



International
Labour
Office



Green Jobs Assessment in Lebanon

Preliminary Assessment
Agriculture and Forestry

Executive Summary¹

This report provides a preliminary assessment of green jobs² potentials in the agricultural and forestry sectors in Lebanon and is meant to serve as a background paper for a policy dialogue workshop on Green Jobs in Lebanon. In the field of agriculture the report focuses mainly on organic agricultural³ and to a lesser extent on Integrated Pest Management⁴ (IPM) only, as other sustainable agricultural activities are either inexistent or negligible. As for the forestry sector, the focus is on the potential job creation in the reforestation activities supervised by the Ministry of Environment. The assessment will quantify jobs for the present time and the year 2020 direct jobs only, as the estimations of indirect and induced jobs require input-output tables for which the required data is not readily available. The report will further analyze the current gaps and potential interventions in skills, technologies, policies, legislations, financing and administrative systems needed for stimulating the growth of green jobs.

The methodology used in this report was based on employment factors, and thus the numbers of jobs are meant to be indicative for preliminary assessment purposes. The area of organic land in Lebanon throughout the years was obtained from FiBL. The number of “green” farmers and workers in the field of agriculture was assessed through telephone interviews with different actors, ranging from organic farmers, packagers and vendors to organic and IPM certifiers. Since all farms could not be contacted, we extrapolated the number of workers to other farms based on a weighted average of the number of workers per farm in our sample. Then, a ratio of current organic jobs to current organic area was used to estimate the number of organic farmers in the future. Regarding forestry, the same procedure was used by estimating the number of workers needed to reforest one hectare of land, and then multiplying the factor by the forest area that should be planted every year in order to reach the 20% target by 2030.

¹ This paper was jointly prepared by Charbel Rizk, Sustainable Land Management Project Manager and Programme Advisor at the UNDP Energy and Environment Programme, and Nael Aoun, United Nations Volunteer on Green Jobs, UNDP Lebanon. The authors wish to thank the Green Jobs Team at the ILO Regional Office for Arab States, particularly Shaza G. Al Jondi, UN Reform Analyst and Focal Point for Green Jobs and Johan Ahlback, UNV on Green Jobs for their inputs and comments.

² “Green Jobs” are defined as **decent** work created in economic sectors and activities, which reduces their environmental impact and adapts to climate change, ultimately leading to environmentally and socially sustainable enterprises and economies.

³ Organic farming is defined by the Directorate General for Agriculture and Rural Development of the European Commission as the form of agriculture that relies on techniques such as crop rotation, green manure, compost and biological pest control to maintain soil productivity and control pests on a farm. Organic farming excludes or strictly limits the use of manufactured fertilizers, pesticides (which include herbicides, insecticides and fungicides), plant growth regulators such as hormones, livestock antibiotics, food additives, and genetically modified organisms.

⁴ Integrated Pest Management (IPM) is defined by FAO as that strategies provide viable alternatives for farmers and policy makers to manage pests and agro-ecosystems in a sustainable way, where yield losses are kept within economically acceptable margins by enhancing ecosystem-services that suppress the development of pests.

The findings of the assessment point to a marked rise in green jobs in the agricultural sector in Lebanon. Currently, the number of green jobs in both organic agriculture and IPM is 683. Assuming a linear trend in organic area until 2020, the projected number of organic workers, including farming, processing labelling and trading activities is expected to increase by 130% to 1620⁵. As for the forestry sector, the National Reforestation plan of Lebanon, aiming at the reforestation of up to 20% of Lebanese soil, adopted by the council of ministers promises to create around 15,000 jobs in reforestation by 2020. Currently however, there are no forest industries or large forest areas in Lebanon, and the current number of green jobs in forestry is very limited, boiling down to some local NGOs and forest guards only, with the latter not enforcing preservation efficiently.

We should note that these figures are very indicative, as they assume that all sub-sectors of organic agricultural are already working at full capacity, and that any increase in cultivated area will result in an increase in labour, as well as the fact that the National Reforestation Plan would be implemented rigorously and on time.

It should also be added that since 2007, GTZ and the Arab Center for the Studies of Arid Zones and Dry Lands (ACSAD) have funded a conservation agriculture⁶ (CA) project that is implemented by the American University of Beirut (AUB) and the Lebanese Agricultural Research Institute (LARI). CA practices are beneficial to the environment and the economies of farmers compared to conventional agriculture, but they are less labour intensive.

The current identified gaps for the larger spread of organic agriculture in Lebanon are the high prices of organic products (200% to 300% higher than conventional agriculture), failures in marketing, the lack of targets, policies and strategies to promote organic farming, and the skills shortages on both professional and technical levels. Besides, currently Lebanon does not export any organic products to EU countries. A main reason is that exporting organic products requires certification from bodies accredited by countries to which the products will be exported. So far, the lack of a unified Lebanese governmental supported certificate has therefore been a major barrier for the farmers⁷. IPM, introduced fore mostly by the United Nations Food and Agricultural Organization (FAO) and Greenline, is still in its infancy in Lebanon, and it is still early to assess its future prospects. LibanCert, a local body providing IPM certification for farmers, has only certified two farms in Lebanon, with 11 employees, as working in IPM.

⁵ It should be noted that, even though some farmers substituted their conventional practices with organic ones, and thus no additional jobs were created, a major chunk of organic farming jobs are new. This is due to the fact that the majority of organic land was not conventional before, as many farmers prefer getting quick certifications instead of waiting for two or three years for the "conventional" farmed land to become suitable for organic practices.

⁶ FAO defines conservation agriculture as an approach to managing agro-ecosystems for improved and sustained productivity, increased profits and food security while preserving and enhancing the resource base and the environment. CA is characterized by three linked principles, namely:

1. Continuous minimum mechanical soil disturbance.
2. Permanent organic soil cover.
3. Diversification of crop species grown in sequences and/or associations.

⁷ Sources: Environmental requirements for export of Lebanese food products to Europe - Carl Bro and Morten Guld Nielsen 2004; ALOA Website: <http://www.aloalebanon.org/facts.php>

In forestry, the main gaps⁸ are the lack of awareness of the Lebanese population about the importance of forests and what can cause fires, the intense yearly fires and arsons that spread out in forests, and the lack of accountability and serious legal actions against arsonists and individuals who caused fires by negligence. In sustainable forestry there are jobs in fire protection measures, guards, forestry managers who identify and complete fire breaches and other measures. This kind of forestry jobs seem to be lacking so as to efficiently protect forests from fire.⁹ There is a potential in forests for creation of green jobs in the eco-tourism sector, which makes the serious protection of forests vital and not only for the preservation of the gains made through reforestation.

The need for green jobs in the agricultural sector cannot be over-stressed, not only because of the detrimental effects of current agricultural activities on health and on the environment but also because of the precariousness of the social status of most agriculturists in Lebanon, especially seasonal or part-time workers, who basically live by the day.

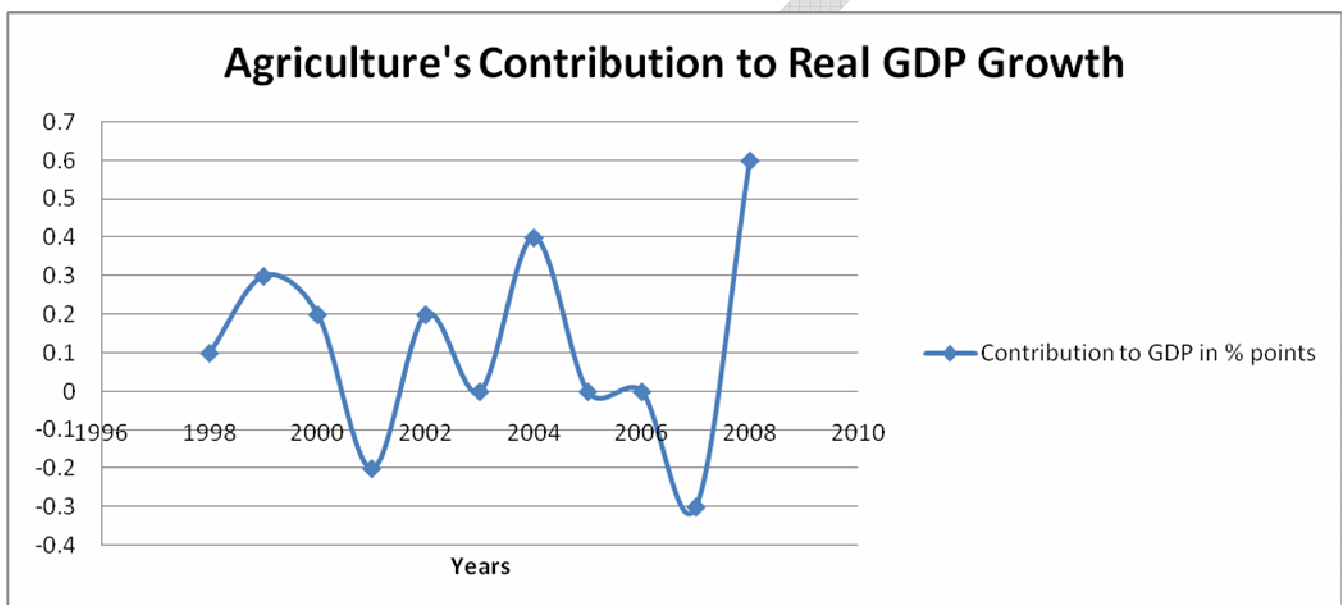
⁸ Gaps in the forestry sector in the context of this report are not barriers to green jobs in forestry, but dangers threatening forests in Lebanon. The irony in the forestry sector is that deforestation, fires and negligence from the government are the source of potential green jobs, and not pro-green policies.

⁹ We should note that we did not include the potential of pro-green policies in the forestry sector such as the use of forest and wood products in forests managed in a sustainable way, as forest areas in Lebanon are very small and patchy.

The Agricultural and Forestry sector

General

The agricultural sector in Lebanon constituted around 6.1% of national GDP in 2008 according to the International Monetary Fund (IMF). Its contribution to GDP growth oscillated throughout the 1998-2008 period, but was cumulatively responsible for 1.2% of GDP growth during that period. The graph below, with data extracted from the IMF, shows its contribution to real GDP growth throughout that same period.¹⁰



The agricultural sector is estimated to encompass around 9% of the total Lebanese workforce according to the Integrated Financing Strategy for Combating Desertification in Lebanon (down from at least 30% in 1964).¹¹ The sector is under funded, as agricultural spending accounts for only 2% of the national budget, which was around \$ 0.22 Billion in 2009.¹²

According to the Lebanese Ministry of Agriculture, 2,771.69 km² of the total Lebanese surface area was cultivated in 2007. This is around 27% of the total Lebanese surface area, and it constitutes a decrease of 0.7% from 2006. The cultivated area has been pretty much constant throughout the period 2004-2007, with small annual variations. The cumulative variation in area from 2004 to 2007 was 3.3%. 42% of the total cultivated area is irrigated, and the rest is mostly rainfed. The Beqaa Valley alone accounts for 42% of the agricultural land. The majority of

¹⁰ International Monetary Fund: *Lebanon: Real GDP Growth Analysis*, 2010.

