o.b.)	0	0	0	n.a	n.a	411000
Total value (1000 local currency)	0	0	0	n.a	n.a	7480200

Note: The figures for the reporting years refer to the averages of years 2006 and 2007.

	1990	2000	2005
Name of local currency	Lebanese Pounds	L.P	L.P

11.5 Comments to Table T11

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Total volume of industrial roundwood removals	Industrial wood removal is still prohibited and not applicable to Lebanon. The only industrial activity is artisanal handicraft, which quantities are negligible and difficult to estimate and value.	
Total volume of woodfuel removals		
Unit value	The value is in most cases in USD. 1USD =1507 LP One ton of fuelwood cost 200\$ which is 300000 usd. Each cubic meter average price is estimated to 411000 LP. A ton of charcoal (requiring 4t of wood) is sold at 1000 usd (1500000 LP)!	Increasing trend due to a higher demand on fuelwood.
Total value		Increasing trend due to a higher demand on fuelwood.

Other general comments to the table

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12 Table T12 – Non-wood forest products removals and value of removals

12.1 FRA 2010 Categories and definitions

Term	Definition
Non-wood forest product (NWFP)	Goods derived from forests that are tangible and physical objects of biological origin other than wood.
Value of NWFP removals	For the purpose of this table, value is defined as the market value at the site of collection or forest border.

NWFP categories

Category
<p><u>Plant products / raw material</u></p> <ol style="list-style-type: none"> 1. Food 2. Fodder 3. Raw material for medicine and aromatic products 4. Raw material for colorants and dyes 5. Raw material for utensils, handicrafts & construction 6. Ornamental plants 7. Exudates 8. Other plant products <p><u>Animal products / raw material</u></p> <ol style="list-style-type: none"> 9. Living animals 10. Hides, skins and trophies 11. Wild honey and bee-wax 12. Wild meat 13. Raw material for medicine 14. Raw material for colorants 15. Other edible animal products 16. Other non-edible animal products

12.2 National data

12.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
National Forest and Tree Resources Assessment and Monitoring (FAO, TCP/LEB/2903)	M	Non-wood forest product (NWFP)	2004	
Ministry of agriculture statistical annual reports and studies	H	Production and value of some products	2006-7	Products such as pine nuts, carob molasses, honey, can be roughly estimated.
Stratégie et Politique Agricole : <i>L'espace Rural Libanais</i>	H	NWFP	2001	

Stratégie et Politique Agricole : <i>La filière plantes aromatiques et médicinales</i>	H	NWFP	2001	
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The expert's opinion in the estimation of several products and their importance and ranking is drawn from personal communications with several non-wood forest products exploiters and users in Lebanon.

12.2.2 Classification and definitions

National classification is in accordance with FRA definitions.

12.2.3 Original data

There is no original data available, except the surface area of stone pine.

12.3 Data for Table T12

Rank	Name of product	Key species	Unit	NWFP removals 2005		NWFP category
				Quantity	Value (1000 local currency)	
1 st	Pine nut	<i>Pinus pinea</i> ,	tons	1500	41400000	1
2 nd	Oregano	<i>Origanum syriacum</i>	tons	3000	24000000	1
3 rd	Sumac	<i>Rhus coriaria</i>	tons	n.a	n.a	1
4 th	Carob molasses	<i>Ceratonia siliqua</i>	tons	2800	1680000	1, 2, 3, 6
5 th	Sage	<i>Salvia fruticosa</i> ,...etc.	tons	700	315000	3
6 th	Laurel oil and leaves	<i>Laurus nobilis</i>	Liters	5000	45000	3
7 th	Myrtle fruits and leaves	<i>Myrtus communis</i>	tons	n.a	n.a	1, 6
8 th	Wild boar		tons	n.a	n.a	12
9 th	Chamomile		tons	2	2000	3
10 th	Birds		n.a	n.a	n.a	9,15
All other plant products					n.a	
All other animal products					n.a	
TOTAL					n.a	

	2005
Name of local currency	LP

12.4 Comments to Table T12

Variable / category	Comments related to data, definitions, etc.
10 most important products	Most products occur in forests and OWL and even in OL. The estimations concern the total production in the country, regardless of the land cover. However, species known to thrive only in OL are not accounted. Laurel is also exploited for its leaves (culinary use). The extraction of leaves is estimated to 2 tons, with the value of 6000000 LP.
Other plant products	Mainly edible and medicinal plants harvested by rural communities. There is no existing data about these species, the extracted quantities as well as the trend of harvesting.
Other animal products	Mainly birds, snails and small mammals. There is no existing data about these species, the number of hunted and collected animals, nor the trend.
Value by product	Since the harvested and collected fauna and flora species are spontaneous and mostly for local consumption, and with the absence of any permit of exploitation or any mechanism for estimation, values cannot be estimated.
Total value	The unknown information could be estimated as as best ones or challenging and anyone could propose another figure but should bring evidence for what he is suggesting.

