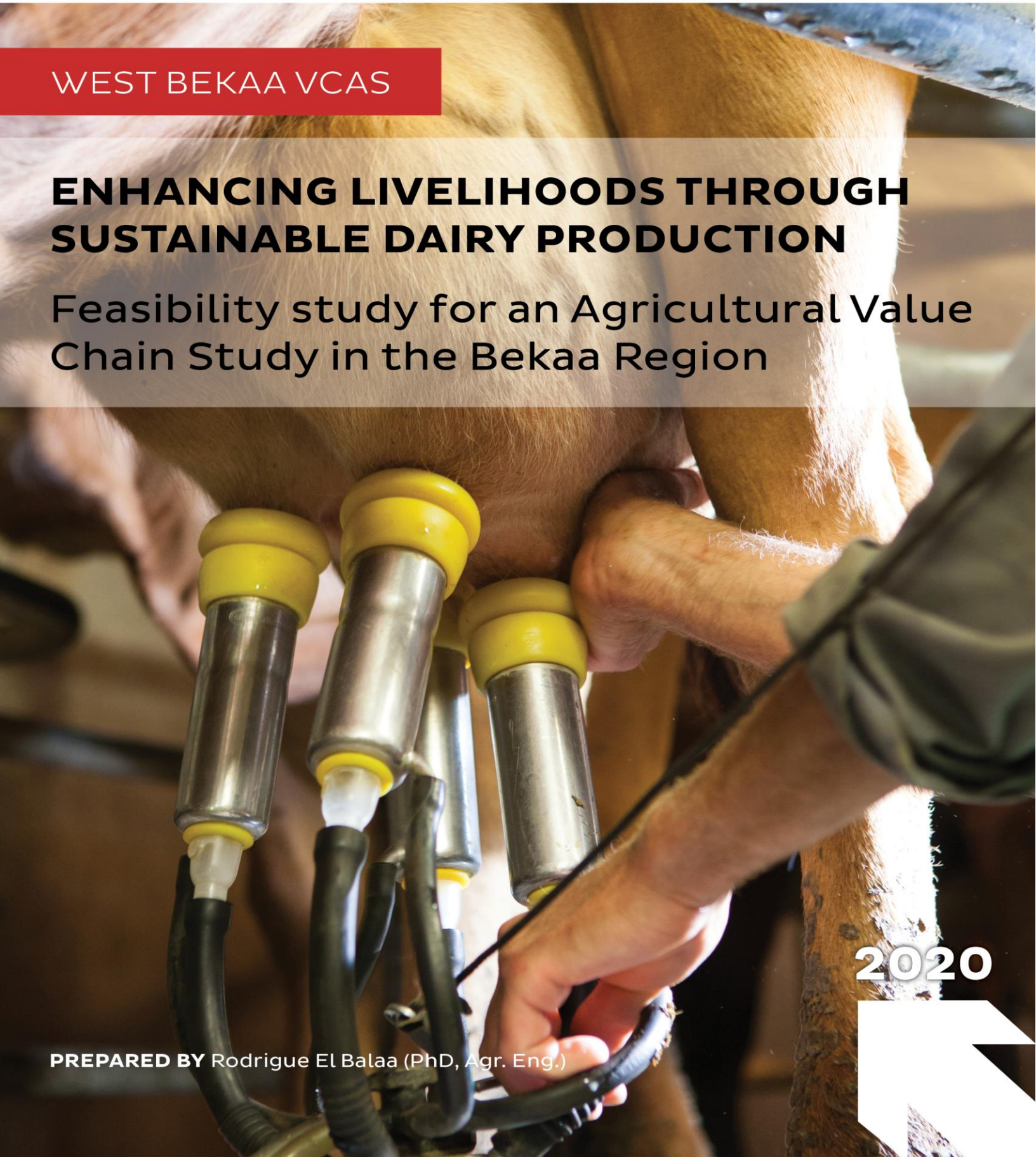
DANISH REFUGEE COUNCIL

FAIR TRADE LEBANON

WEST BEKAA VCAS

ENHANCING LIVELIHOODS THROUGH SUSTAINABLE DAIRY PRODUCTION

Feasibility study for an Agricultural Value Chain Study in the Bekaa Region



2020

PREPARED BY Rodrigue El Balaa (PhD, Agr. Eng.)

Table of Contents

Table of Figures

I. Background

Fair Trade Lebanon and Danish Refugee Council partnered under the feasibility study for an agricultural value chains support project.

II. Objectives

The objective of this study is to provide an agricultural value chain analysis to develop an accurate and relevant livelihood program, focusing on local and sustainable economic development for displacement affected communities.

Target area is the Bekaa which has the highest market potential for small-scale farmers and highest potential to create jobs while ensuring a protective and sustainable environment.

The objective of the below report is to provide recommendations to narrow the scope of agricultural value chains which would be selected for phase 2, the value chains cluster analysis.

III. Methodology

The study report is based on two main sources of information: the first is a secondary data analysis of reports and studies carried by public (Ministry of agriculture, Ministry of Economy and Trade), International (Food and Agriculture Organization (FAO), United Nations Economic and Social Commission for Western Asia (ESCWA), Investment Development Authority of Lebanon (IDAL)) and market experts (MerciCorps, Bankmed).

The second source are Key Informative Interviews with sector experts including **Eng. Said Gedeon** – Deputy General Manager, Head of Services and Agricultural Development Department - Chamber of Commerce Industry and Agriculture of Zahle, **Eng. Mariana Yazbek**, Gene Bank Manager, International Center for Agricultural Research in the Dry Areas, **Eng. Michel Issa El Khoury**, director, LARI branch, Abdeh, Akkar, **Dr. Eng. Sabine Saba**, University of Balamand, Institute of the Environment, Project manager of Sustainable Action for Bioenergy Production in Koura (SABioP), **Dr. Michel Afram**, Director General of LARI, **Eng. Roland Andari**, Director, olive oil sector, LIVCD and a brain storming meeting with FTL and FTTL team on currently ongoing agricultural projects in the Bekaa, mainly **Mr. Joe Abi Harb**, sales manager at Terroirs du Liban.

The study was conducted in two phases: during the first phase, a decision making tool based on identified parameters was set up to identify the target regions for the project and to select the value chains. The second phase provides specific information about the target region and the concept of the project with the interaction between the selected value chains.

Phase 1

Identification of targeted value chains and targeted regions

1. Introduction

The first phase of the study is based on secondary data analysis and key informative interviews with the aim of selecting the most suitable region and value chains in accordance with the objectives of the project.

2. Methodology

The decision making tools includes a list of parameters which were applied on major value chains in order classify them according to their importance. The value chains categories are Dairy Products, Spices and herbs, Cereals & Pulses, Fruits, Vegetables, Olive and olive oil, Honey, Meat Products, Chicken, Products and Fish Products. The parameters were distributed according to value chain stakeholders major categories (producers, processors, distributors and consumers).

The stakeholders' parameters are as follows:

Producers: Geoclimatic conditions, know how, associated agriculture, infrastructure development potential and SMEs influence.

Processors: Steady supply, steady quality, production know how, infrastructure development potential and SMEs influence.

Distributors: Export possibilities, national market demand, value added products (organic, Protected Denominations of Origin (PDO), Protected Geographical Indications (PGI), etc.), transportation, storage, direct sales and competition.

Consumers: Storage, Identity, consumption frequency, shelf life and convenience

As for identified value chains, they include: Dairy Products, Spices and herbs, Cereals & Pulses, Fruits, Vegetables, Olive and olive oil, meat, chicken and fish.

The results are presented in the form of a summary table including value chain stakeholders and value chain categories.

3. Results

The summery analysis of the combined data shows the following results:

Table1: Summery analysis of proposed value chains

	Production	Processing	Distribution	Consumption
Dairy Products	+++	+++	++	+++
Spices and herbs	+++	+++	+++	+++
Cereals & Pulses	+++	++	+++	+++
Fruits	+++	++	++	+++
Vegetables	++	++	++	++
Olive and olive oil	++	++	+++	+++
Honey	+++	+++	+++	++
Meat Products	+	+	+	++
Chicken Products	+	+	+	++
Fish Products	+	+	+	++

3.1. Geo-climatic conditions of targeted regions

3.1.1. Topography

Administratively, Lebanon was divided until 2003 into six mohafazats or governorates (Beirut, North, Mount Lebanon, South, Nabatiyeh and Bekaa). In 2003, two new mohafazats were created (Akkar and Baalbeck Hermel). Topographically, there are four parallel areas running north-south which are, from west to east, as follows:

a. A flat, narrow coastal strip parallel to the Mediterranean sea;
b. the Lebanon Mountains, a chain with mid-range mountains up to 1 000 m above sea level and high mountains reaching 3 087 m above sea level at Qurnat as Sawda in northern Lebanon;
c. the fertile Bekaa Valley at around 900 m above sea level;
d. the Anti-Lebanon mountainous chain, which rises to 2 800 m and stretches across the eastern border with the Syrian Arab Republic. [1]

[1] FAO, 2008. Aquastat

Figure 1: Lebanon Topography representing the effect of Mount Lebanon on the Bekaa valley (CDR)