¹¹ MoA, UNDP, UNCCD, ELARD: *Integrated Financing Strategy*, 2007.

¹² <http://www.ambbeirut.um.dk/NR/rdonlyres/ADFBC8B1-9243-48A5-B659-8DF1DBD250CF/0/TheFoodandAgricultureSector.pdf>

Lebanese farms are small-sized, as shown from the table below, taken from a report compiled by ECODIT for the Ministry of Environment:¹³

<i>Farm size category (in dunum)</i>	<i>Percent of farmers</i>	<i>Percent of total cultivated area</i>
Smaller than 5	53.0	9%
5-100	45.4	61%
Larger than 100	1.6	30 %

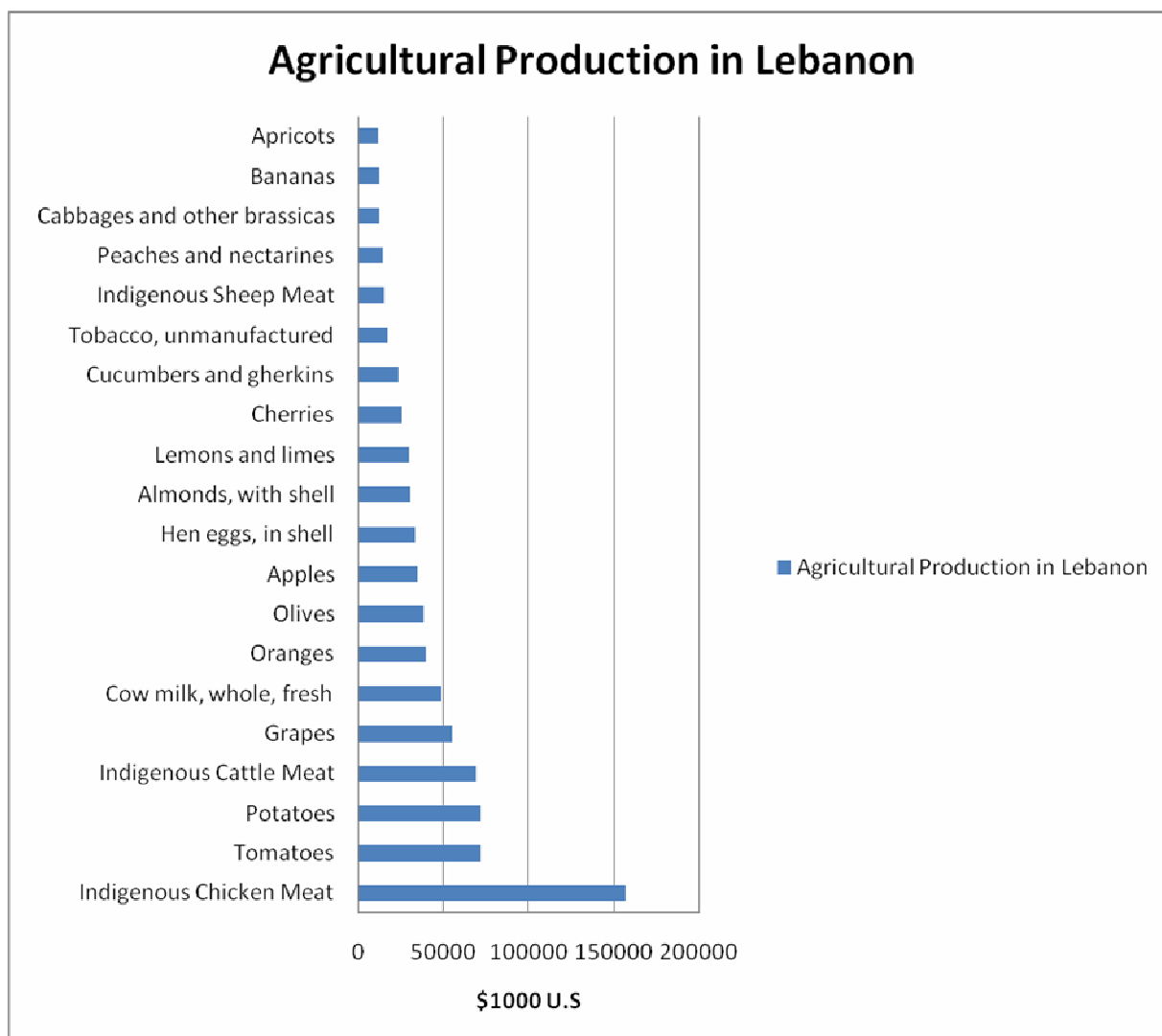
Source:ECODIT

The ministry of agriculture has estimated the value of national agricultural production to be \$ 1,963 million in 2007, with 73% in vegetable and fruit production, and 27% in animal and livestock production. This was an increase by 15% compared to 2006, and around 55% from 2003.

Due to its unique climate, Lebanon has the ability to produce a variety of agricultural products. The following graph, from FAO, shows estimates for different agricultural outputs in 2008, sorted by monetary value:¹⁴

¹³ ECODIT: *Lebanon State of the Environment Report*, 2001

¹⁴ <http://faostat.fao.org/site/339/default.aspx>



Lebanon also both imports and exports agricultural products. Large imports, in monetary terms include wheat, cigarettes, boneless meat-cattle and maize.¹⁵ As for exports, they include unmanufactured tobacco, prepared food, non-alcoholic beverage and preserved vegetables.¹⁶ Besides, exports of organic products from Lebanon are taking place to Dubai (UAE), and London (UK) as ready-to-eat traditional Lebanese foods. Export of fresh fruits and vegetables has also very recently been re-initiated to Dubai (UAE) and Bahrain¹⁷. Additionally, it should be noted that despite the small area and local consumption, Lebanese wine still contributes to a significant part of the exports, due to its excellent quality and the numerous international awards that Lebanese wine producers have received worldwide. Vineyards require smaller quantities of pesticides and fertilizers than other crops. Moreover, in order to ensure a good wine quality, irrigation is kept to a minimum for the first two years of crop growth only. Thus,

¹⁵ <http://faostat.fao.org/site/342/default.aspx>

¹⁶ <http://faostat.fao.org/site/342/default.aspx>

¹⁷ Source: ALOA Website, <http://www.aloalebanon.org/facts.php>

wine farming in Lebanon has a low environmental burden. Furthermore, organic wine farming practices have been recently introduced in a winery in Batroun. Chateau Ksara is the leading wine producer of Lebanon, providing for 30% of the Lebanese market and exporting for foreign markets. According to FAO, Lebanon has exported 1814 tons of wine in 2008, the monetary equivalent being around \$ 13 million. The MoA has estimated the value of agricultural imports and exports to be \$ 1,942 million and \$ 373 million respectively in 2007. Both imports and exports have increased during the 2005-2008 period. Agricultural imports were around 16% of national imports, while exports accounted for 20% of total production, and around 13% of total national exports.

The forestry sector

Regarding the forestry sector in Lebanon, its situation is considered to be catastrophic. According to the 2010 FAO's Lebanon Forest Resources Assessment, at least 13% of Lebanon's surface area is covered by forests. Other Wooded Lands (OWL), constituted of coniferous shrubs, broadleaved shrubs, mixed shrublands and grassland with trees, further cover an additional 10% of Lebanon.¹⁸ It should be noted however that in such assessments, burned forests are still considered as forests. Fires constitute a big threat to Lebanese forests. In 2005, there were 536 incidents of fires in Lebanon.¹⁹ Finally, regarding employment, the FAO estimated that 10,000 formal full-time equivalent workers worked in forestry in 2006 in Lebanon, mostly in pulp and paper then wood processing. The sector contributed to 1.1% of GDP in that same year.²⁰

On the international level, FAO estimates that worldwide forest area is around 4 billion hectares.²¹ Deforestation and forest degradation are estimated by the IPCC to account for at least 18% of GHG emissions worldwide, with a net yearly forest loss of 7.3 million hectares.²² The Stern Review has estimated that world forests store around 4500 Gg tons of CO₂. This number is larger than the amount of CO₂ currently present in the atmosphere.²³ The worldwide employment in the forestry sector in 2006 was estimated 13.709 million people by the FAO, with a 1% contribution to global GDP.²⁴ However, it is estimated that, accounting for informal work, indigenous people, agro-forestry and the number of people depending on forests for additional incomes, the number of workers in the forestry sector would rise to between 957 million and 1.75 billion workers.²⁵ It should be stressed however that all employment estimates for the forestry sector are very indicative and are based on rough calculations.

Similarly to the case of green agriculture, there are many green practices and initiatives in forestry that can create green employment in the forestry sector. The controversial "Reducing Emissions from Deforestation and Forest Degradation" (REDD) and REDD+ initiatives have claimed that they have the potential to create jobs, although there is no concrete data to

¹⁸ Forestry Department Food and Agriculture Organization of the United Nations: *Global Forest Resources Assessment, Country Report, Lebanon*, 2010

¹⁹ Ibid.

²⁰ FAO: *State of the World's Forests*, 2011

²¹ FAO: *State of the World's Forests*, 2011

²² UNEP, ILO, IOE, ITUC: *Green Jobs: Towards decent work in a sustainable, low-carbon world*, 2011

²³ Ibid.

²⁴ FAO: *State of the World's Forests*, 2011

²⁵ UNEP, ILO, IOE, ITUC: *Green Jobs: Towards decent work in a sustainable, low-carbon world*, 2011

validate these claims yet. UNEP has launched its own worldwide tree planting campaign, with more than 2.1 billion trees planted already;²⁶ however, most jobs from such campaigns are neither lucrative nor secure. Agro-forestry practices, which consist of combining the planting of trees with crop and livestock cultivation on agricultural lands has a promising potential of green job creation, as well as carbon abatement. The World Bank estimates that around 1.2 billion people are currently depending on agro-forestry for food and income.²⁷ Finally sustainable forest management and sustainable forest certification also have a strong potential for forest protection and green employment.