Other general comments to the table

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13 Table T13 – Employment

13.1 FRA 2010 Categories and definitions

Category	Definition
Full-time equivalents (FTE)	A measurement equal to one person working full-time during a specified reference period.
Employment	Includes all persons in paid employment or self-employment.
Paid employment	Persons who during a specified reference period performed some work for <u>wage or salary</u> in cash or in kind.
Self-employment	Persons who during a specified reference period performed some work for <u>profit or family gain</u> in cash or in kind (e.g. employers, own-account workers, members of producers' cooperatives, contributing family workers).

13.2 National data

13.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
MoE	H	Employment in the management of protected areas	2008	

Data is based on the expert opinion, including personal communication with workers in fuel wood collection, charcoal and pine nut production, and natural reserves committees.

13.2.2 Original data

Original data is based on tables 11 and 12.

13.3 Analysis and processing of national data

Five tons of fuel wood ready for use or charcoal production requires 6 FTE-days. One ton of charcoal requires 6 FTE-days. Thus, to produce 18200 m³ (9100t of wood/charcoal) we need 10920 FTE-days or 49 FTE (on the basis of 225 working days per year).

One ton of pine nut (white grain) harvesting requires 200 FTE-days. Pruning and cleaning the understory of one hectare of *Pinus pinea* (260 trees/ha) trees requires an average of 64 FTE-days every four years, or 16 FTE-days per year. Stone pine exploitation requires 390560 FTE-days or 1736 FTE (for 1500t of pine nuts produced on an area of 5660 hectares). The total of 401 496 FTE-days per year has been divided by 225 working days per year to estimate the number of man-years FTE.

Self-employment is roughly estimated to one third of the total employment.

13.4 Data for Table T13

FRA 2010 Category	Employment (1000 years FTE)		
	1990	2000	2005
Employment in primary production of goods	n.a.	n.a.	1.785
...of which paid employment	n.a.	n.a.	1.190
...of which self-employment	n.a.	n.a.	0.595
Employment in management of protected areas	n.a.	n.a.	5.148

13.5 Comments to Table T13

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Employment in primary production of goods	Concerns only employment for the exploitation of forest trees: fuel wood (including charcoal) and pine nuts.	This trend is to increase with the higher demand on fuel wood and pine nuts, especially in deprived areas.
Paid employment / self-employment	Does not include shepherds, beekeepers, landowners, plant and animal collectors, hunters and secondary users...	The trend of such employment is decreasing since people are not keen to work in forestry and agricultural activities that are less remunerating than other type of employment.
Employment in management of protected areas	Does not include forest guards, municipality guards, landowners...	The trend is increasing due to increasing ecotourism activities in natural reserves.

Other general comments to the table

Since there is no syndicate that integrates all workers in the forestry sector, and since forestry is not a major income resource in Lebanon, it is rarely the only generated income by families, and thus difficult to estimate.

14 Table T14 – Policy and legal framework

14.1 FRA 2010 Categories and definitions

Term	Definition
Forest policy	A set of orientations and principles of actions adopted by public authorities in harmony with national socio-economic and environmental policies in a given country to guide future decisions in relation to the management, use and conservation of forest and tree resources for the benefit of society.
Forest policy statement	A document that describes the objectives, priorities and means for implementation of the forest policy.
National forest programme (nfp)	A generic expression that refers to a wide range of approaches towards forest policy formulation, planning and implementation at national and sub-national levels. The national forest programme provides a framework and guidance for country-driven forest sector development with participation of all stakeholders and in consistence with policies of other sectors and international policies.
Law (Act or Code) on forest	A set of rules enacted by the legislative authority of a country regulating the access, management, conservation and use of forest resources.