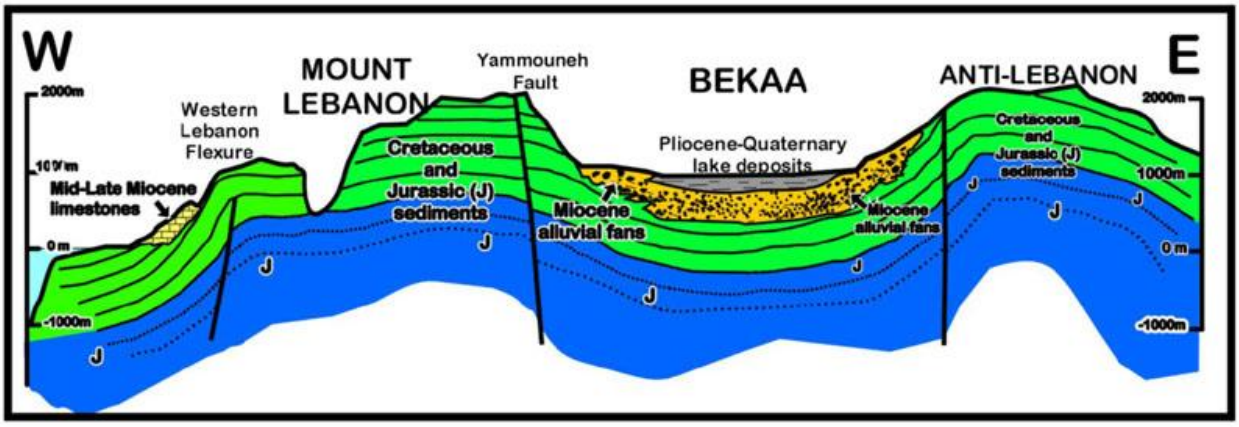


Figure 2: Cross section of Lebanese Topography

3.1.2. Pluviometry

Average annual rainfall is estimated at 823 mm although this varies from 700 to 1 000 mm along the coastal zones and from 1 500 to 2 000 mm on the high mountains, decreasing to 400 mm in the eastern parts and to less than 200 mm in the northeast due to the high Mount Lebanon chain of mountains. There's a large difference between the Northern Bekaa where precipitations can be as low as 200 mm per year and Rashaya and Western Bekaa with precipitation reaching as high as 900 mm per year.

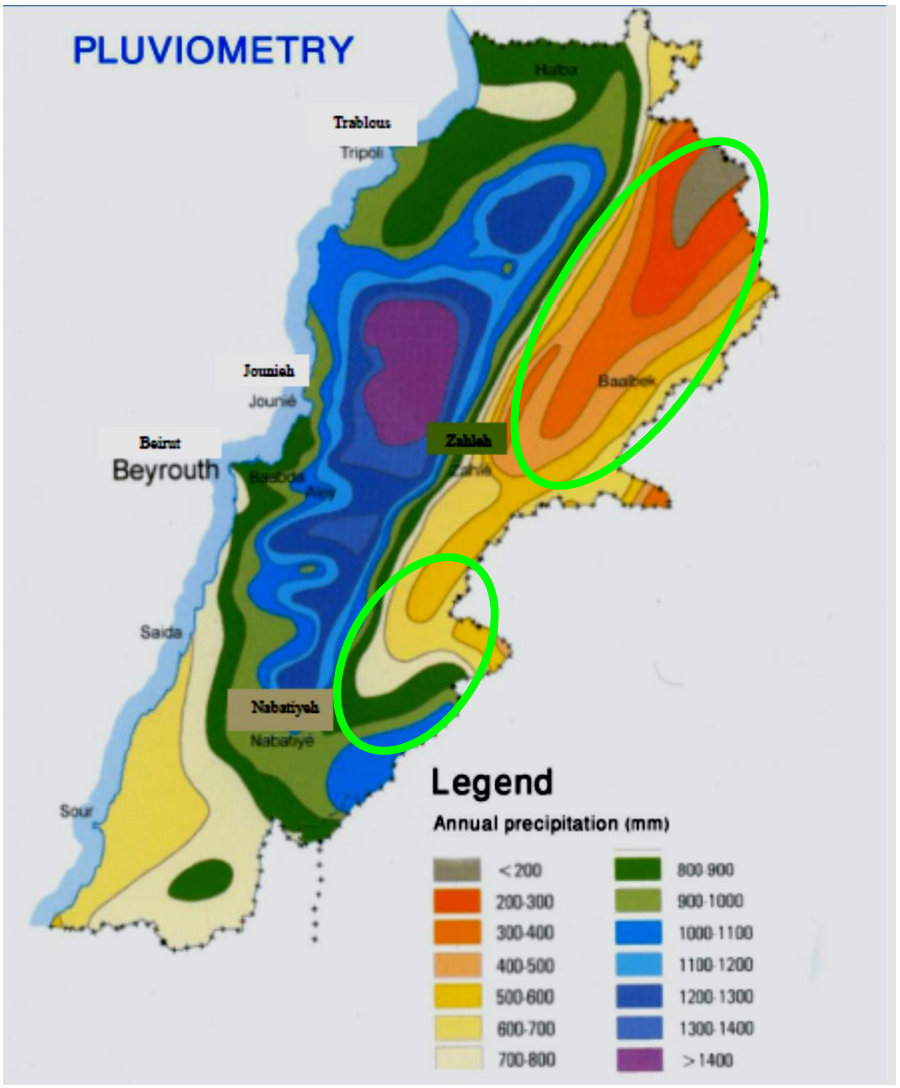


Figure 3: Bekaa precipitations as affected by Mount Lebanon chain of mountains (CDR)

3.1.3. Soil cover

The soils of Lebanon are typically Mediterranean, generally calcareous except for the sandy soils formed on the basal cretaceous strata of the Akkar Plain and the alluvial soils of central and western Bekaa Valley. Lebanon has a complex landform consisting of sloping and steep lands. The high slope gradient is a major physical factor, exacerbating water erosion of the upper layer of the soil and leading to a weak structure and reduced water-holding capacity.

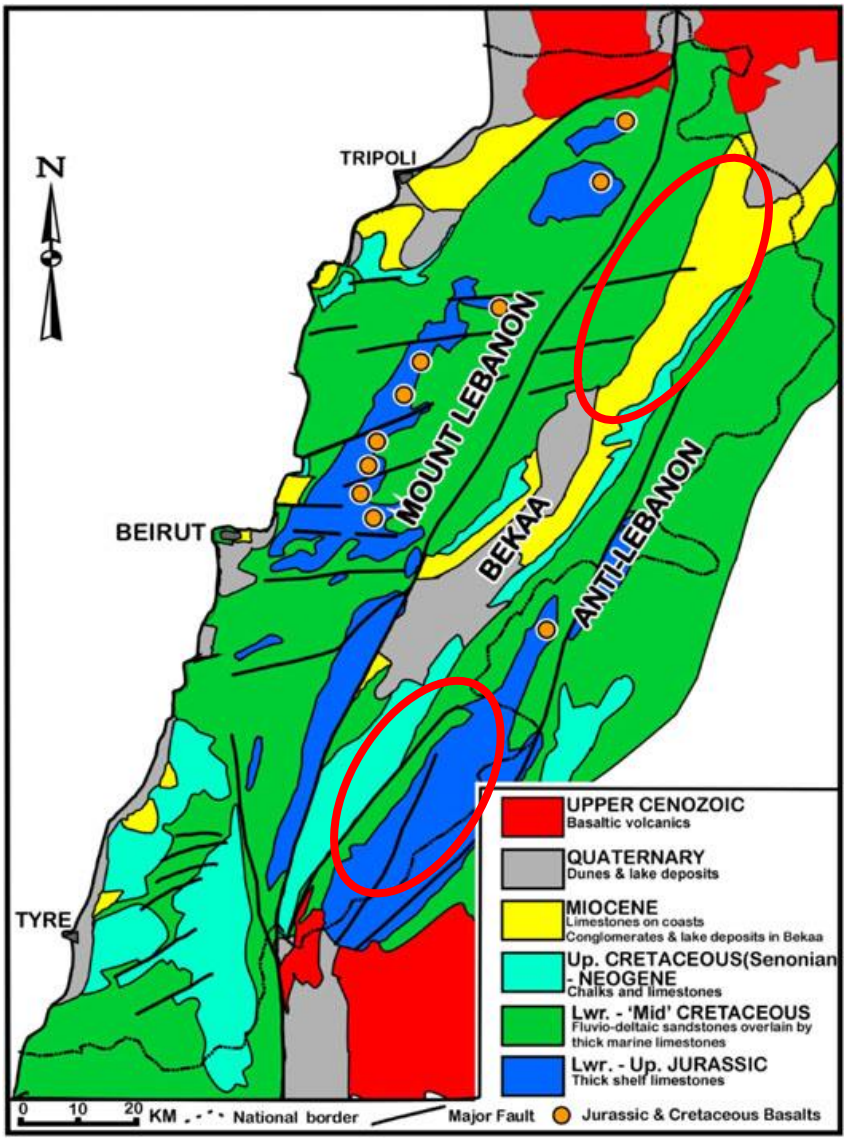


Figure 4: Bekaa distribution of soils affecting the quality of crops (CDR)