Projects Related to Forestry Sector

Project	Description
Alleviating Barriers for Quarries Rehabilitation in Lebanon	Funded by the European Commission through EC - Life Third Countries and executed by MoE. The project was launched at MoE on December 2nd, 2005
Integrated Management of Cedar Forests in Lebanon in Cooperation with other Mediterranean Countries	Funded by the Global Environment Facility (GEF) and executed by MoE and the American University of Beirut (AUB). It is a three year project that started in July of 2004
Top-Up Biodiversity Enabling Activity	Funded from the Global Environment Facility (GEF), executed by MoE and UNDP since 2002. In 2004, MoE and UNDP continued the execution of the project in collaboration with a team of experts
Biodiversity Enabling Activity	Executed in 1998 by MoE, implemented by UNDP with funds from GEF
Biodiversity Planning Support Programme in 2000	Funded by GEF and executed by UNDP
Stable Institutional Structure for Protected Areas Management (SISPAM)	Funded by the European Commission / LIFE Third Countries Program and executed by MoE in collaboration with UNDP (2004-2006)
Strengthening the Environmental Legislation Development and Application System in Lebanon (SELDAS)	A project by the UNESCO-Cousteau Ecotechnie Chair at the University of Balamand, funded by the European Commission Life Third Countries Program (2005)
Strengthening of National Capacity and Grassroots In-Situ Conservation for Sustainable Biodiversity Protection (Protected Areas Project)	Funded by GEF, executed by the Lebanese Government and MoE and implemented by UNDP, IUCN, Nature Reserves Committees, and NGOs (5 year project-1996)
Combating Desertification in Lebanon" Project	Funded by UNDP and GTZ and executed by MoA (1995)
Strategic Action Plan for the Conservation of biological diversity in the Mediterranean Region	Implemented in 2002 by the Regional Activity Center for Specially Protected Areas (RAC/SPA) within the framework of the Mediterranean Action Plan (UNEP/MAP)
Design, Testing and Evaluating of Best Practices for in situ Conservation of Economically Important Wild Species: funded by GEF and implemented (2003) by the United Nations Environment Program (UNEP) with the following supporting agencies	FAO, Diversitas, and International Plant Genetic Resources Institute (IPGRI)

Source: State of Lebanon's Forests

Organic Agriculture²⁸

The organic farming sector has grown since the early 1990s in Lebanon. According to the Association for Lebanese Organic Agriculture (ALOA) there were 331 organic farms in October 2006, whereas the total area occupied by the organic farms is 3490 Ha approximately.²⁹ However, some farmers are abandoning organic farming and shifting to more traditional forms of agriculture again because of losses incurred by inadequate marketing of their products. The

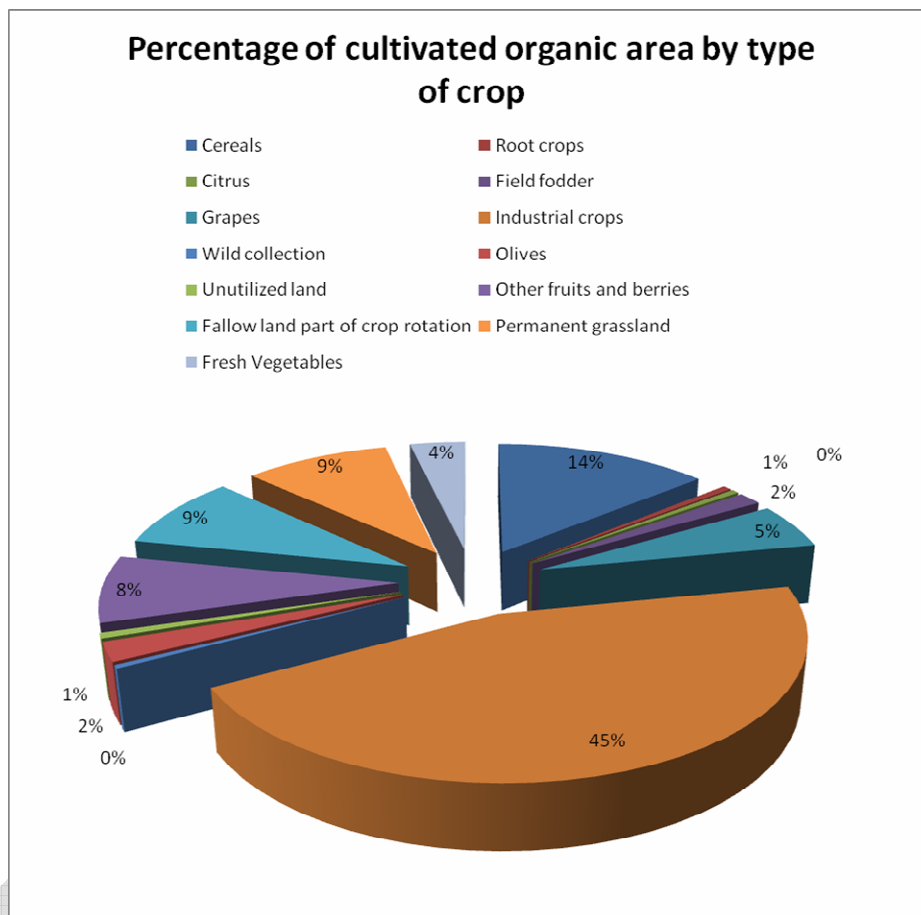
²⁶ Ibid.

²⁷ Ibid.

²⁸ The export market for organic agriculture was not addressed in this section as it is negligible in Lebanon, if not virtually inexistent.

²⁹ <http://www.aloa.org.lb/>

following graph shows the percentage of the total organically cultivated area occupied by different organic products (figures in the graph were calculated from data available at ALOA's website)³⁰:



Almost half of organic products are industrial crops. Cereals come second and constitute 14% of total production. It should be noted though that because of the lack of certification and support in the field of organic agriculture at the time, the majority of organic products in Lebanon were imported from the U.S, Europe and Japan and these imports constitute 50% to 75% of organic products sold in the local market.³¹ Organic products in Europe are estimated to be 15-20% more expensive than products grown through conventional methods. However, herbs and wild plants can be more than 40% more expensive.³² In Lebanon, prices of organic products are at least 200% higher as compared to conventional products.

There are currently two private certifying bodies for organic agriculture in Lebanon: LibanCert and IMC-Liban. LibanCert, originally working under the supervision of AUB provides a range of certifications, mainly in organic, but also in other domains such as in IPM. The certificates are awarded not only to farmers of organic products, but also to labellers, processors, packagers

³⁰ Ibid.

³¹ http://www.fao.org/organicag/display/work/display_2.asp?country=LBN&lang=en&disp=summaries

³² Ibid.

and traders. It also provides trainings for inspectors, catering, and organic and natural cosmetics. LibanCert is collaborating with the Swiss Bio.Inspecta, an internationally accredited certifying agency which is financially supported by the Swiss State Secretariat for Economic Affairs.³³ The second certifying body is the Lebanese partner of the Italian Mediterranean Institute of Certification (IMC), IMC-Liban.³⁴

On the international level, according to a joint report by IFOAM and FiBL, the global organic market was valued in 2009 at US 54.9 Billion (a 207% increase from 2000) with a global organic agricultural area of 37.2 million hectares. Australia alone accounted for around 32% of organic land. As a percentage of world total agricultural land, organic agricultural land accounts for a minor share of 0.9%. A positive aspect of the development of organic agriculture is that, unlike renewable energy, it is not restricted mostly to developed countries, although the latter do have the largest amount of organic agricultural land. For example, Latin American comes third after Oceania and Europe. However, when it comes for organic markets, the countries with the largest markets are all developed countries, with the US having the biggest market for organic food.³⁵

In addition to the environmental benefits, organic and sustainable agriculture in general are more labour intensive than conventional agriculture, mainly due to the lesser use of mechanical equipments and chemicals. FAO estimates that labour levels may increase from comparable levels to conventional agriculture and up to 30% more. For example, in some cases, organic farmers eliminate pests by hand, requiring thus more workers than with the conventional spraying. A study by Washington State University estimated that US 1 million sales in organic apple created 29.4 jobs compared to 25.9 in conventional farms in Washington State.³⁶

Global investments in green agriculture can potentially lead to positive consequences in many dimensions, be it social, nutritional, ecological and economical. A modelling by the United Nations Environmental Program (UNEP), has predicted that an additional investment of \$ 198 Billion in the period 2011-2050 can increase agricultural production by 11.5% and employment by 3% by 2050, compared to a business as usual scenario. Moreover, soil quality will improve, and agricultural water use is less by 35%, harvested land by 4%, and deforestation is reduced by 53%. Finally, an increase in calories per capita is also witnessed.³⁷

³³ <http://www.libancert.org/1/>

³⁴ <http://lnx.imcert.it/v3/index.php?&lan=en>

³⁵ Willer, Helga and Lukas Kilcher: *The World of Organic Agriculture. Statistics and Emerging Trends 2011*. FiBL-IFOAM Report, 2011.

³⁶ Pon Nya Mon and David W. Holland: *Organic Apple Production In Washington State: An Input-Output Analysis*, 2005.