14.2 Data for Table T14

Indicate the existence of the following (2008)			
Forest policy statement with national scope	<input type="checkbox"/>	Yes	
	<input checked="" type="checkbox"/>	No	
If Yes above, provide:	Year of endorsement		
	Reference to document		
National forest programme (nfp)	<input type="checkbox"/>	Yes	
	<input checked="" type="checkbox"/>	No	
If Yes above, provide:	Name of nfp in country		
	Starting year		
	Current status	<input type="checkbox"/>	In formulation
		<input type="checkbox"/>	In implementation
		<input type="checkbox"/>	Under revision
<input type="checkbox"/>		Process temporarily suspended	
Reference to document or web site			
Law (Act or Code) on forest with national scope	<input checked="" type="checkbox"/>	Yes, specific forest law exists	
	<input type="checkbox"/>	Yes, but rules on forests are incorporated in other (broader) legislation	
	<input type="checkbox"/>	No, forest issues are not regulated by national legislation	
If Yes above, provide:	Year of enactment	1949	
	Year of latest amendment	1996	
	Reference to document	Forest laws booklet/Government laws (book nb. 18)	

In case the responsibility for forest policy- and/or forest law-making is decentralized, please indicate the existence of the following and explain in the comments below the table how the responsibility for forest policy- and law-making is organized in your country.		
Sub-national forest policy statements	<input type="checkbox"/>	Yes
	<input checked="" type="checkbox"/>	No
If Yes above, indicate the number of regions/states/provinces with forest policy statements		
Sub-national Laws (Acts or Codes) on forest	<input type="checkbox"/>	Yes
	<input checked="" type="checkbox"/>	No
If Yes above, indicate the number of regions/states/provinces with Laws on forests		

14.3 Comments to Table T14

Variable / category	Comments related to data, definitions, etc.
Forest policy statement with national scope	No formal policy exists for forestry in Lebanon, however a strategy for forest fire is under conception
National forest programme (nfp)	A national programme for reforestation exists within the Ministry of Environment. However this programme is independent from the Ministry of Agriculture activities and is not coherent with a national plan or scope for forestry.
Law (Act or Code) on forest with national scope	Beside the law, several decrees have been elaborated since the last amendment in 1996, however this law has been compiled and reviewed, and several studies and analyses have been realized and suggest amendments to be done to this law.
Sub-national forest policy statements	
Sub-national Laws (Acts or Codes) on forest	

Other general comments to the table

Several cross cutting responsibilities exist between different governmental institutions that deal with forestry, forest fire fighting, protection, law enforcement, and other forest related issues. For instance, the forest fire fighting integrates the efforts of the Civil Defence (Ministry of Interior), Forest guards (Ministry of Agriculture) and the army (Ministry of Defence). Law enforcement is mandated to the Ministry of Agriculture; however the municipal guards and the police have also the right to put into effect the law.

15 Table T15 – Institutional framework

15.1 FRA 2010 Categories and definitions

Term	Definition
Minister responsible for forest policy-making	Minister holding the main responsibility for forest issues and the formulation of the forest policy.
Head of Forestry	The Head of Forestry is the Government Officer responsible for implementing the mandate of the public administration related to forests.
Level of subordination	Number of administrative levels between the Head of Forestry and the Minister.
University degree	Qualification provided by University after a minimum of 3 years of post secondary education.

15.2 Data for Table T15

Table 15a – Institutions

FRA 2010 Category	2008
Minister responsible for forest policy formulation : please provide full title	Minister of Agriculture Engineer Elias Skaff
Level of subordination of Head of Forestry within the Ministry	1 st level subordination to Minister
	2 nd level subordination to Minister
	x 3 rd level subordination to Minister
	4 th or lower level subordination to Minister
Other public forest agencies at national level	Ministry of Environment
Institution(s) responsible for forest law enforcement	Ministry of Agriculture Ministry of Interior and Municipalities

Table 15b – Human resources

FRA 2010 Category	Human resources within public forest institutions					
	2000		2005		2008	
	Number	%Female	Number	%Female	Number	%Female
Total staff	na	na	210	9%	236	8%
...of which with university degree or equivalent	na	na	12	17%	11	18%

Notes:

1. Includes human resources within public forest institutions at sub-national level
2. Excludes people employed in State-owned enterprises, education and research, as well as temporary / seasonal workers.