3.2. Socio economic overview of targeted regions

3.2.1. Hermel

Baalbeck & El Hermel is the largest district in Lebanon with 2,319 Km2. It is one of the least populated governorates with a population density of 180 people/Km2, with 13% of deprived population. It has the lowest unemployment rate in Lebanon of 4% compared to a national average of 6.4%. The soil texture in Baalbeck provides a great potential for field crop and intensive cultivation. It holds the highest share of industrial crops and 2nd highest share of cereal production in Lebanon. There are around 32 industrial

firms, 34% of which are engaged in agro-food related activities. In terms of access to market, it is 48 km away from Al Masnaa, the main custom office between Lebanon and Syria.[2]

3.2.2. Rashaya and West Bekaa

The Bekaa Governorate is Lebanon's third largest Governorate, and is composed of 3 almost equaly distributed districts: Zahle, West Bekaa and Rashaya, with Zahle as its administrative center. West Bekaa's surface is 425 Km2 and Rashaya's is 485 Km2. It has around 532,000 inhabitants including Syrian and Palestinian refugees with Zahle District having the highest population density of around 834 people/km2, West Bekaa 317 people/km2 and Rashaya 90 people/km2. The labor force in Bekaa is mainly engaged in manufacturing activities (42.6%) and wholesale and retail trade (30%). Being a major agriculture and agro-food hub in the country, the Governorate has a better unemployment rate (6%) than the national average (6.4%). The Bekaa region is the biggest producer of cereals, pulses and vegetables as well as grapes, creating opportunity to develop industries around them with cereals representing 37% of its agricultural production and pulses 35%. The region holds the highest share of packaging centers (33%) and cold storage houses (42%) in Lebanon. The Bekaa Governorate has the 2nd highest share of industrial companies after Mount Lebanon with more than 40% of those firms working in the food and beverages sector. As an agriculture-based economy, the Bekaa region is the largest exporter of fruits and vegetables in the country (55%).[3]

3.3. Vulnerability of target areas

There are 938,565 people living in these governorates, 42% of which are Syrian and Palestinian refugees. There are 65 vulnerable localities in the Bekaa region, 39 are located in Bekaa governorate and 26 in Baalbek/Hermel governorates, of which six localities in Bekaa and five localities in Baalbek Hermel are classified as most vulnerable. 35 of the 65 localities are also considered under substantial and high pressure where the ratio of refugees to deprived Lebanese is at least three to one or more. Inter-sectoral coverage has increased in the most vulnerable localities under the highest pressure, however, livelihood interventions are lacking in many of them.[4]

[2] IDAL, 2017. Investment opportunities in Baalbeck El Hermel.
[3] IDAL, 2018. Investment opportunities in Bekaa.
4 United Nations Office for the Coordination of Humanitarian Affairs (OCHA), 2018. Bekaa and Baalbek/Hermel Governorates Profile

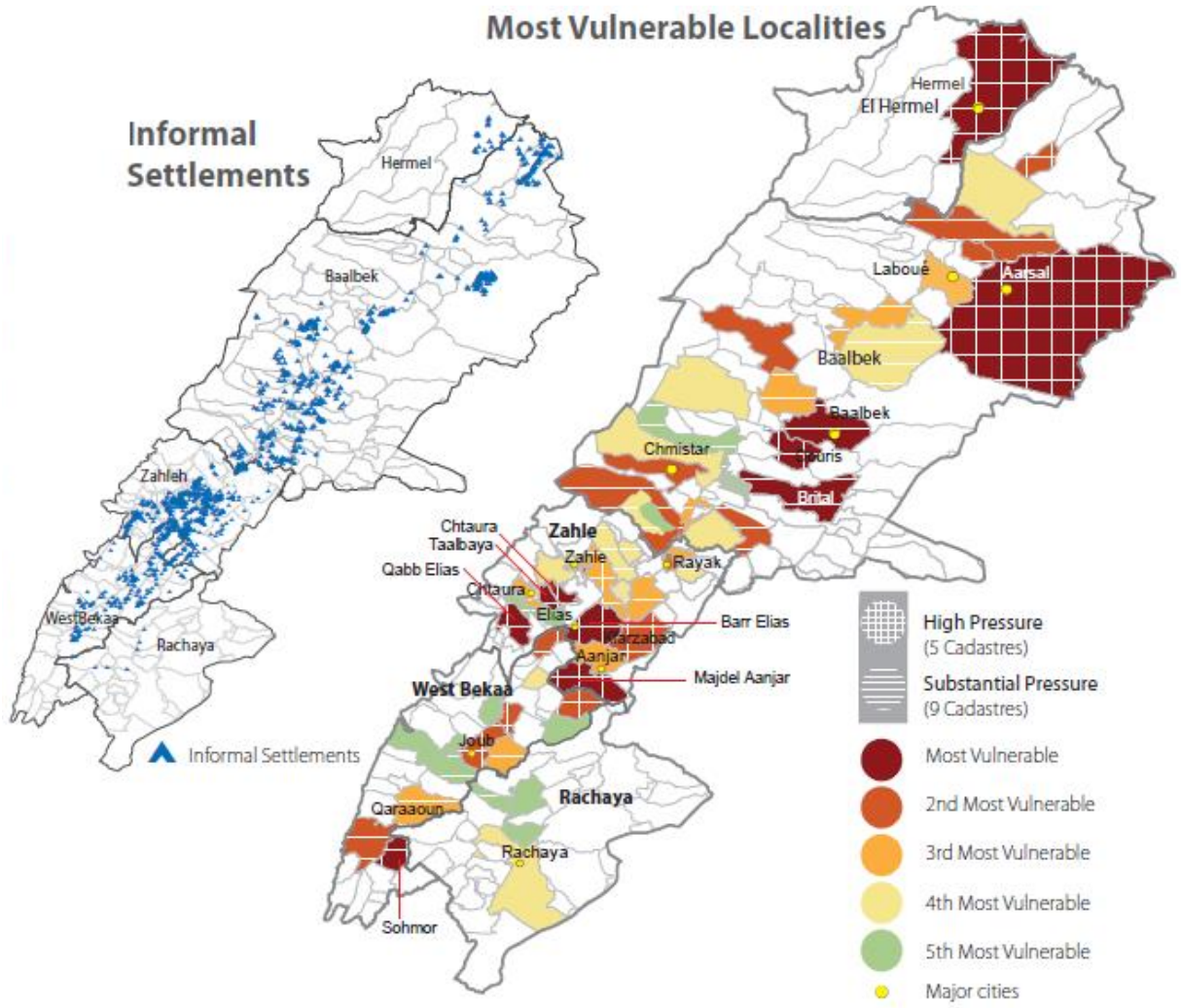


Figure 5: Distribution of vulnerable localities in the Bekaa

3.4. National unemployment criteria

There was an unemployment rate of 6% in 2009 at the national level. A closer look at unemployment indicates the rates were higher among women (10%) than men (5%). The highest unemployment rates were recorded among young people (below 30 years), particularly women; hence the importance of working on ways to integrate the younger population into the labor market through specialized trainings or business incubation models for start-ups.

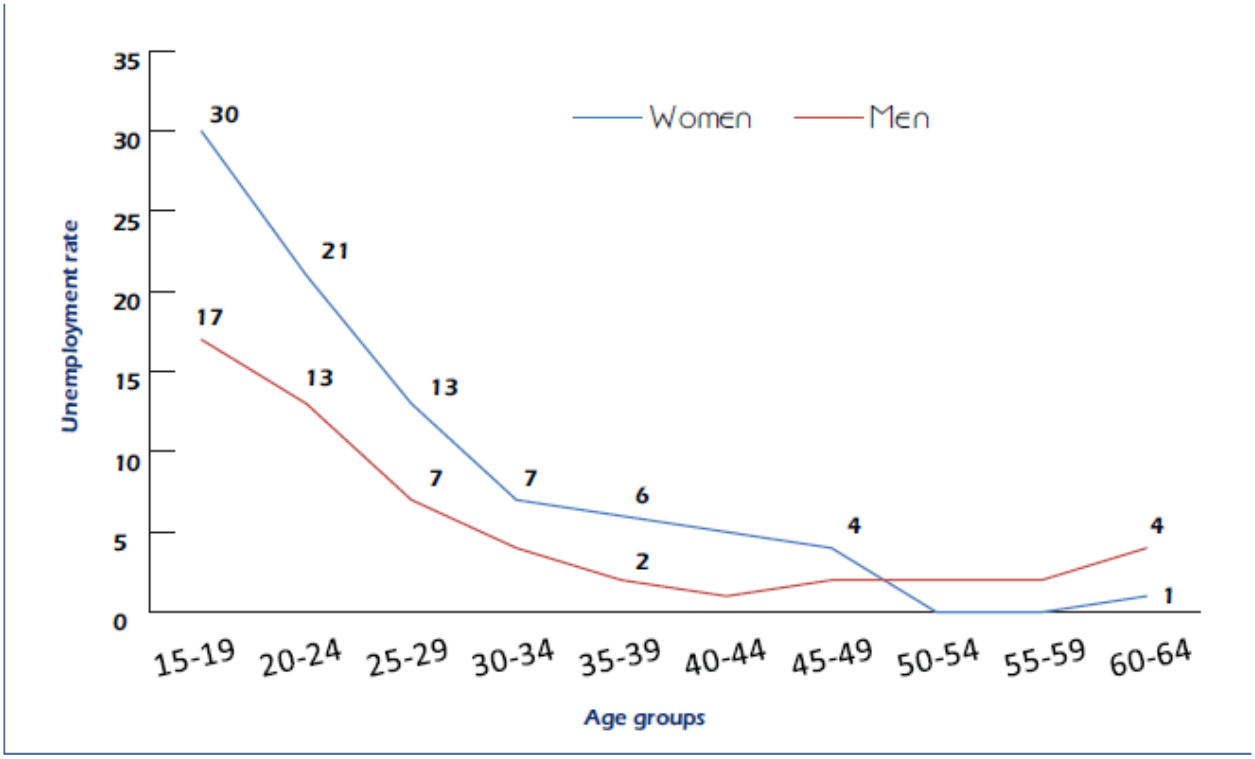


Figure 6: Unemployment rate by age and sex[5]

3.5. Value chains

3.5.1. Dairy production (small ruminants)

Dairy production is fairly developed in the Bekaa region and several large SMEs are already well established with specific categories of products; however, the small ruminant dairy value chain is more traditional and includes a large number of producers with higher need for development.