³⁷ UNEP: *Agriculture Investing in natural capital*, 2011

Projects in Agriculture Sector

Projects	Projects Description
Five organic agriculture projects by World Vision	30,000\$ fund by the Japanese embassy in Lebanon. Provided extension services for organic agriculture and training of around 30 farmers, and resulted in the establishment of an organic agriculture center. 150,000\$ fund by World Vision Canada. Additional training of another 50 farmers. 1.8\$ million sub-grant by USDA to MercyCorps. Eight pilot farms were chosen for organic farming training. Establishment of an organic agricultural center at Bint Jbeil. 6\$ million fund by USAID. Support for Biocoop Lubnan. Establishment of four organic agricultural centers. Training of 150 farmers. Full-time employment of 50 engineers. 8\$ million fund by USAID. Extension of previous project. Cooperation with universities and research centers on organic agriculture. Extensive marketing activities. Merger of other centers with Biocoop Lubnan.
GreenLine pilot projects	Survey on pesticide use. IPM demonstration project through a Canadian grant. Creation of the Organic Committee in 1999 Organic farming project through a fund by Novib, the Dutch affiliate of Oxfam. Project resulted in the introduction of organic pest control methods in Lebanon. Training of around 47 engineers in organic farming. Creation of Biocoop Lubnan cooperative. GTZ funded "Promotion of Organic Agriculture in Lebanon". Created a legal framework and a certification process for organic agriculture. Promulgation of the National Standards for Organic Farming by LIBNOR.
Integrated Waste Management For The Olive Oil Pressing Industries In Lebanon, Syria And Jordan	Establishment of database for olive oil mills. Environmental auditing of 6 olive oil mills. Calculation of cost of environmental degradation from the olive oil sector. Assessment of impact of different olive oil pressing techniques on oil quality, training needs of farmers, and their costs and revenues, Issuance of a guideline for better production of olive oil.
American University of Beirut projects	Yammouneh Technology Transfer and Extension Project funded by World Bank, CDR, MoA and IFAD. Improvement of productivity, irrigation water efficiency, increase in agricultural production and reduction of production costs. "Growing Sustainability An Integrated Village Development Project El Qaraaoun pilot village" project. Funded by Mercy Corps. Promotion of organic farming practices. Integrating marketing program to facilitate the selling of the products.
Phase-out of Methyle Bromide Project by MoE, UNDP and UNIDO	2.51\$ million fund from the Montreal Protocol. Phase-out of substance from vegetables, cut-flowers and tobacco cultivations, and with the United Nations Industrial Development Organization (UNIDO) for the phase-out from strawberry production. Introducing Lebanese farmers to alternatives to Methyl Bromide such as soil solarization, biofumigation, grafting and certain chemical alternatives. Training of 10,000 farmers in alternative techniques. Project awarded the Exemplary Project Award by the Montreal Protocol.
Organic certification and market development in Lebanon by The German Research Institute for Organic Agriculture	Introduced the Participatory Market Chain Approach, a R&D method to boost innovation by encouraging the participation of different players throughout the market chain.
Sustainable Agricultural Projects by Arc-En-Ciel	Sustainable agricultural extension program. Assessment of agricultural activities based on the Indicateur de Durabilité de l'Entreprise Agricole (IDEA) model. Building of "WATANI" agricultural network to stimulate the sustainable agriculture value chain in Lebanon, and encourage the sales and consumption of products of sustainable agriculture.
FAO's Regional Integrated Pest Management Program in the Near East	Enhancing food security in Near-Eastern countries by increasing food production through the use of "green" or ecological integrated pest management. Training of farmers using the Farmer Field School (FFS) methodology.
Conservation Agricultural Project by AUB and LARI	Funded by GTZ and ACSAD. Experiments on vetch and barely. 20 farmers participating in the project in 2008/2009.

Impact of environmental degradation and climate change³⁸

According to the Lebanese Second National Communication's (SNC) report to the United Nations Convention for Climate Change (UNCCC), agriculture was responsible for 5.76% of national Greenhouse gas (GHG) emissions in 2000. Forests and croplands were also estimated to have abated 143.87 Gg of CO₂ during the same year. Agriculture was the second emitter of Methane (CH₄) after the Waste sector, with 8%-9% of national emissions. It was however the leading

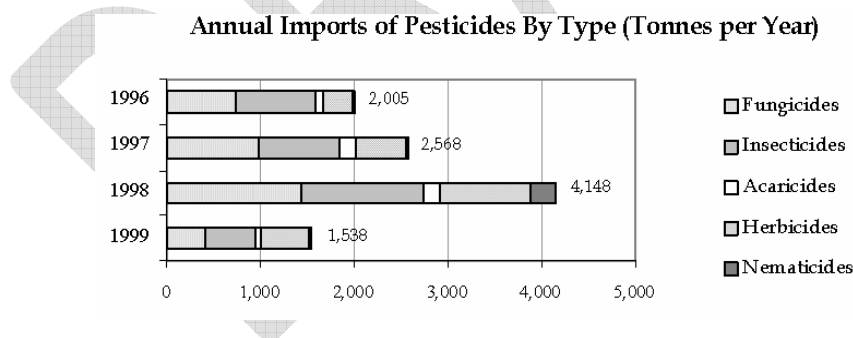
³⁸ We should note here that, although we quote international figures of the environmental impact of agriculture on workers such as pesticide poisoning, we do not provide figures for Lebanese farmers as there are no statistics regarding such issues by hospitals and the Ministry of Health.

source of N₂O emissions with 88% of national emissions.³⁹ It is estimated that more than 350 Lebanese die prematurely every year due to urban air pollution.⁴⁰

Agriculture is the largest consumer of water in Lebanon, and is putting increasing stress on water resources in the country, especially that a larger percentage of cultivated land in Lebanon is being inefficiently irrigated instead of being rain-fed.⁴¹ In fact, the MoA and FAO have estimated that the agricultural area under irrigation has doubled since the early 1960s to the late 1990s.⁴² Moreover, agriculture is projected to be more water-stressed in the future, as increasing volumes of water are going to be diverted for domestic and municipal use. The agricultural sector, according to ECODIT, is estimated to consume 60%-70% of total annual Lebanese consumption of water, and the demand for water by the agricultural sector is expected to increase, although the percentage of agricultural water demand out of the total water demand in the country is estimated to decrease, as pressure will rise due to the increasing population⁴³. Last but not least, Lebanese farmers have introduced in the past decades more water demanding crops to replace less demanding ones.⁴⁴

According to the Lebanese Central Administration of Statistics, Lebanon imported around 70,000 tons of fertilizers in 2008. Fertilizers are large emitters of GHG. In fact, the Stern Review estimates that fertilizers are the biggest emitters of GHG within the agricultural sector worldwide, with 38% of total agricultural emissions. Also, high levels of nitrate in groundwater can cause the Blue Baby Syndrome a potentially fatal disease to newborns.

The following graph, taken from the ECODIT study that submitted to the ministry of environment shows the yearly imports of pesticides per type of pesticide. As can be seen from the graph, the biggest annual imports of pesticides have consistently been fungicides and insecticides. Herbicides also constitute a big percentage of yearly imports.



Source: ECODIT

Pesticides, if applied with disregard to the right procedures, can have severe negative effects on the environment and on human health. Lebanese farmers rarely respect the standards of good

³⁹ Second National Communication Lebanon, Energy Sector, 2010.

⁴⁰ World Bank: *Cost of Environmental Degradation — The Case of Lebanon and Tunisia*, 2004.

⁴¹ ECODIT: *State of the Environment Report*, 2001

⁴² Ibid.

⁴³ Ibid.

⁴⁴ Ibid.

use, and there is no watch-dog or monitoring committee from the MoA or Lebanese government. Many farmers apply amounts of pesticides greater than the safe threshold and thus put consumers at a greater risk of developing cancer later in their lifetime, especially since pesticides bio-accumulate in the human organism. The ministry of environment has indicated that at least 40% of local Lebanese fruits and vegetables contain dangerous levels of pesticides. Also, regarding the cases of pesticides acting within the agricultural crop's organism, many farmers sell their products to consumers before the end of the pesticide's active lifetime within the crop's organism, and thus while the pesticide is still potent. The potential harm from pesticides must not be ignored, as around 40,000 farmers die from pesticide poisoning every year in the world.⁴⁵ Moreover, it is estimated that 3 to 4 million agricultural workers suffer from extreme pesticide poisoning every year.⁴⁶ Furthermore, pesticides and fertilizers' prices are very much dependant on oil prices, and thus do not constitute a secure social shield for poor farmers.

Other environmental impacts of agriculture include grazing (it was estimated that around 800,000 goats and sheep grazed in rangelands that cover around 40% of Lebanese territory), potential erosion from the negligence and lack of maintenance of terraces, and agricultural waste.⁴⁷ The cost for agricultural soil erosion and terrace degradation has been estimated by the World Bank to be 0.36-0.54% of GDP in 2000.⁴⁸

As for the forestry sector, forests do not cause harmful effects to the environment. Since forests mainly have positive effects such as carbon sequestration, this paragraph will talk about threats to forests. According to AFDC Lebanon has already lost 35% of its initial cover within the past years 40 years. The biggest danger to forests comes from fires.⁴⁹ As mentioned earlier, the FAO noted 536 fires in 2005. These fires can endanger fragile ecosystems as well as release polluting and harmful gases in the atmosphere. According to the MoA 1200Ha are lost yearly due to fires.⁵⁰ The years 2007 and 2008 were calamitous to Lebanon's forests due to large fires that burned big swaths of forests. AFDC, in its state of Lebanon's forests report claims more than 1500ha of forests were burned during the 2007 fires, triple the total reforested area from 1993 to 2005, with some trees lost beyond regeneration.⁵¹ Other threats and dangers to forests in Lebanon include disturbances by insects, diseases biotic and abiotic agents. The FAO's 2010 country report for Lebanon's forests puts the area of affected forests at 3530Ha.⁵² The most famous insect outbreak was that of the *Cephasia tannouriniensis* that attacked the Cedar trees in Tannourine. Uncontrolled quarries and chaotic expansion of residential buildings are also major threats to Lebanese forests. It should be noted also that according to the FAO's 2011 State of the Forest's report there are 2 million tons of carbon stocked in forests in Lebanon.⁵³ Thus, cut and burned forests have the potential to release a substantial quantity of carbon.

⁴⁵ UNEP, ILO, IOE, ITUC: *Green Jobs: Towards decent work in a sustainable, low-carbon world*, 2011.

⁴⁶ Ibid.

⁴⁷ ECODIT: *State of the Environment Report*, 2001

⁴⁸ World Bank: *Cost of Environmental Degradation — The Case of Lebanon and Tunisia*, 2004.

⁴⁹ AFDC: *State of Lebanon's Forests*, 2007.

⁵⁰ Ibid.

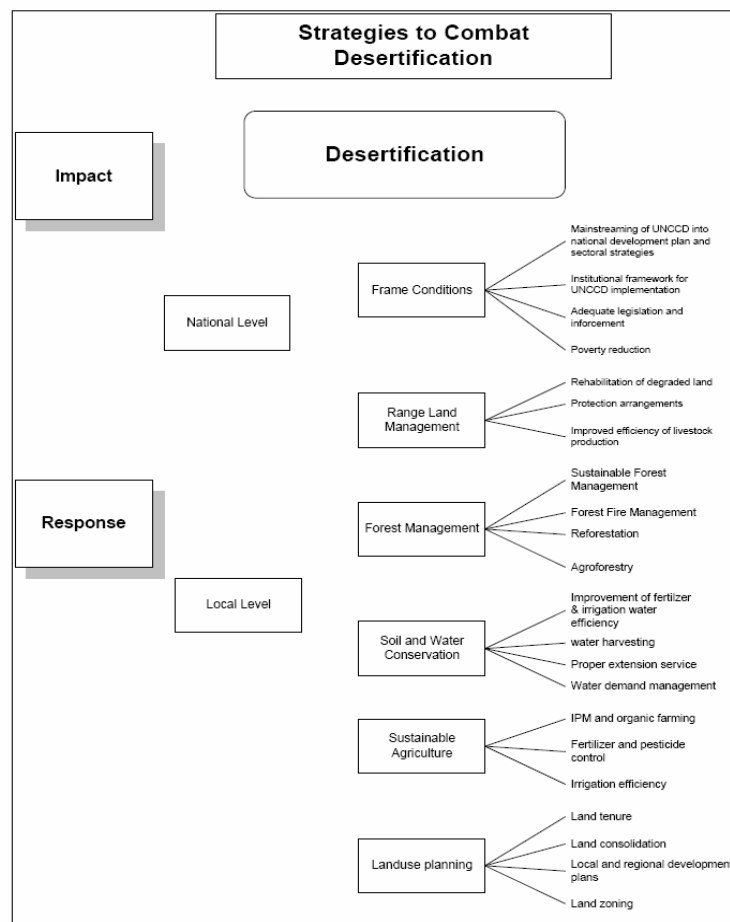
⁵¹ Ibid.