15.3 Comments to Table T15

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Minister responsible for forest policy formulation		
Level of subordination of Head of Forestry within the Ministry	The head of forestry department proposes his plans and activities to the Director of rural development and natural resources management, which also refers to the Director General of the Ministry, then the Minister, each one according to his responsibilities	
Other public forest agencies at national level	The Ministry of Environment is responsible on natural reserves management, and holds the reforestation program	
Institution(s) responsible for forest law enforcement	The forest guards of the ministry of agriculture as well as the police and municipality guards of the ministry of Interior are responsible for law enforcement	
Human resources within public forest institutions	This includes engineers and forest guards at both Ministry of Agriculture and Ministry of Environment (unit dealing with forestry). It excludes staff of institutions dealing with law enforcement, fire fighting and research...	

Other general comments to the table

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16 Table T16 – Education and research

16.1 FRA 2010 Categories and definitions

Term	Definition
Forest-related education	Post-secondary education programme with focus on forests and related subjects.
Doctor's degree (PhD)	University (or equivalent) education with a total duration of about 8 years.
Master's degree (MSc) or equivalent	University (or equivalent) education with a total duration of about five years.
Bachelor's degree (BSc) or equivalent	University (or equivalent) education with duration of about three years.
Technician certificate or diploma	Qualification issued from a technical education institution consisting of 1 to 3 years post secondary education.
Publicly funded forest research centers	Research centers primarily implementing research programmes on forest matters. Funding is mainly public or channelled through public institutions.

16.2 National data

There are no forest related education and research institutions in Lebanon.

16.3 Data for Table T16

FRA 2010 Category	Graduation ¹⁾ of students in forest-related education					
	2000		2005		2008	
	Number	%Female	Number	%Female	Number	%Female
Master's degree (MSc) or equivalent	0	0	0	0	0	0
Bachelor's degree (BSc) or equivalent	0	0	0	0	0	0
Forest technician certificate / diploma	0	0	0	0	0	0
FRA 2010 Category	Professionals working in publicly funded forest research centres ²⁾					
	2000		2005		2008	
	Number	%Female	Number	%Female	Number	%Female
Doctor's degree (PhD)	0	0	0	0	0	0
Master's degree (MSc) or equivalent	0	0	0	0	0	0
Bachelor's degree (BSc) or equivalent	0	0	0	0	0	0

Notes:

1. Graduation refers to the number of students that have successfully completed a Bachelor's or higher degree or achieved a certificate or diploma as forest technician.
2. Covers degrees in all sciences, not only forestry.

16.4 Comments to Table T16

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Graduation of students in forest-related education	The forestry course provided to students is one credit and is not significant. The diploma is a bachelor or agriculture engineer. Majors (plant protection, animal production...) do not include forestry.	
Professionals working in public forest research centres		

Other general comments to the table

There is no educational or research institution in Lebanon that provides a degree in forestry. This issue is given only as a secondary course or credit in universities that has BS and MS degrees in agriculture and environment related subjects. This mostly due to the minor economical importance of forestry in Lebanon.

17 Table T17 – Public revenue collection and expenditure

17.1 FRA 2010 Categories and definitions

Category	Definition
Forest revenue	All government revenue collected from the domestic production and trade of forest products and services. For this purpose, forest products include: roundwood; sawnwood; wood-based panels; pulp and paper; and non-wood forest products. As far as possible, this should include revenue collected by all levels of government (i.e. central, regional/provincial and municipal level), but it should exclude the income of publicly owned business entities.
Public expenditure	All government expenditure on forest related activities (further defined below).
Operational expenditure (sub-category to Public expenditure)	All government expenditure on public institutions solely engaged in the forest sector. Where the forest administration is part of a larger public agency (e.g. department or ministry), this should only include the forest sector component of the agency's total expenditure. As far as possible, this should also include other institutions (e.g. in research, training and marketing) solely engaged in the forest sector, but it should exclude the expenditure of publicly owned business entities.
Transfer payments (sub-category to Public expenditure)	All government expenditure on direct financial incentives paid to non-government and private-sector institutions, enterprises communities or individuals operating in the forest sector to implement forest related activities.
Domestic funding	Public expenditure funded from domestic public financial resources, including: retained forest revenue; forest-related funds; and allocations from the national budget (i.e. from non-forest sector public revenue sources).
External funding	Public expenditure funded from grants and loans from donors, non-governmental organisations, international lending agencies and international organisations, where such funds are channelled through national public institutions.