- **Producers**

There are two sorts of small ruminant dairy producers: the semi-extensive system, where no supplements are presented during the grazing period, representing 90% of total production, and semi-intensive, which involves including daily supplements to animals. Due to deteriorating weather conditions and the Syrian crisis, there's a clear tendency for the second rearing system.

An important component of the VC is the collector or the Hallab, who links producers and processors and thus can be subject to an improvement action including their collection and transportation systems as well as different hygienic conditions.[6]

5 Central Administration of Statistics, 2011. The Labor Market in Lebanon.

In its 2015-2019 strategy, MoA highlights the need to improve the competitveness of the smallholder dairy sector, for enhancing quality and food safety of local dairy products and to reinforce the role of dairy cooperatives.

- **Processors**

There are large SMEs that possess their own retail stores in central Bekaa, they also have their own farms and buy supplement milk from other small farmers. Small SMEs are limited by their capacity of processing and storage. A few dairy cooperatives exist due to recent international development projects.

In Bcharré, Ehden, El Akoura, Hrajel and Aynata, the production of goat milk was preserved and the milk transformed into the well-known Darfiyé Cheese Bcharré. However, in Baalback, Chouf and Chebea goat milk was preserved and processed in a different way. It was preserved as Labneh Anbris (Sirdalé). Another type of preservation for goat milk is the "Labneh Darf Baalback". The actual region of production is concentrated in the Jurds (rural highland mountains) of Baalback; (Ras Baalback), Deir el ahmar, Arsaal, yammouneh, Nahleh.

"Kishek Baalback" started as a product of shepherds, when they use to save goat's milk for longer times especially in the Jurd (high hills). The shepherds would stay with the herd all year around and move with the herd during the spring to allow for further breeding in the Jurd.[7]

- **Distributors**

With imports adding up to $316.6 million, dairy products form the biggest category of F&B imports and represented 17 percent of total agro-food imports in 2017.

A niche market of upper price range exists and is mainly supplied by imports of a diverse range of dairy products coming primarily from France. It is currently being slowly filled by two recently established intensive producers: Gout Blanc and Khoury dairy, both present in the Jbeil mountains.

The major obstacle for supplying supermarkets is consistency and stable supply of quality products; however, they are recently more open to supply shortages due to increasing demands.[8]

---

[6] MercyCorps, 2014. Protect and provide livelihoods in Lebanon: Small Ruminant Dairy Value Chain Assessment.

[7] Ministry of Economy and Trade, 2007. Article on inventory products potentially eligible for PDOs and PGIs in Lebanon. EFTA/Swiss project on protection of Geographical Indications in Lebanon.

[8] El Tabch, L., 2018. The Food and Beverages Sector: Position, Problems and Prospects. Lana El Tabch. Center for Economic Research at the Chamber Of Commerce, Industry and Agriculture of Beirut and Mount Lebanon.

- **Consumers**

According to Mercy Corps, below are some of the major trends in the small ruminant dairy consumption:

- Strong demand for small ruminant dairy products such as labneh, kishk and baladi cheeses
- New product development and marketing support for dairy processors and cooperatives may increase demand
- Need for more diversified packaging options both in design and volume.

3.5.2. Spices and herbs

- **Producers**

The ministry of agriculture noted that the Bekaa is ranked second for thym production with 29% after the south's 32%.

Oreganum Syriacum also known as thym or locally as Zaatar is a low-input crop that is adapted to marginal lands. As water scarcity and land hardness are limiting the choices of alternative crops, medicinal and aromatic plants tolerate water scarcity and represent good candidates which are adapted to the local environment, are part of the local diet, and have traditional uses.[9]

Total collection of O. syriacum is estimated at 1 000 tonnes (dried) per year – for an approximate collection value, i.e. not processed and not mixed, of US$ 5.33 million. There have also been interesting cultivations following several development projects in the North and the South.[10]

In a nutshell, Zaatar's production brings the following advantages:

- Crop diversification on marginal and degraded land
- Appropriate crop for remote rural areas
- Conservation and expansion of the benefits of biological diversity[11]

- **Processors**

Concerning the Zaatar processing, Hamadeh (2016) reports that after wild collection, *O. syriacum* branches, including leaves and flowers, are shade-dried in beds raised 20 to 30 cm from the ground. Then the flowers and leaves are ground having been removed from the branches. Ground and dried O. *syriacum*

[9] ICU-Istituto per la Cooperazione Universitaria Onlus. Zaatar In Lebanon: Value Chain Assessment And Analysis Executive Summary And Recommendations.

[10] Hamadeh, K., 2016. Non-Wood Forest Product Value Chains in Lebanon.

[11] ESCWA, 2010. Best Practices and Tools For Increasing Productivity And Competitiveness In The Production Sectors: Assessment Of Zaatar Productivity And Competitiveness In Lebanon.

is then used to produce zaatar mix, which is a dried and ground mix of *O. syriacum* with sumac (*Rhus typhina*), sesame seeds and salt.

This mixture is sold in the local market with different qualities and therefore at different prices. The level of grinding of *O. syriacum,* as well other potential additional cheaper substitutes for *O. syriacum,* such as *Thymbra spicata* or *Thymus vulgaris,* or, as mentioned by several interviewed stakeholders, wheat milling products' residues and colorant, all contribute to lowering the selling price of the mixes. Great effort has been made involving the value chain stakeholders and the Lebanese standards and norms institutions (LIBNOR) to develop production norms for zaatar mixes and to protect denomination. However, these efforts have not yielded results yet; and retails prices of a kg of zaatar mix can vary from US$ 30 for a high end hand-ground mix to US$ 5.6 for mixes used by bakeries for the production of "manqousheh" - a widespread Lebanese pastry eaten during breakfast and/or as a snack or entrée.

As reported by the ministry of economy and trade, Thyme south Lebanon (Zaetar El Litanie) possesses the highest percentage of volatile oils compared to the thyme produced worldwide. The flowers of the thyme determine the flavor and the aroma of it.

Its historical background goes back many centuries and decades when people of the south used to consume it as basic food along with bread during war and peace, during the Turkish and the French mandate and during the Israel occupation.

Sesame, Semmae and salt are added to the Origanum Syriacum in order to get the seasoned Thyme south Lebanon (Zaetar El Litanie) ready for the Manakish.

As Origanum sp. was grown widely, in large quantities and in excellent quality in the south, it was easy for the thyme South Lebanon to become well known in all regions of Lebanon and even in foreign countries especially as a medicinal plant.

- **Distributors**

Approximately, 10 percent of the production is exported in the form of dried O. syriacum (110 tonnes in 2012), and another 20 percent is exported in the form of zaatar mixes. Total export of dried O. syriacum and zaatar mixes amounted to 548 tonnes in 2014 for an approximate value of US$ 1.9 million.

- **Consumers**

Overall, it is estimated that the local Lebanese market consumes around 700 tonnes of dried O. syriacum in the form of a diverse range in quality of zaatar mixes (Hamadeh, 2016).

3.5.3. Cereals and pulses

- **Producers**

According to the ministry of agriculture, the bekaa and the Hermel departments are first in the following productions:

Seasonal agriculture (60%), cereals (65%), more specifically wheat (58%), barley (88%), vegetables (59%), leafy greens (55%). Potatoe (70%), pulses (56%) (beans (45%) chickpeas (66%), broad beans (49%) lentils (72%), peas (58%).[12]

Eng. Yazbeck showed great interest in the cereals and pulses since they are varieties originated in the Middle East and producing local varieties would provide a better traceability and more genuine processed products. However, when discussing the potential of organic production, many difficulties arose including the quality of water used for irrigation and the small surfaces of holdings which make it difficult to get organic crops if all neighboring producers are not invested in it as well[13].

- **Processors**

According to Mr. Said Gedeon, from CCIAZ, there are some of the most important cereals and pulses processors in the Bekaa valley, and there would be an interesting demand for these crops to be transformed into Hummus dip or simply sterilized packaged grains; however, what would be interesting is to provide a traceable local crop which could be linked to its production region and hence provide an added value to the product. He wasn't excited either for the organic products since they are costly and the certification process is doubtful, moreover, it is difficult to provide all organic components for specific dishes.

- **Distributors**

Once sterilized, or transformed into processed food like hummus dips, it is easy to transport and store these crops; however, it is important to note that competition from surrounding countries is very strong, hence the importance of providing a value added product.