⁵² Forestry Department Food and Agriculture Organization of the United Nations: *Global Forest Resources Assessment, Country Report, Lebanon*, 2010

⁵³ FAO: *State of the World's Forests*, 2011

Policy

There is no concrete and adopted policy by the Lebanese government to foster sustainable and environmentally friendly agricultural practices. There is however a National Action Plan (NAP) to combat desertification that promotes sustainable agriculture.⁵⁴ Quoting from the NAP report, the objective of the NAP “is to outline measures needed to combat desertification and mitigate the effects of drought and the misuse of land through effective action at all levels supported by international cooperation and partnership arrangements, in the framework of an integrated approach contributing to the achievement of sustainable development of affected areas.”⁵⁵ The following flow-chart, also from the NAP report, summarizes the main areas of action that a NAP can intervene in:



[Source: NAP]

⁵⁴ This NAP came as a result of Lebanon's obligations towards the Convention to Combat Desertification (UNCCD), since it has signed and ratified the convention in October 14th 1994 and May 16th 1996 respectively. The NAP was developed with technical assistance from UNDP and GTZ.

⁵⁵ MoA, UNDP, GTZ: *National Action Plan to Combat Desertification*, 2003.

The Lebanese government defined two categories of priority actions: Category A, dealing with the national framework, and Category B dealing with natural resources. In addition to that, the government must support research into the causes and impacts of desertification. The following table summarizes the two categories:

Category A	Institutional framework for NAP implementation
	Legislative Framework
	Land use planning
	Socio-economic frame conditions
Category B	Water management
	Forest management
	Sustainable agriculture
	Rangeland management
	Soil conservation
	Protected areas

In 2001, the MoE launched its National Reforestation Plan (NRP). During the same year, the Lebanese government allocated \$16.67 million to reforestation for five years.⁵⁶ The previous Lebanese Government formed after the 2009 elections officially adopted a 20% forest cover target over Lebanon's surface area after 20 years, starting in 2010 in its ministerial declaration. The 20% target had already been mentioned in many studies, and in earlier NRP activities, but was never concretely adopted until this ministerial declaration.⁵⁷

Legislation:

Lebanon, as mentioned in the previous paragraph, has signed and ratified the UNCDD. The UNCDD was translated into a non-compulsory action plan containing a legislative framework, but with no binding commitment to implement laws that protect against desertification in the agricultural field. Lebanon has also signed and ratified the Stockholm Convention on Persistent Organic Pollutants (POPs).⁵⁸ Lebanon ratified the Montreal Protocol on Substances That Deplete

⁵⁶ <http://www.moe.gov.lb/Reforestation/Pages/National%20Reforestation%20Plan.aspx>

⁵⁷ The NRP has already undergone two phases, and is in the process of a third one. The first phase started in 2002, and by its end in 2004 had already resulted in the planting of 305Ha.⁵⁷ The year 2004 saw the launching of the second phase. The reforestation results of this phase fell shorter than that of the previous, mainly due to the 2006 war, which interrupted the second phase. The third phase started in 2010 and is due to end by 2012.

⁵⁸ On the 23rd of May 2001 and 3rd of January 2003 respectively

the Ozone Layer⁵⁹, and thus committed itself to phase out the use of Methyl Bromide in agriculture. Finally, Lebanon signed and ratified the International Treaty for Plant Genetic Resources for Food and Agriculture⁶⁰.

On the national level, the MoA is responsible for the protection of agricultural land, and the protection of forests and soils from grazing. It also controls the mechanism for the import, production and sale of chemical fertilizers. The MoA currently bans the import of 110 pesticides. In 2005, a law on organic agriculture was drafted and was forwarded to the cabinet for approval. After gaining approval from the parliament, the law should then be ratified by the Lebanese parliament. The approval by the cabinet is still pending. If implemented, the law would result in the establishment of an Organic Agriculture unit within the MoA. The draft law complies with the European Union's (EU)EEC Regulation 2092/91 on organic production. This was mainly done in order to stimulate exports to European countries.

As for forestry, Lebanon has ratified many international agreements that address forests either directly or indirectly, such as the UNESCO World Heritage Convention, aiming to protect natural and historical sites⁶¹ and the Convention on Biological Diversity⁶². Last but not least, Lebanon also signed a regional protocol, the Protocol Concerning Specially Protected Areas and Biological Diversity in the Mediterranean⁶³. This protocol aims to protect endangered habitats in the Mediterranean. On the national level, many laws and decisions delimiting protected areas and natural reserves were passed. On the national level, both MoA and MoE are concerned with forestry and reforestation activities and legislations.

Environmental legislation could have the potential to create jobs. The creation of the MoE, as well as the recent development of environmental legislations has created job opportunities for environmental specialists and the number of staff in the MoE has increased from around 30 in 1999 to 55 in 2003.⁶⁴ However, doubt remains about the long-term potential of environmental legislation in Lebanon. The MoE and other public agencies, whose projects are mainly by international donors, cannot absorb huge numbers of jobs for the long-term.

Institutional Setup

Virtually all agricultural activities in Lebanon are private. The government monitors and gears agricultural activities, legislations and statistics through the MoA. Public interventions in agriculture and forestry include the Green Plan organization, under the direct supervision of the Minister of Agriculture. The Green Plan has participated in reforestation, building of agricultural roads and other specialized roads through forests, as well as the rehabilitation and remediation of agricultural lands. The other organization that is also under direct supervision from the Minister of Agriculture is the Lebanese Agricultural Research Institute (LARI), a research center that primarily aims to solve problems faced by Lebanese farmers, and to support agricultural development. At present, LARI is implementing five cooperative research projects dealing with

⁵⁹ On the 31st of March 1993

⁶⁰ In 2002 and 2004 respectively

⁶¹ Ratified on the 30th of October in 1990

⁶² Ratified on the 1st of August 1994,

⁶³ Signed the 22nd of February 1994

⁶⁴ Unpublished Annex 5 in "Strengthening the Environmental Legislation Development and Application System in Lebanon (SELDAS)", 2005

olive propagation, cereal grain and legume, pasture and forage, barley and male sterile technology for biological research. Most sustainable agriculture activities are however, as we have already seen, implemented by international organizations such as the UNDP, private entrepreneurs and NGOs. The two certifying bodies for IPM and organic agriculture are also private companies. Finally, the Organic Committee, mentioned earlier, was the main driver in the promulgation of the yet un-ratified standards of organic agriculture.

AFDC, in its State of Lebanon's Forests report mentions that the MoA is the official and main institution responsible for the forestry sector in Lebanon. The MoE, the MoEW, and the National Center for Remote Sensing also participate in forestry related management, legislation and project activities. There is some overlap however between the MoA and MoE when it comes to legislation, as both ministries have the right to promulgate forestry laws and submit them to cabinet approval.

Financing

The circular 10187 from the Central Bank of Lebanon (BoL) promotes investment in environmental and energy projects at a limited interest rate of 3%. Greener forms of agriculture, such as organic agriculture, are eligible. Circular n°80, titled provides subsidies to the interests incurred on loans extended to the Industry, Tourism and Agriculture sectors. Also, Fransabank currently offers the Agricultural Loan for agricultural projects (not restricted to environmentally friendly projects). The loan amount can be between L.L 3 million and L.L 25 million, and the loan period can reach up to 4 years, with a 3 months grace period and an interest rate of 5%.

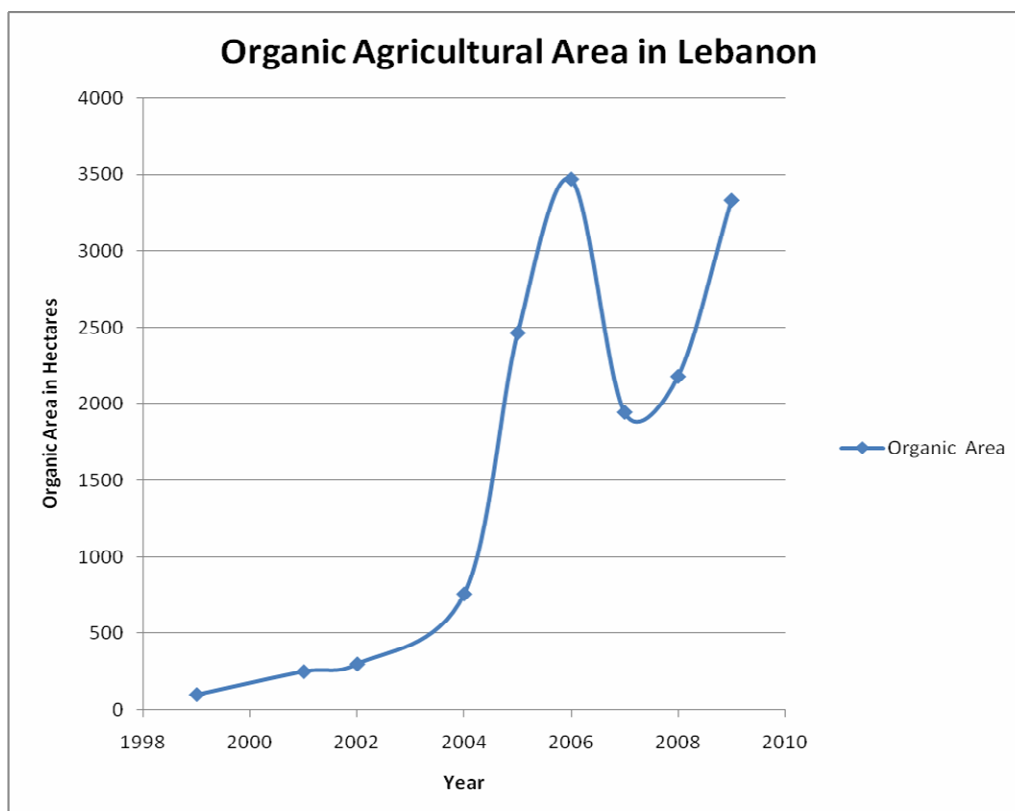
Green Jobs Estimation

In order to estimate the current number of Green Jobs in agriculture in Lebanon, we have decided to calculate the number of employees in companies that are certified as organic by IMC and LibanCert, the number of employees in the two latter certifying bodies, and the number of farmers working in IPM in addition to employees in international organizations who work in sustainable agriculture projects. A sample number of companies/farms (25 out of 176) were asked about the number of their employees by phone, and since the rest of the companies and farms are known to be of the same size as these sample companies, we projected an average number of workers on the companies that we did not manage to contact. This assumption is solid, as there exist no large organic farms and processing facilities in Lebanon, and so the number of workers typically varies between 3 and 6. The average number of workers that was projected to other organic facilities was calculated as a weighted average of the number of workers in the sample companies or farms that were interviewed by phone. The weighted average was found to be 3.84. The total number of green workers in agriculture, taking into account all of the above, is then estimated to be 683.