17.2 National data

17.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
MoA	H	Forest revenue, Forest expenditure	2007-8	
MoE	H	Forest expenditure	2007-8	

17.2.2 Classification and definitions

National class	Definition
Communal land exploitation (bidding)	Exploitation of forests, other wooded land and rangeland for charcoal and pine nut production, fuel wood production, fodder and grazing, through bids according to tender dossier delivered and supervised by MoA and municipalities.
Tree cutting and charcoal production licences	Licences delivered by the MoA for private landowners
Forestry activities in communal lands (reforestation, maintenance...)	Expenditure in communal land related to forestry activities, accounting 1/3 of the money collected form communal land exploitation, under MoA supervision
Operational expenditure (MoA, MoE)	Salaries and grants related to the forestry department in MoA and the

	protected areas and reforestation sections at MoE, and all forestry activities done by these ministries and the municipalities...
Transfer payments (MoA, MoE)	Contracts with private sector and NGOs to implement forestry activities (reforestation, forest management, forest protection from insects and diseases, research, studies, monitoring...).
Domestic funding	FRA definition
External funding	FRA definition

17.2.3 Original data

All data comes from the archive of the Ministry of Agriculture/directorate of rural development and natural resources (years 2007-2008), as well as from the ministry of Environment for the same years.

Communal land exploitation (bidding)	1478500000 LP (average 2007-2008)
Tree cutting and charcoal production licences	34500000 LP (450 licences for about 6000t in 2008)
Forestry activities in communal lands (reforestation, maintenance...)	492833333 LP (one third of the communal land revenue in 2007-08)
Operational expenditure (MoA, MoE)	3812000000 LP (average 2007-2008)
Transfer payments (MoA, MoE, donors, international organizations to private sector and NGOs...)	2350900000 LP (average 2007-2008)
Domestic funding	5404733333 LP (2008)
External funding	5688000000 LP (2008)

17.3 Analysis and processing of national data

We estimate that forest revenues are underestimated because of leakage of controlled revenues from exploited communal lands. All this leakage is estimated to reach up to 30% of the forest revenue. Values tend to decrease because of the economical crisis and the pressure on the natural resources, which makes the authorities obliged to accept the accorded low prices during bids, or even deliver permits to exploit the natural resources for free without retrieving any charge (fuel wood, fodder, non-wood forest products...). External funding tends to decrease, as most of the funds came after July war in 2006, as recovery or rehabilitation funds.

17.4 Data for Table T17

Table 17a - Forest revenues

FRA 2010 Categories	Revenues (1000 local currency)		
	2000	2005	2008
Forest revenue	n.a	n.a	1513000000 LP

Table 17b - Public expenditure in forest sector by funding source

FRA 2010 Categories	Domestic funding (1000 local currency)		External funding (1000 local currency)		Total (1000 local currency)	
	2000	2008	2000	2008	2000	2008
Operational expenditure	n.a	4304833333	n.a	4132500000	n.a	8437333333
Transfer payments	n.a	795400000	n.a	1555500000	n.a	2350900000
Total public expenditure	n.a	5100233333	n.a	5688000000	n.a	10788233333
If transfer payments are made for forest management and conservation, indicate for what specific objective(s) - Please tick all that apply.	<input checked="" type="checkbox"/>	Reforestation				
	<input type="checkbox"/>	Afforestation				
	<input checked="" type="checkbox"/>	Forest inventory and/or planning				
	<input type="checkbox"/>	Conservation of forest biodiversity				
	<input type="checkbox"/>	Protection of soil and water				
	<input checked="" type="checkbox"/>	Forest stand improvement				
	<input checked="" type="checkbox"/>	Establishment or maintenance of protected areas				
	<input checked="" type="checkbox"/>	Other, specify below				
Forest fire fighting, protection from insect and fungi outbreaks						

17.5 Comments to Table T17

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Forest revenue	Year 2008 and not 2005 Includes only revenues of MoA and municipalities. It does not include entrance fees to protected areas and natural reserves	Could decrease due to the economical crisis
Operational expenditure	Year 2008 and not 2005 Includes all services and activities implemented in forests, as well as the operational cost and salaries of forestry staff.	Salaries have increased in 2008, leading to an increase in operational expenditure
Transfer payments	All payments transferred to contractors from either domestic or external funds, from public authorities or projects under these authorities	

Other general comments to the table

External funding rose mainly after July war in 2006, as many emergency projects and rehabilitation funds were ensured after Stockholm meeting that followed the war. These funds came mainly from International organizations (GEF/Lebanese Rehabilitation Fund/UNDP/FAO/GTZ)...