Exports of fresh grapes have been growing steadily and reached exports of more than € 10 million last year. Fresh grapes are exported to a diverse portfolio of markets, with leading buyers in Saudi Arabia, Germany, Iraq and the UK.

Other export fruits that have been growing strongly are apricots, plums, cherries, bananas and avocados.

[12] Ministry of Agriculture, 2014. Strategy 2014-2019

[13] Ministry of Agriculture, 2012. General results of the global agricultural census.

- **Consumers**

The local market is very receptive to these crops since its traditional cuisine is characterized by a Mediterranean aspect which includes pulses and grains in their dishes. Export markets are also open for the famous hummus dip, also characteristic of the Middle Eastern cuisine.

3.5.4.Fruits

- **Producers**

According to the ministry of agriculture, the Bekaa region is home for 71% of national stoned fruits, mainly cherries with 91% and apricot with 88% in Baalback, peaches and nectarine with 50% for the Bekaa region. Grapes production is a regional specialty with 69% of national production of processing grapes and 82% of table grapes; however an EU funded project executed by Expertise France is already in place for cherries and table grapes.

However due to low productivity and inefficiencies in the value chain, Lebanon is not meeting its potential for both responding to domestic demand and supplying the entire Middle East with fruit and vegetables.[14]

- **Processors**

As noted by the ministry of trade, **the apricot of Baalback** originates from the city of Baalback; far back, the Baladi variety was the most prevailing type of apricot grown in the region. As the apricot of Bealback was so reputed for its premium quality and market access and as the climatic conditions of the North Bekaa were suitable for the production of apricots; growers of Caza Bealback started to grow apricot trees in other regions close to the area from which the reputation originates. The Bekaa is characterised by its mild and dry summers, rainy winters and an average temperature of 25°C with about 240-250 days/year of sunshine. Therefore, apricots present an important opportunity for a value added products both for fresh and processed use.

The same for cherries which could be sold as fresh dehydrated and jams. Mr. Gedeon also noted that there are large possibilities for berries of all kids: strawberry, blue berry and blackberries to be processed and used in pastry, cornflakes mixes, etc.[15]

[14] FAO, 2011. Agricultural Export Promotion (AEP) Strategy for Lebanon.

[15] CBI, Danish Ministry of Foreign affairs, 2016. Export Value Chain Analysis Fresh Fruit and Vegetables Lebanon.

- **Distributors**

According to El Tabch (2018) Preparations of vegetables, fruits and nuts ranked first in the list of main Lebanese F&B products exported; at $108.3 million in 2017. This category represents nearly 22 percent of total F&B exports.

Post-harvest interventions and special packaging could increase the products' shelf life and transportation potential.

- **Consumers**

Certainly, the local market is receptive for fresh consumption, despite the regional competition, but there is also an interesting need for dried fruits to be used as healthy snacks both locally and internationally.

3.5.5. Vegetables

- **Producers**

With a total production of 412,000 tons, potato ranked first in the top ten commodities produced in Lebanon in 2013. Tomato production ranked second with a volume of 325,107 tons in 2013 followed by cucumbers. Based on production value of commodities, tomatoes ranked first with USD 120,148 thousands[16].

Potato Bekaa gained much interest when the producers moved out of the middle Bekaa to the north and west of it searching for more available water and good fertile soil.

The potato Bekaa is well known in all of Lebanon due to its high production that covers most of the Lebanese demand during the summer from July to September.

Greenhouse agriculture is not very spread in the Bekaa for two reasons, the first is that heating cost during winter is very high due to low temperatures and the second is that crops are replaced by other cold bearing crops such as potatoes that provide two crops per year.

- **Processors**

Many post-harvest and processing technologies allow extending crops shelf life and turn it into value added final product. Potatoes are turned into chips, tomatoes into sundried tomatoes, paste, ketchup, etc. Appropriate packaging allows better transportation and storage and diminishes losses for fresh vegetables such as cucumber, lettuce, etc.

[16] Bankmed, 2016. Analysis of Lebanon's Food Market.

- **Distributors**

The major concerns of distributors are mostly steady production and stable quality. The leading export vegetable is potatoes, reaching € 56 million exports in 2015, grown threefold since the € 15 million in 2011 (CBI, 2016); moreover, Exports of cabbage lettuce has also increased threefold in the past 5 years, reaching € 12 million last year. Lettuce is almost exclusively exported to the Gulf region.

- **Consumers**

Tomato paste is very integrated in the Lebanese cuisine as well as different fresh crops and salads. Recently, health concerns from the polluted Litani river water has surfaced.

3.5.6. Olive and olive oil

- **Producers**

Olive production covers 43% of the total area of constantly farmed land in Lebanon. The Bekaa region represents only 13% of this area, but with an increase from 6% in 1998; therefore, it represents quite a potential, especially in Western Bekaa. There's certainly a great need for developing pruning techniques, proper use of agrochemicals, applying GMPs and irrigation techniques.

The average age of an olive oil farmer is approximately 65 years and less than 1% of olive farmers are below the age of 45. As alarming as it may seem, when surveyed, 95% of olive landlord's children admitted that they wouldn't continue in the family business as olive and olive oil production does not provide them with any healthcare insurance (NSSF).

Olive trees in Lebanon no longer produce the same quantities they used to in previous years, since farmers are no longer investing in those trees and buying fertilizers. The increasing urbanization in the country has cut down the olive area. Given that the cost of drip irrigation is high coupled with the fact that farmers are not able to pay for fertilizers, olive trees' productivity has decreased throughout the years.

Many activities have been conducted on the olive oil value chain by the LIVCD through a USAID grant, which led to an improvement in production and processing methods.

Figure 7: Mapping of olive groves[17]

- **Processors**

Olive high production cost is a major issue for processors, which makes them turn to cheaper sources with comparable quality. Around 70% of the olive trees are destined to the production of olive oil, and the remaining ones are destined to the production of table olives. The oil productivity of the olives in Lebanon ranges from 18-25%.

More actions are needed aiming at the traceability which provides an added value to the final olive oil product.

On the other hand, an innovative EU funded project was recently closed by the University of Balamand in collaboration with the Municipalities of Koura. Sustainable Action for Bioenergy Production in Koura (SABioP). The project aims at implementing a sustainable activity for biofuel production, i.e. biomass briquettes production from pruning residues of olive groves and public forests, in order to support the Koura Municipalities Union (KMU) in facing challenges related to energy sustainability. The project resulted in building a facility with a capacity to transform a 1000 tons of pruning residues into 700 tons of biomass briquette.

[17] FAO – Ministry of Agriculture, Agricultural Census, 2000

- **Distributors**

There are some difficulties in selling all olive oil production due to market saturation and high prices. There are also still difficulties for export due to high process and doubtful traceability.

On the international front, Lebanon has been a net exporter of olive oil for more than 5 years, with a surplus in the trade balance of $15.62M, up to August 2018. Olive oil trade balance stood at $22.87M in 2017, 4% lower than its value in 2016. The lower yield of olive trees can be considered the main driver behind the 20% yearly drop in olive oil in 2017. Lebanon exported 4,632 tons of olive oil by August 2018, worth $15.86M. In 2017, olive oil exports stood at 7,703 tons worth $24.32M, compared to 10,013 tons worth $30.12M tons in 2016. By August 2018, 25% of Lebanese olive oil exports were sent to the US, 15% to Kuwait, and 10% to the United Arab Emirates.

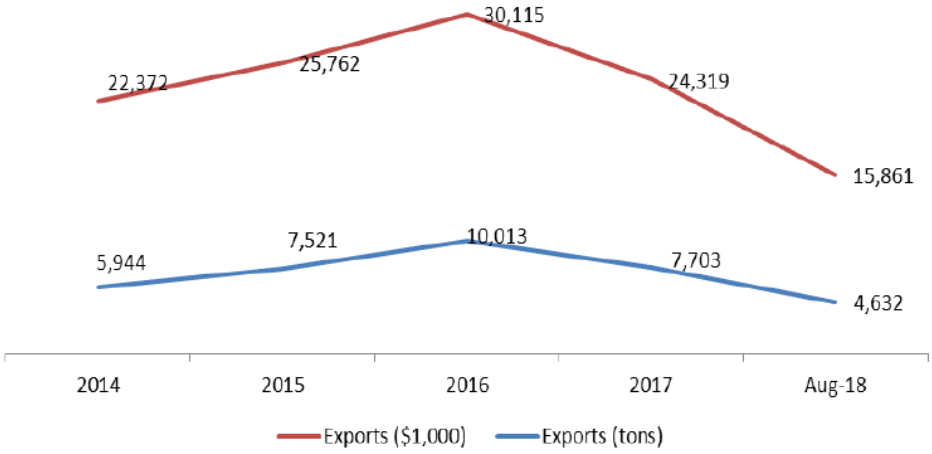


Figure 8: Variation of olive oil exports[18]

- **Consumers**

Local consumers insist on the organoleptic component; however, high prices limit the consumption of local production. As for international consumers, recent demands for organic olive oil are increasing.