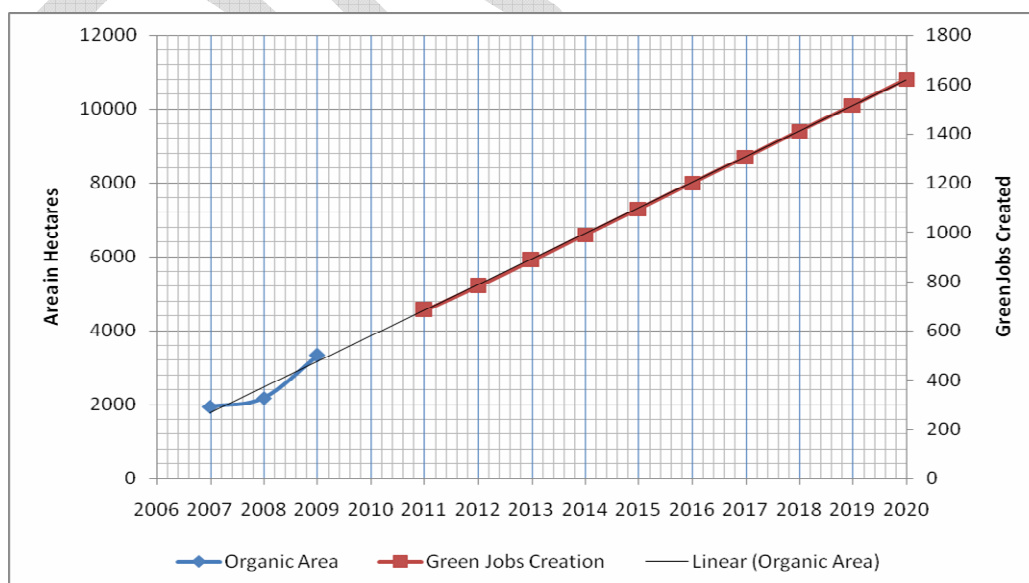
For organic agriculture, in order to calculate projections for 2020, we estimate the organic land for that year, based on a regression of the growth in organic land during the past few years. Since we already know the agricultural area for the current year, by dividing the number of workers in organic by the total area, we can get an estimation, although a rough one, of the number of workers per unit area in organic agriculture. Using that factor, we multiply by the projected area in 2020 and we thus get the expected number of farmers by 2020. We should emphasize again that this number is indicative, as we do not know if actual farmers and processors are working at full capacity. Moreover, it should be noted that we included the number of processors, packagers and labellers in the total factor, although these workers are not directly involved in land work. However, we can assume that the growth in organic agricultural area will lead to an increase in the number of packagers, processors and labellers since their numbers are positively related to the quantity of organic products on the market.

The following graph shows the area of organic land in Lebanon since 1999.⁶⁵ We should note that in some years area measurements were not available, so we assumed that growth in organic land during these years follows the overall trend since 1999. Also, we note a big dip in organic area in 2006 which was mainly due to the hostilities with Israel.

⁶⁵ <http://www.organic-world.net/statistics-world.html>



Since, as seen from the graph, the trend from 2006 is very similar to the trend from 2004 onwards and the potential space for organic agricultural in Lebanon is far from being saturated, we will thus build a regression around the period from 2007 to 2009, and project the potential organically cultivated area for 2020. The following graph shows the projected increase in the area of organic agriculture between 2007 and 2020, as well as the estimated job creation.



As can be seen from the graph, the total area under organic cultivation is projected to increase from around 4,500 Ha in 2011 to around 10,800 Ha in 2020. Consequently, this is expected to lead to an increase in the number of green jobs in agriculture, from 683 in 2011 to about 1,500 – 1,600 (1620) workers in 2020.

The only green activity in the forestry sector with a large jobs creation potential is reforestation. In order to calculate predictions for 2020, we assume that the NRP will succeed in reaching its 20% target by 2030, which is equivalent to 209,040Ha approximately. Since the current 13% cover consists of 135876Ha, the planted area should then be 73164Ha. Thus, an equivalent area of 3658.2Ha should be planted yearly. It should be noted that regardless of the time limit, the yearly created jobs would be the same since we are assuming that the average reforested area is the same throughout years, and because the target of 172458Ha by 2020 is equivalent and requires the same amount of labour as the 209,040Ha by 2030. 26 workers are required in order to reforest a hectare for 2 years according to the MoE (800 trees should be planted per hectare).⁶⁶ However, since these workers are seasonal, we assume based on expert knowledge that they are equivalent to 2 full-time workers per 2 years. Thus, assuming that the government is successful in their plans of planting approximately 3,660 Ha of forest annually, the number of people working in reforestation in 2020 will be around 14633 workers⁶⁷.

These jobs created with reforestation will partly disappear, partly continue to replant forests lost to fire and partly be transformed to long term jobs in sustainable forest management. This includes the traditional wood, pulp and paper industry as well as could include new jobs in more fireguards and control. However, the day when reforestation activities will completely stop would realistically be way beyond the year 2030, since as it has been mentioned in note 85, we are not accounting for the delaying effect of fires. The Lebanese government has 10 nurseries that produce seedlings. In order to satisfy the demand for reforestation around 10 workers should be operating full-time at each nursery, thus giving us 100 full-time workers. Moreover, around 3 full-time engineers are required to supervise the activities, along with 199 current forest guards supervised by MoA. So, the total number in 2020 would amount to around 15000 workers. Finally, we should mention that as the forest area increases, there will be more opportunities for eco-tourism in Lebanon's forests, and consequently green jobs could be created in activities such as hiking and sight-seeing. The numbers are hard to come by presently, as the eco-tourist industry in Lebanon is negligible if not virtually inexistent, and extrapolations would be very uncertain.

Skills

As mentioned earlier, a number of organizations, such as World Vision, Green Line and FAO, and AUB, have conducted trainings in IPM and organic agriculture. However, these trainings were offered in the majority of cases as part of transfer of technology projects. The biggest contribution to "green agriculture" in Lebanon should most probably come from the FAO's IPM project, since it encourages coordination, cooperation between farmers, as well as the FFS methodology that encourages continual training. The PMC approach in organic agriculture also has a positive potential because it also stimulates collaboration between and participation of

⁶⁶ Garo Haroutunian, MoE

⁶⁷ I should be noted that the MoA estimates that a total of 1200Ha of forest area is burned yearly in Lebanon, and thus our projections and the National Reforestation Plan assume ideal conditions.

the different players throughout the market chain. There are unfortunately until now no formal training organizations and/or institutes that give specialized courses in sustainable agricultural methods and practices.

Regarding higher education institutions, the American University of Beirut has many programs and facilities addressing greener agriculture in Lebanon and the MENA region. The Environmental Sustainable Development Unit has provided trainings and implemented projects to improve agricultural sustainability and knowledge sharing mainly in Lebanon, but also in the MENA region.⁶⁸ The Agricultural Research and Education Center's (AREC) research activity mainly focus on sustainable food systems in drylands, such as the Beqa'a where the center is located. Research topics addressed by AREC include sustainable soil and water management, IPM, sustainable animal production and crop selection, improvement and conservation.⁶⁹ AREC coordinates activities with local people in the region, and so it does contribute to the transfer of new skills and farming methods to the Beqa'a, Lebanon and beyond.

The departments within the Faculty of Agriculture and Food Sciences have all participated in sustainability research activities. The faculty provides a variety of sustainability oriented courses on both the undergraduate and graduate levels addressing topics such as organic agriculture, sustainable agro-ecosystems and ecological landscape design and natural resource management and conservation.⁷⁰ The Institute of Water Resources and Environmental Technologies at the Lebanese American University works towards transferring water and environmental technologies (including agriculture) to the Middle East, and it also aims to stimulate many areas of applied research including fields such as drip irrigation and the optimization of agricultural production in runoff agroforestry systems.⁷¹ Other universities including programs in agricultural sciences and agronomy are the Lebanese University, Saint Joseph University and the Holy Spirit University of Kaslik. The "Institut des Recherches Agricoles au Liban" is a public agricultural research center.

On the private sector side, major companies having R&D activities and testing facilities are Debbaneh Group and Unifert. It should be noted though they are not specialized in green agriculture.

As for forestry, until recently there were no university programs in Lebanon addressing forestry solely. However, all degrees in agricultural and environmental sciences in Lebanese universities cover more or less plant sciences, natural resource management and environmental protection. Moreover, AUB, as already mentioned in the previous paragraph and the energy report, has many research institutes addressing sustainability and plant protection such as IBSAR (Nature Conservation Center for Sustainable Futures)⁷² and the ecosystem management program which offers three programs; Environmental sciences, Landscape Design and Eco-Management and Plant Genetic Resources, Conservation and Use.⁷³ Recently however, the Lebanese University has launched a new program, in collaboration with the University of Cordoba in Spain, with a goal of doing research in reforestation Lebanon and to transfer expertise in this field.

⁶⁸ <http://staff.aub.edu.lb/~webeco/ESDU/>

⁶⁹ <http://www.aub.edu.lb/fafs/arec/research/Pages/ResearchActivities.aspx>

⁷⁰ <http://www.aub.edu.lb/fafs/Pages/index.aspx>

⁷¹ <http://www.lau.edu.lb/centers-institutes/iwret.php>

⁷² <http://www.ibsar.org/>

⁷³ <http://staff.aub.edu.lb/~webeco/>

Decent Work

Work in agriculture, if not well regulated, can be very dangerous. In fact, the ILO identifies agriculture, mining and construction as the three most dangerous occupations. As mentioned earlier, it is estimated that 40,000 agricultural workers die every year because of pesticide poisoning, in addition to 3 to 4 million workers suffering from severe poisoning every year. More alarming is the fact that 70% of world child labor is in the agricultural sector⁷⁴, where 1 out of 5 children only is paid.⁷⁵ The U.S Bureau of Labour Statistics describes agricultural work as typically “strenuous”, and in most cases is located outdoors regardless of weather conditions. Furthermore, many agricultural workers (such as farmers and machine operators) work during the week-ends especially during the harvesting or planting seasons.⁷⁶

As mentioned before the number of Lebanese working in agriculture is estimated at 9% of the total workforce. Some sources, such as FAO and MoA have estimated the number of farmers at 195,000 in Lebanon, with around 66% of these farmers having other jobs in addition to agriculture. Moreover, there is a large additional number of seasonal workers, with many being foreigners from countries such as Syria and Egypt mainly. Most if not all of these seasonal workers enjoy no social safety nets, and many are migrant agriculture workers with no permanent housing who shift to different agricultural lands or farms depending on the season and the crop being raised. The number of seasonal workers is hard to estimate, especially that different farmers employ very different numbers of employees. Our own inquiries found farmers employing 6 seasonal workers during the year, whereas one winery mentioned employed up to 300 seasonal workers.

⁷⁴ <http://www.fao.org/newsroom/en/news/2006/1000394/index.html>

⁷⁵ ILO: Accelerating action against child labour, 2010

⁷⁶ <http://www.bls.gov/oco/ocos349.htm#nature>

Recommendations and Conclusion

This report is only a preliminary assessment of current green jobs, with the main objective being to stimulate and encourage policy discussions, as well as to raise awareness in the industry and policy-making milieu to the concept of green jobs. Based on the gaps identified in this report, we present below policy suggestions that promote the growth of green jobs:

- Comprehensive and coordinated national employment and environmental policy to promote and incentivise organic farming and reforestation.
- Capacity building of farmers on knowledge of the superiority of organic farming in terms of draught, desertification and changing weather patterns/climate change, water use, long term productivity, market prices and nutrition level, its positive impact on health and the reduced costs of organic in comparison to chemical fertilizers and pesticides.
- Adoption of the National Standards for Organic Farming by the GoL
- Implementation of a national awareness and marketing campaign by the MoA on the health and environmental benefits of organic products
- Implementation of an educational and training policy targeting all educational institutions (from primary schools to universities) and technical institutions (including the MoA's technical institutes) to provide the necessary skills base for organic agricultural practices
- Promotion of eco-tourism in Lebanon's forests
- Selection of a larger sections of Lebanon's land and sea wilderness as natural protectorates

Sector	Actors	Description	Key information	Job creation potential
1. Policy				
National Action Plan (NAP) to Combat Desertification	Ministry of Agriculture	The NAP is a document that lists causes of desertification and actions and projects to combat them	- Combating desertification leads to projects in sustainable agriculture, organic farming. - The issue of climate change adaptation and mitigation is also a strong component of NAPs - The NAP is still not endorsed by the COM	Implementing the NAP can lead to the creation of green jobs
National Reforestation Plan (NRP)	Ministry of Environment	The NRP has set a target to reforest 20% of the area of Lebanon by 2030	- Reforestation activities can contribute to the creation of an eco-tourism and forest management sectors - The issue of climate change adaptation and mitigation is also a strong component of NRP - Reforesting 20% of the Lebanese area is an important step in the preservation of biodiversity in Lebanon - The NRP has been	- Implementing the NRP can lead to the creation of around 15,000 green jobs yearly. Most jobs will disappear though as reforestation activities end. - Can lead to the creation of new jobs in sustainable forest management and eco-tourism

Sector	Actors	Description	Key information	Job creation potential
			adopted by the most recent COM's ministerial declaration	
2. Legislation				
Draft standards for organic farming	Ministry of Agriculture	The standards for agriculture regulate organic farming	• The law has not been ratified yet; neither by the cabinet nor the parliament • The law, if adopted, will result in the creation of an Organic Agricultural unit in the Ministry of Agriculture to regulate the Lebanese organic market • The draft law complies with EU standards • The law aims to simulate exports to the EU	• So far around 680 jobs have been created in organic farming; more can be expected if there are support policies.
3. Project Interventions				
ARC EN CIEL Project ILAC Improving Lebanese Agriculture Competitiveness	NGO	One project to promote sustainable agriculture practices	• Provided training and market support to farmers on sustainable agriculture and to some on organic farming	• The project created 15 jobs on the project and recycled around 30 farmers into sustainable agriculture

Sector	Actors	Description	Key information	Job creation potential
World Vision projects interventions in organic agriculture	NGO	5 projects to promote organic farming with a total budget of approximately 16 M\$ by World Vision	• Around 230 farmers adopted at first organic practices. • The cooperative of Organic Farmers Cooperative, BIOCOOP LOUBNAN was supported financially and 30 employees hired • The number of farmers dropped down drastically due to marketing policies • The number of current farmers does not exceed 30 and the coop staff around 10. • Support to creation of a certifying body and company	• Created 15 jobs on the projects, 35 jobs in the coop and 230 farmers recycled into organic. • Supported the creation of a certification body with 2 full time jobs.
GreenLine project interventions	NGO	Projects in organic agriculture and integrated pest management	• Survey on the use of pesticides by Lebanese farmers • IPM projects in 4 areas in Lebanon • Creation of the organic farming committee • Introduction of organic pest control methods in Lebanon	• The local and international training of around 47 agricultural engineers in organic agricultural production, certification, composting and soil testing in coordination with

Sector	Actors	Description	Key information	Job creation potential
			Participation in the promulgation of the National Standards for Organic Farming in Lebanon	the International Federation of Organic Agricultural Movements (IFOAM)
Integrated management of olive oil waste	European Union, MoEs in Lebanon, Syria and Jordan	Introduction of olive waste management techniques in Lebanon	- Establishment of a database of olive oil mills and their complementary industries - Environmental auditing of 6 olive oil mills - Calculation of the cost of environmental degradation from the olive oil production sector - Assessment of the impact of different pressing techniques on olive oil quality, as well as their costs and revenues - Assessment of the training needs of olive farmers and mills owners for "greener" and better quality of oil - Issuance of a guideline to produce	•

Sector	Actors	Description	Key information	Job creation potential
			better olive oil	
AUB projects interventions	AUB, World Bank, Council for Development and Reconstruction, Ministry of Agriculture, International Fund for Agricultural Development, United States Department of Agriculture	Interventions in Sustainable Agriculture	• Improvement of productivity • Irrigation water efficiency • Increase in agricultural production and the reduction of production costs • Construction of Wetlands • Promotion of Organic Agriculture • Integrated Marketing Strategy for organic products	•
MoE methyl Bromide Phase-Out Project	UNDP, UNIDO, MoE, Montreal Protocol	Phase out of Methyl Bromide from greenhouses and agricultural practices in Lebanon (due to Lebanon's ratification of the Montreal's Protocol)	• Introduction of alternatives to Methyl Bromide • Virtually complete phase-out of Methyl Bromide from Lebanon	• Training of 10,000 farmers in alternative practices
FAO's IPM project in the Near East	FAO	Introduction of IPM techniques to the Near East Region to increase food security	• Increasing food production through IPM techniques • Training of farmers using FFS methodology for olive and tomato grown in	• Training of 162 trainers and 240 farmers

Sector	Actors	Description	Key information	Job creation potential
			greenhouses	
Conventional Agriculture	GTZ, ACSAS, LARI, AUB	Introduction and testing of conventional agricultural practices in Lebanon	- Conventional agricultural experiments on Vetch and Barley - Additional experiments on olive oil	Involvement of up to 20 farmers in these tests
Reforestation/Afforestation projects	Mada, AFDC, Friends of the Cedars of Bsharre, Norwegian Agency for Development Cooperation, WWF, EU life project, MoE, MoA, UNDP, GEF, Italian Cooperation Program, Agence Francaise pour le Developpement	National awareness, fire prevention, reforestation/afforestation, planting of seeds from local nurseries	- National Reforestation Plan (mainly by AFDC) - National Awareness campaigns - Lobbying for designation of larger areas as protected by the government - Production of seedlings - Fire prevention projects - Encouraging municipalities to participate in reforestation activities - Reforestation projects	- Training of forest guards, firemen - Training of other workers in reforestation
4. Service Providing				
Certifying bodies	Private sector	Certifies organic farmers, traders, processors etc...	Supports organic farming and enables export	6 jobs in two certifying companies LibanCert and IMC

Sector	Actors	Description	Key information	Job creation potential
Retail outlets	Private sector	At least 15 Retail outlets and one farmers market that sell organic produce fresh and processed.	Provides a market for the sale of organic produce	At least 30 full-time jobs created
Reforestation contractors	Private sector	At least 3 contracting companies exist in Lebanon	- Reforestation is a seasonal, non-permanent job. - Forest management will create permanent jobs	At least 15 seasonal jobs created
NGOs working in reforestation	NGOs, Schools	At least 3 NGOs have strong focus on reforestation AFDC, Jouzour Loubnan and TERRE Liban. Others, including schools, have also undertaken some reforestation work.	- NGOs are key players in reforestation - Most work is done by volunteers - A small management group is hired to run the NGO - Jobs such as wardening are paid but only over two to three years periods only	At least 10 jobs created in reforestation
7. Main external support agencies				
World Vision Lebanon	NGO	An American Relief and Developmental Organization	Implemented Organic farming projects	
FIBL	NGO	Independent institute for research in organic agriculture based in Switzerland	One project to promote organic farming	

Sector	Actors	Description	Key information	Job creation potential
FAO	United Nations Agency	Agency leading international efforts to defeat hunger	IPM regional project	
UNDP	United Nations Agency	Agency working with governments and local communities and helping them to find solutions for global and national developmental challenges	Implemented reforestation, methyl bromide phase-out and combating desertification projects	
GTZ	Private International Enterprise	Enterprise owned by the German Federal Government and specialized mainly in technical cooperation for sustainable development	Funding of Conventional Agriculture, combating desertification and the promotion of organic agricultural projects	
8. Research & development				
Research is mainly restricted to academia (mostly by the American University of Beirut)				

Annex - Projects

World Vision has already implemented five organic farming projects. The respective amounts of funding for the five respective projects were US \$30,000 by the Japanese Embassy, US \$150,000 by World Vision Canada, a US \$1.8 million sub-grant by MercyCorps, which itself had received the funds from the United States Department of Agriculture (USDA), and US \$6 million and US \$8million grants by USAID for the last two projects.

The first project was implemented throughout the 2001-02 period in Debel. It provided extension services for organic agriculture and resulted in the training of around 30 farmers and the establishment of an organic agricultural center for olives and different field crops. The second project, also in Debel, ran parallel to the first and ended in 2003. It resulted in the additional training of another 50 farmers. The third one had as goal the revitalization of the local economy through sustainable management of water and agricultural resources. The sustainable agriculture branch of the project consisted mainly of organic agriculture. Eight pilot farms were chosen from the villages of Rmeish, Debel, Qawzah, and Aita Al Shaeb, along with two farmers to be trained. This project's main achievement was the establishment of an organic agricultural center at Bint Jbeil, where there were cooling facilities, packaging, IT staff, a warehouse and an olive mill. The Debel center was moved and combined with the center at Bint Jbeil. The center's products were marketed and relayed to Beirut through pick-up trucks provided by World Vision. The project lasted from 2002 to 2004.