3.5.7.Honey

- **Producers**

Beekeeping is common in all Lebanese regions. Around 6 200 Lebanese, mostly part-time, beekeepers produced approximately 1 620 tons of honey in 2013, for a total value estimated at US$ 32 million, of which US$ 23 million17 represents the value of forest and shrub land honey. During the last 20 years,

[18] BLOM Invest 2018, The Lebanese Olive Oil Sector: Market Review.

production quantities have been volatile. Although the overall trend shows a decrease in production, the last five years have witnessed an increasing pattern.

In Lebanon, the bee commonly used for production is the *Apis melliferica syriaca* or Syrian Bee. It is a local variety with a relative low productivity and high aggressiveness: however the bee is well adapted to the local environment. The *Apis melliferica ligustica* or Italian bee, which is gentle, more productive and resistant to diseases, is also used by Lebanese beekeepers.

The total number of beehives is estimated at around 170 000 beehives distributed among five main categories of beekeepers.

- Small-scale beekeepers with 25 hives or less – 70 percent of beekeepers: these producers are mostly hobby beekeepers, and production per hive is usually lower than marketoriented production units.
- Medium-scale beekeepers with between 26 and 49 hives – 14 percent of all beekeepers - and operating as small family businesses using unpaid family work.
- Unbranded large-scale beekeepers with 50 hives or more – 16 percent of beekeepers: these producers exhibit many similarities to medium beekeepers. Virtually all large beekeepers practice hive migration to yield at least two harvests per year.
- Branded companies with more than 200 hives: there are only about 10 beekeepers in Lebanon with over 200 hives, all of which have their own brands. This category of large beekeepers has invested in maintaining their own specialized retail outlets in Beirut and other urban centers to be able to access consumers in those areas.
- Large branded companies with more than 1 000 hives: there are two main players in this category. These actors developed brand names and control a significant share of the domestic market and most of the export market.[19]

- **Processors**

According to the same source, two main types of honey can be differentiated:

- forest and shrubland-based honey, including wild flowers, such as Syrian oregano - *Origanum syriacum* - honey, oak - mainly *Quercus Libani* – honey, as well as cedar – *Cedrus Libani* – honey, although production of the latter is limited; and
- orange blossom honey.

It is common for beekeepers to move their beehives to coastal areas during winter to obtain a harvest of orange blossom honey in early spring. It is estimated that orange blossom honey constitutes around

[19] Kanj Hamadeh for FAO, 2016. Non-wood forest product value chains in lebanon

one third of the total Lebanese honey production, and is on average 33 percent less expensive than wild flower and/or oak honey in retail outlets.

- **Distributors**

In addition to the local production, Lebanon imported around 250 tons of honey for a value of US$ 2.54 million in 2014, while exports were limited to 50 tons of honey valued at US$ 0.63 million. The honey sector in Lebanon is underexploited - the level of honey production remains below the country's potential. There is scope for increasing honey production capitalizing on export markets of both Gulf Council Countries (GCC) and of the countries of the Lebanese diaspora.

- **Consumers**

Honey trade in Lebanon follows four different channels:

- It is sold directly by the beekeepers to the consumers through personal relationship, or to a smaller extent, with the intermediation of a cooperative. This channel conveys to the consumer around 62 percent of the total Lebanese production and represents 54 percent of the total Lebanese honey market.
- Honey is sold branded through retails stores. Approximately 35 percent of the Lebanese production and 44 percent of total domestic market sales are conveyed through this channel.
- Small companies which integrate retail into their operations. This is a sub-channel of channel 2 (branded and retailed honey); however, it allows small honey companies to be independent from distributors and retailers, thus capturing all of the product value. However this is a niche market and expansion potential is limited.
- Export market channel which is dominated by large companies that have put effort into creating linkages with distributors in GCC, as well as in the US. Lebanese large honey companies have shown the ability to respond to market changes, e.g. exports to Jordan are a direct result of the Jordanian ban of a well-known commercial honey brand. Also some large beekeepers are able to export part of their production, especially to African countries hosting a large Lebanese diaspora. Note that in most of the cases exporting is performed directly by the beekeepers without the intermediation of an exporter.

3.5.8.Meat

Large animals breeding for meat production is very limited due to the lack of grazing surfaces, which means an increasing feed cost. As for dairy production, it is based on intensive production based on imported feed by large producers.

There are no central slaughter houses in the Bekaa as stated by Mr. Gedeon, which is a weak point for the value chain's hygienic component and the amount of needed investment is a multimillion number.

3.5.9. Chicken

The Bekaa is home to 22% of the national chicken production and it contain around 6-10 slaughterhouses that are used by smaller producers. This value chain is doing well with decentralized productions most of which are directly related to the larger producers by comprehensive contracts including the provision of one day old chicks, feed and technical support and buy the final product; therefore, it is difficult to enter this value chain and lead a substantial impact.

3.5.10. Fish

The two main aquaculture species cultured in Lebanon are Rainbow Trout (90% of total aquaculture production) and Tilapia (10%). Total aquaculture production in 2013 reached 1,280 tons which constitutes 20% of local consumption. Fish production is far below the potential production capacity that could be attained through implementing a new farming system such as Recirculating Aquaculture System (RAS). Potential investments in in-land recirculation aquaculture systems in Lebanon are possible for the following fish species: Barramundi, Seabass, Shrimp, Stripped bass[20].

3.6. Crops association

Based on the presented crops, there's a possibility for crops association in a manner that would lead to a sustainable production and highlights crops complementarity. Therefore, there are two possibilities, according to the regions:

The first possibility is to associate organic olive trees with chickpeas or thymes in the Rachaya region, since there are already organic olive orchards with no need for a transitional period. The chickpeas, being leguminous possess the possibility through their nodules to absorb nitrogen from the air and accumulate it in the soil, which would highly participate in naturally fertilizing the soil; moreover, the chickpeas competition with weeds will replace the need for herbicides use. The association of beehives will increase the pollination potential and thus the production of both crops. On the other hand, the use of Thyme instead of chickpeas will help produce honey with special taste. The provided by thyme will also play an important role in confusing insects such as the olive fruit fly (*Bactrocera oleae*, *Dacus oleae*).

[20] IDAL, 2017. Agricultural sector factsheet.

In this case, it is important to introduce adapted agricultural practices like the use of soil worms to aerate the land since the roots of olive trees are very shallow and proceeding with innovative pruning techniques to preserve the aeration in a bottom up approach.

Another option would be to associate thyme or chickpeas to beehives in marginal lands on the eastern face of mount Lebanon or the western face of anti-Lebanon, which will gradually help reclaiming lost lands and reestablish soil cover and diminish soil erosion due to wind and precipitations.

4. Recommendations

The highlights of the study can be summarized as follows:

- There's a need to invest in unused marginal lands to valorize them.
- It is important to focus on a specific supply chain and a specific cluster in order to maximize the efficiency of the investments.
- Reaching an added value, final product, with a marketable profile is advisable, mainly related to the regional identity and know how.
- Investing in already established projects ensures continuity and provides lessons learned in order to accumulate knowledge and advancement and avoid overlapping.
- Concentrating on a small number of beneficiaries and carrying them all the way to have a sustainable, functional ecosystem.
- It would be interesting to collaborate with young entrepreneurs and provide them with an incubation period in order to develop new start-ups with innovative products and marketing strategies.
- The Bekaa region is characterized by already established agricultural value chains with relevant infrastructures and internal and external markets, therefore, it is important to incorporate farmers and cooperatives into these functional value chains.
- As showed in table 1, the most interesting value chains which would present interesting potentials for growth with the right amount of qualitative investment are:
    - Dairy production, either small ruminants or small scale dairy cow producers in marginal lands, mainly northern Bekaa.
    - Spices and herbs, more specifically Thyme or Zaatar in eastern side of mount Lebanon or the western side of the eastern mountain chain
    - Pulses and grains, especially the ones with the potential to be processed, and would valorize marginal lands, especially that they are heirlooms, genetically originated in the Middle East. They can be produced in the middle and western Bekaa.

- Fruits, transformed into dried fruits present an interesting potential especially in western Bekaa and Zahle highlands (Arsaal and Kaa el Rim), specifically cherries and apricots. The introduction of different kinds of berries (raspberries, blackberries, etc.) into marginal lands or in an associated agriculture. Moreover, the tendency for healthy snacks offers an interesting market.

5. Conclusion

Following a meeting with FTL and DRC, where the market research was also presented, five value chains were presented which could be complementary and in which, investments would lead to the best improvement: Olive oil, Thyme, Chickpeas, Rhus (Sumac) and Beekeeping. The second phase of the study was concentrated on the details of the chosen region and the outlines of the proposed project.

.

Phase 2:

West Bekaa and Rashaya

Outlines of a development project for Agri-food value chains:

Olive oil, Thyme, Chickpeas, Rhus (Sumac) and Beekeeping

6. Introduction

In this phase of the study, a multifaceted profile analysis of the Rashaya and West Bekaa region is presented including the geographic profile (altitude, dominant land use, agricultural domain and water resources), agricultural profile (Distribution of agricultural lands, number of farmers per average land size), industrial profile, agrifood and agri-tourism potential.

7. Rashaya and West Bekaa

7.1. Population

Of the total 1,335 Km^2 of the Bekaa governorate, West Bekaa holds an area of 425 Km^2 (32%) and Rashaya 485 Km^2 (36%). The governorate has a total population of 519,607 persons, of whome 25% live in West Bekaa and 8% in Rashaya.[21]

There are two universities in West Bekaa (LU and LIU) with a total number of 692 students in 2016 in business administration, applied sciences, engineering, pharmacy, arts and education.

7.2. Geographic profile

- **Altitude**

Most of the lands in Western Bekaa are a plain with an altitude between 800 and 1100 m, whereas in Rashaya, most of the land is mountainous with altitudes more than 2250 m.

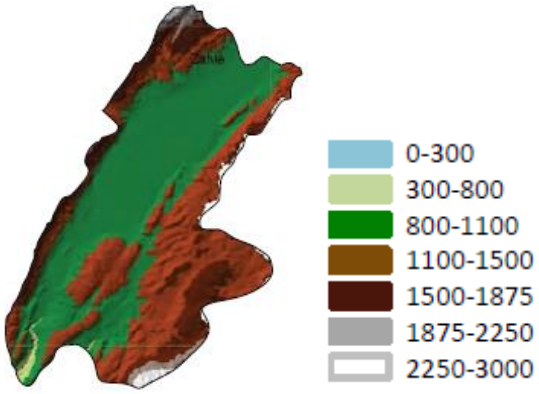


Figure 9: Altitude of Western Bekaa and Rashaya

- **Dominant land use**

[21] UN OCHA, Bekaa and Baalbek/Hermel Governorates Profile, 2016

Western Bekaa is a mix of main agricultural area and mixed rural area, whereas most of Rashaya is a natural area.

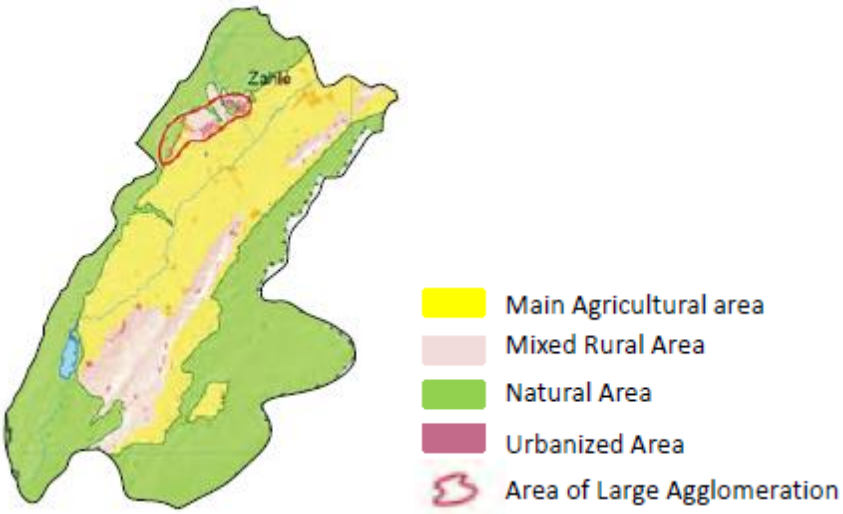


Figure 10: Dominant land use Western Bekaa and Rashaya

- **Agricultural domain**

Both regions possess one of the best soil quality in Lebanon, making Western Bekaa one of the major agricultural intensive regions in the country.

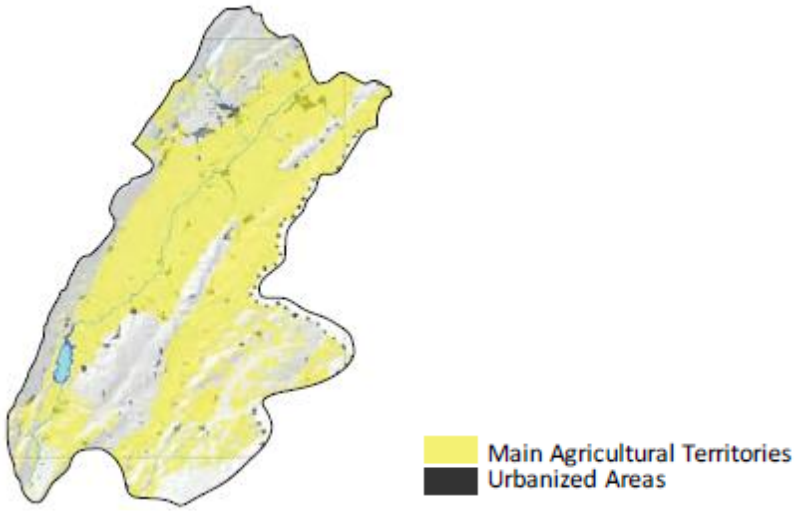


Figure 11: Agricultural domain in Western Bekaa and Rashaya

- **Water resources**

The district enjoys abundant water resources including the country's largest dam (220 million m^3) and wetland, providing abundant water resources for agriculture, although water pollution remains an important issue.

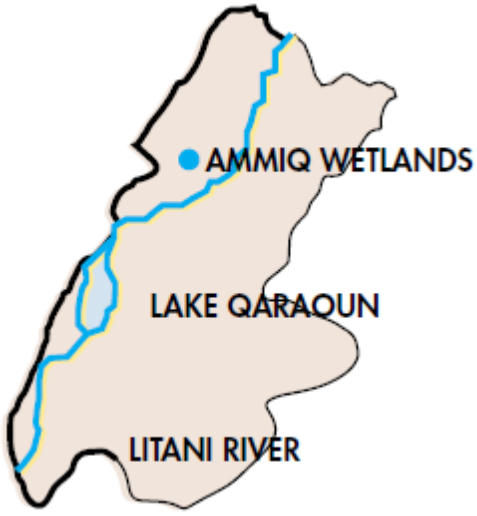


Figure 12: Water resources in western Bekaa

7.3. Agricultural profile

As shown by MoE/UNDP/GEF [22] report on the Bekaa region, most of Rachaya's and Western Bekaa's lands are used for open field crops, which presents interesting opportunities for chickpeas both districts also include equal surfaces of olives

[22] MoE/UNDP/GEF (2018). Baseline Socio-Economic Assessment in the districts of Zahle, Rachaya, and West Bekaa and Monitoring & Evaluation Guidelines Report. Beirut, Lebanon.

Table 1: Distribution of agricultural lands

	Zahle	Rachaya	West Bekaa
Open field crops (1000 m2)	493,486	58,921	186,580
Intensive farming (greenhouses) (1000 m2)	520	-	161
Fruit trees (stone fruits, pome fruits, others) (1000 m2)	49,340	8,170	17,862
Olives (1000 m2)	11,105	16,612	17,893
Vinyeard (1000 m2)	18,174	3,806	9,375

The report also shows that most farmers possess land sizes ranging between 2,000 and 10,000 m2 which are considered small land owners, hence the importance of developing cooperative activities.

Table 2: Number of farmers per Average Land Size

Number of farmers per Average Land Size	Zahle	Rachaya	West Bekaa
No agricultural lands	570	48	403
<1000	14	9	31
1,000 - 2,000	254	275	552
2,000 - ,5000	666	767	1,177
5000 - 10,000	677	697	825

- **Olive and olive oils**

The Bekaa, mostly the targeted region is responsible for 13% of national production and around 70,000 dunum. Two thirds of the olive orchards have a surface less than 40,000 m2. Regional production varies between 10.5 thousand tons and 23 thousand tons. The number of olive trees is estimated at around 2 million trees (with a plant density of 200-250 trees per ha).

The average productivity of olive trees is estimated at around 3-3.5 tons per ha (high production years) vs. 1.3-1.5 tons per ha (low production years) where the production of non-productive olive trees was accounted for. In addition, the low productivity is mainly due to the high number of old trees (more than 50% in North and Mount Lebanon) and prevailing agricultural practices.

The most important olive varieties that are grown are local varieties: Souri, Samakmaki, Airouni, Baladi…New Italian and Spanish varieties of olive trees were recently introduced in the framework of many projects financed by international organizations.

More than 70% of the total olive area is destined to olive oil production and the remaining is consumed as table olives. Olive oil residues from the milling process are used for heating; in addition bad quality olive oil is transformed into soap (around 15% of the total olive oil production.

Around 5% of the farmers have a production of 200 kg of olive oil; 80% have a production between 1000-1200 kg; and 15% of the farmers have a production higher than 2500 kg yearly.

On the other hand, various soil and climatic conditions along with the different cultural practices and varieties produce special characteristics and tastes for olive oil[23].

- **Thyme**

The surface covered with Oreganum S. in the targeted region is around 350,000 m2 according to MoA's sensus and our calculations. The region includes around 20 million plants (approximately 0.22 plants/m2 and twice the concentration in wild collection areas, equal to 0.44 plants/m2). The region produces around 200 tonnes of Oreganum S. for an approximate value of 1 million USD.

- **Chickpeas**

The target region is covered with 2900 dunums of chickpeas. Most of the lands have a surface ranging between 10 and 60,000 m2 with a production of 150 – 200 Kg per 1000 m2, a total ranging between 435 tonnes and 580 tonnes.

- **Rhus (Sumac)**

A three to four years orchard of sumac includes around 200 shrubs with a total production of 400 Kg. with an average production of 2-3 Kg, used mainly as a major ingredient of the "Zaatar" mix. However, there are only few large orchards as it is planted randomly in the fields.