The Sustainable Agriculture and Rural Development (SARD) project, the fourth one implemented by World Vision, was aimed to support the Biocoop Lubnan cooperative (more on Biocoop later). The project was at the scale of all Lebanon, and it resulted in the establishment of four organic agricultural centers in Marjayoun, Libaa, Zahleh and Bsharre. Ten pick-up trucks, tractors and harvesters were bought to support farmers, 150 farmers were trained, and 50 engineers were employed full time for the project. It started in 2002 and ended in 2005. The final World Vision project was the Sustainable Agribusiness Initiative for Lebanon (SABIL). It was an extension to the SARD project, but went further by cooperating with universities and research centers, as well as by doing more extensive marketing activities. Additional equipment and machinery were bought and all centers were finally merged with Biocoop Lubnan. It started in 2005 and ended in 2008.

Green Line, an environmental NGO in Lebanon, has implemented pilot projects aiming to reduce the use of chemicals and pesticides in agricultural activities. It has completed a survey on the use of pesticides by Lebanese farmers, and an integrated pest management (IPM) demonstration project through a Canadian grant in 4 areas in Lebanon for a period of 3 years. The latter project resulted in the creation of the Organic Farming Committee in 1999. Starting from 1999 to 2001, and through funding from Novib, the Dutch affiliate of Oxfam, the committee has implemented the Organic Farming project, which resulted mainly in the introduction of organic pest control methods in Lebanon, the local and international training of around 47 agricultural engineers in organic agricultural production, certification, composting and soil testing in coordination with the International Federation of Organic Agricultural Movements (IFOAM) , and last but not least the creation of the cooperative for organic farmers, Biocoop Lubnan in 2001. Finally, through a grant by GTZ, GreenLine implemented the "Promotion of Organic Agriculture in Lebanon" project, focusing on creating a legal framework

and a certification process for organic agriculture in the country. This latter project led to the promulgation of the National Standards for Organic Farming by LIBNOR.

Regarding olive oil waste, Lebanon, Syria and Jordan decided to explore the integrated waste management system to tackle this issue. A project funded by the European Union (EU) and the ministries of environment of Lebanon, Syria and Jordan aimed to introduce olive oil waste management techniques to Lebanon. Project activities were initiated in 2005 and ended in 2008. The project resulted mainly in the establishment of a database of olive oil mills and their complementary industries, environmental auditing of 6 olive oil mills, the calculation of the cost of environmental degradation from the olive oil production sector, the assessment of the impact of different pressing techniques on olive oil quality, as well as their costs and revenues, an assessment of the training needs of olive farmers and mills owners for “greener” and better quality of oil, and last but not least the issuance of a guideline to produce better olive oil.

The American University of Beirut (AUB) has been a big contributor to organic farming and sustainable agricultural practices in Lebanon. For example, the “Yammouneh Technology Transfer and Extension Project”, funded by the World Bank, the Council for Development and Reconstruction (CDR), the Ministry of Agriculture (MoA) and the International Fund for Agricultural Development (IFAD) had as objective the improvement of productivity, irrigation water efficiency, the increase in agricultural production and the reduction of production costs. Another project implemented by AUB was the constructed wetlands project. After a period of research and pilot scale applications, a life-size system was implemented in 1999 in Jbeil. Also, the “Growing Sustainability An Integrated Village Development Project El Qaraaoun pilot village”, funded by Mercy Corps under USDA’s supported Rural Community Development Cluster project, has promoted organic agriculture by teaching farmers organic farming practices both in farms and in their personal gardens, and by providing them with an integrating marketing program to facilitate the selling of their products. AUB has a farm located in the Beqaa valley which uses sustainable agricultural practices, and has helped in knowledge transfer throughout Lebanon and the Middle East.

Some of the cited projects previously had, in addition to the goal of promoting organic agriculture in Lebanon, the objective of empowering women. Of the women cooperatives mentioned by the ALOA is the “Women Cooperative Association for Food Processing” in Rashaya, which was the first to receive a certification for its organic products.

The MoE, through a \$ 2.51 million USD fund from the Montreal Protocol, has implemented a phase-out project of Methyl Bromide, an ozone-depleting substance used by farmers to sterilize the soil. The MoE coordinated with the UNDP on the phase-out of the substance in vegetables, cut-flowers and tobacco cultivations, and with the United Nations Industrial Development Organization (UNIDO) for the phase-out from strawberry production. The project aimed at introducing Lebanese farmers to alternatives to Methyl Bromide such as soil solarization, biofumigation, grafting and certain chemical alternatives. It started in 2002 and was completed in 2008, and it was conferred the Exemplary Project Award by the Montreal Protocol on the occasion of its 20th anniversary. By the time of completion, most quantities of Methyl Bromide had been phased out, virtually all greenhouse production sectors previously using methyl bromide were converted into alternative techniques, and more than 10,000 farmers were trained on the accurate application of the new techniques proposed.

Other organizations having implemented projects in Lebanon include The German Research Institute for Organic Agriculture, which implemented the “Organic certification and market development in Lebanon” project, and introduced the Participatory Market Chain Approach, a R&D method to boost innovation by encouraging the participation of different players throughout the market chain. The Middle East Center for the Transfer of Appropriate Technology is one of the organizations in Lebanon that worked in introducing organic farming. Finally, Arc-en-Ciel, a Lebanese NGO, also implements a sustainable agricultural extension program. Its activities are based on the Indicateur de Durabilite de l’Entreprise Agricole (IDEA) model. The model has 42 indicators that reflect the sustainability of the environmental, social and economical dimensions of the considered farms. The NGO has also built a network named WATANI to stimulate the sustainable agriculture value chain in Lebanon, and encourage the sales and consumption of products of sustainable agriculture. Funders of Arc-en-Ciel include USDA and the Spanish Agency for International Cooperation (AECI).

FAO has implemented since 2004 the Regional Integrated Pest Management Program in the Near East in Egypt, Iran, Jordan, Lebanon, the Palestinian Territories and Syria. In 2009, the program was also launched in Algeria, Iraq, Morocco and Tunisia. The program aims to enhance food security in these countries by increasing food production through the use of “green” or ecological integrated pest management. Farmers are trained using the Farmer Field School (FFS) methodology. The FFS methodology in the case of IPM basically teaches farmers in a collective and participatory manner throughout the whole cropping season to increase their agricultural productivity while reducing the use of chemical pesticides, depending on the type of crop and the geology and biota of the region. In the case of Lebanon, as of July 2010, these methodologies were implemented for olive and tomato grown greenhouses and the training of 162 trainers and 240 farmers.

Finally, GTZ and ACSAD have funded a CA project in Lebanon in 2007 that was implemented by AUB and LARI. The experiments were done on barley and vetch. Vetch produced higher yield with CA compared to conventional farming, however barley had a lower yield with CA. The lower barley yields were due most probably to weed infestation; however, since CA improves soil as compared to conventional agriculture, it was thus expected that CA barley yields would increase. CA had higher soil moisture than conventional farming, whereas CA production costs were lower reaching 30% in some cases. CA is also being tested on olive plantations. During the 2007/2008 season only two farmers were employed in this project. The number of farmers involved increased to more than 20 during the 2008/2009 seasons.

As for the forestry sector, a number of NGOs have been working in the protection of forests. The ECODIT/USAID “Lebanon Forest & Biodiversity Conservation Assessment” mentions three main NGOs: Mada, a NGO established in 2000, managed to include a 270Km² pilot zone in Akkar as a national park in the government’s National Land Use Master Plan; the Association for Forest Development and Conservation (AFDC) that mainly deals with fire prevention and forest management; and the Friends of the Cedars of Bsharre Committee has been overseeing the Cedars Forest in Bsharre and has also implemented reforestation activities. AFDC played the leading role in releasing “Lebanon’s Strategy for Forest Fire Management: Building Partnerships”. It also regularly implements awareness and reforestation campaigns, and it produces its own seedlings in its own nurseries. AFDC has been the most active in reforestation and can be considered the largest NGO dealing with forests, as revealed by the numerous reforestation and fire prevention projects implemented throughout the years with many

international donors such as the Norwegian Agency for Development Cooperation, WWF, the EU life project, the World Bank etc. The Friends of the Cedars of Bsharre Committee launched in 1998 an 18-year long reforestation project funded by “Iles de France”. The Committee also manages a plant nursery and operates maintenance activities for a period of 18 years after planting.

International organizations have also implemented projects related to forestry in Lebanon. The UNDP and GEF have implemented the “Protected Areas Projects”, which consisted of applying stringent conservation measures to three natural reserves in Lebanon in order to enhance natural re-gensis in these protected areas. Also, in 2009, the UNDP, in coordination with the MoE and GEF, has launched the “Safeguarding and Restoring Lebanon’s Woodland Resources”, with the objective “to develop a national strategy for the preservation and restoration of the forests of Lebanon, and to assist the MOE in the implementation of the third phase of its reforestation agenda through capacity building and execution of appropriate Sustainable Land Management (SLM) policies and practices.”⁷⁷ This project introduced a new approach to implement reforestation activities by calling for direct contracting between the MoE and concerned municipalities thus prompting the latter’s direct involvement in reforestation activities in their respective regions. 41 municipalities were selected out of 90 applicant municipalities. The project will result in the reforestation of 185Ha trough the 2011/2012 period. This project is actually the third phase of the National Reforestation Plan, which will be mentioned later. The already mentioned ECODIT/USAID report also mentions donations the Italian Cooperation Program and the Agence Francaise pour le Developpement. More surprising is the mention in the report of a private initiative from a Lebanese entrepreneur to protect Jabal Moussa. His relentless work resulted in the founding of the Association for the Protection of Jabal Moussa, and the designation the area as a Biosphere Reserve by UNESCO and as an Important Bird Area by Birdlife International.

The MoA, through its Directorate for Rural Development and Natural Resources (DRDNR) currently implements reforestation and afforestation projects, worth around USD 1 million, according to the State of Lebanon’s Forests report compiled by AFDC. In 2002, the DRDNR planted hundreds of hectares on the Lebanese side of the Anti-Lebanon range as part of a joint afforestation project with Syria. The reforestation responsibilities have been more or less transferred to the MoE since 2001. DRDNR has also implemented a National Forest and Tree inventory assessment in Lebanon with support from FAO. The MoE initiated the National Reforestation Plan and subsequent reforestation activities. In 2007, according to the State of Lebanon’s Forests reports the MoE had already planted 600Ha. In the table below is a list of most important forestry projects until 2007, taken from the same report.