- **Beekeeping**

According to MoA's sensus in 2010, the Bekaa region including Middle Bekaa, Rashaya and Western Bekaa) represents 5% of local honey production, which means, according to our calculations, that the region includes around 250 beekeepers, producing around 65 tonnes of honey with a total number of beehives reaching 6800 beehives.

7.4. Industrial profile

Western Bekaa is more industrially developed than Rashaya, with 23 industrial companies, most of them in Marj and Manara and more than 55% of the industrial employees work in Kefraya or Khirbit Anafar.

[23] Amal Salibi, 2007. Marketing Study for Olive, Olive Oil and Apple in Lebanon

Agro-food and furniture production are the most common activities in the district, holding 90% of the employees. Main agro-food activities include wine and alcoholic beverages, dairy products, refrigeration and seasonal fruits, oils, pickles, preserved, non-alcoholic beverages, coffee and mixed nuts.[24]

The West Bekaa agricultural regions span across an area of 16,818 ha divided in 4,818 agricultural holdings, 76% of which are exclusively used for farming activities [25]. More than 90% of permanent agricultural land is used for the production of olives, raisins, and seed and stone fruits. The total number of people working on land is 24,859, of which, 57% work only for agriculture.

Olive Olive oil is amongst the most prominent Lebanese agro-industrial products with a high export potential with a Compound Annual Growth Rate (CAGR) export of 10.29% between 2012 and 2016.

7.5. Rashaya Agri-food profile

- **Weather**

The precipitations in Rachaya fluctuate between 650 millimeters and 750 millimeters each year with around two fifths of this amount falling between November and March. The temperature varies between 35 °C in the summer season down to −5 °C in winter, and the average annual temperature is of 15 °C. The dominant wind orientation is east to west from which the town is somewhat protected by the mountains.

[24] IDAL survey 2016
[25] Ministry of Agriculture sensus, 2010

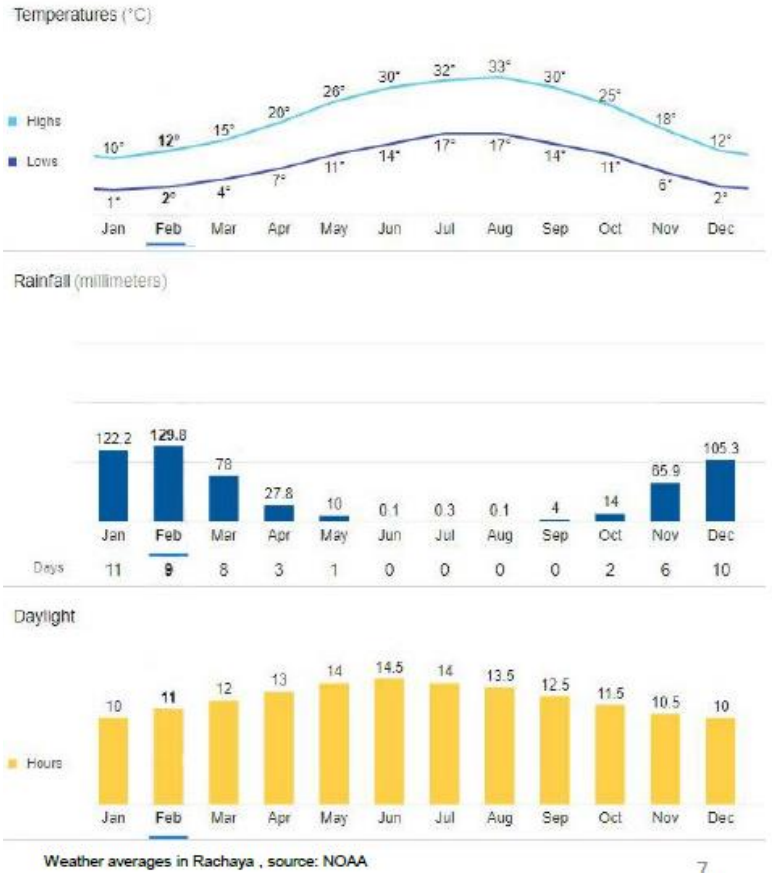


Figure 13: Average temperature, rainfall and daylight in the Rashaya region

- **Agriculture and Agritourism**

Following the map elaborated by the national center of scientific research in 2005, ordinarily grown products incorporate fruits, **olives**, apricots and grapes. Some wild cucumbers are additionally developed, however vegetables are less grown because of low precipitation.

Tree species, for example, oak, wild pistachio and **sumac** are also grown in the area. The locals of Rashaya produce their own agro food, grape molasses, goat milk derivative products, they are also popular in the **beekeeping practice for honey extraction in Jabal El Sheikh**, especially that the mountainous land around Mount Hermon with its diverse wild plants and flowers contribute to the production of a variety of honey as well as the knowledge of local bee-keepers makes it one of Lebanon's most well-regarded.

Rashaya has 5 factories: **two olive oil presses** and **three grape molasses factories**, Rashaya owns an important agricultural potential. Animal breeding is also applied, mostly with goats, of which the Labneh

assortment is a well-known staple food for local people. On another hand, there are some pastoralism activities in the region which aren't well organized and currently affect negatively the agricultural lands.
In addition to the seasonal activities organized by the union of municipalities and other associations, many projects supporting the agricultural and agro-food processing heritage, are planned and ongoing such as:

- Establishment of an agricultural educational center has been a potentiality in Rachaya ,the center provides educational services to the farmers on the kinds and quantities of the fertilizers and pesticides to be used and reduction in using the persistent organic pollutants.
- Making fridges for conservation of crops and enhancing the rural production. Most of the farmers held several meetings with local community representatives and cooperated with agricultural cooperatives.

- **Sylvi-agro-pastoralism and conservation agriculture**

Different factors can contribute in the classification between pastures or arable lands in Rashaya such as climate, geomorphological and biophysical characteristics of the region, this classification is very essential, it can limit the harmful pasture activity and can also influence positively Rashaya's farmers.
The approach can be also developed by the elaboration of a map specifying the potential of the concerned areas, a site study in terms of soil depth, slope, water irrigation need… the main objective of this study is the protection of the agricultural lands and valorization of their landscaping and cultural values, as well as the preservation of the existing genetic diversity of local domestic animal breeds and cultivated plants, taking into consideration that the maintenance of a vegetal cover also reduces soil erosion and improves soil infiltration and organic matter content. On another hand, the agro - production of grape molasses, goat milk derivative products and practice beekeeping for honey extraction should be reintroduced and reinforced as well as traditional processes shared with the new generation in order to preserve and strengthen this characteristic culture of Rachaya.
This sector can be enhanced by the development of a competitiveness strategy based on several steps starting by hosting agricultural experts to teach local farmers the correct methods of cultivation, checking the quality of all products, working on a creative and attractive labeling and running a successful marketing strategy.[26]

[26] Local Government Resilience Programme Lebanon. Spatial Economic Development Plan, Rachaya Region.

Figure 14: Competitiveness strategy components

7.6. Existing programs

- **VNGI**

The Department of International Cooperation of the Union of Municipalities of the Netherlands (VNGI) and the Dutch Ministry of Foreign Affairs worked on the Local Government Resilience Program. They have hosted the heads of the Unions of municipalities of Western Bekaa and Rashaya in the Hague to set up a strategic plan for the region[27]. The plan included the following:

Hard pillars of development:

- Basic services and amenities
- Drivers of development: agro-business and tourism
- Urbanization

Soft pillars of development:

- Communication and civic response
- Capacity Building

The five pillars of development are elaborated on below.

The second pillar, based on agro-business is a covered with a three level action plan:

Short-term (2016 – 2017)

[27] Local Government Resilience Programme Lebanon, Local economic development strategy West Bekaa. Roadmap towards peaceful prosperous and healthy communities during and after the Syrian crisis.

- Territorial Marketing/Branding West Beqaa: to stimulate regional tourism
- Piloting value-chain approaches in eco-tourism and agro-business.

Mid-term (2017 – 2020)

- Improve standards to facilitate the branding and export of agriculture produce and market West Beqaa as a "special" nature tourism destination
- Export of wine: the West Beqaa has great vintners.
- Stimulate small medium enterprises in the West Beqaa.

Long-term (2019 onwards)

- Nodes of a world-wide distribution network: the West Beqaa Valley could be a leading area for the trade of fruits, vegetables and wine with distribution centres, handling and packages facilities.

It would be interesting to get in contact with this institution and learn about their activities to avoid duplication and accumulate regional knowledge.

- **UNDP**

UNDP, in partnership with the Ministry of Social Affairs, within the framework of the Lebanon Host Communities Support Programme – LHSP, and through funds from the Netherlands, is training over 2,500 existing beekeepers in collaboration with the Lebanese Agriculture Research Institute (LARI). The project is coordinated by Eng. Dany Yammouni (LARI) and implemented by Dr. Dany Obeid (LU Professor and bee expert). The project has covered the two regions, which means there are at least a number of sensibilised farmers that could be contacted to become potential beneficiaries.

- **USAID - LIVCD**

The Lebanon Industry Value Chain Development (LIVCD) project was a five-year, $41.7 million U.S. Agency for International Development (USAID) program aimed at improving Lebanon's economic stability and providing income-generating opportunities for small business while creating jobs for the rural population, in particular women and youth. LIVCD aimed to improve the competitiveness and value of products and services in both local and export markets by increasing the quality, quantity, and consistency of Lebanese products and companies. The project:

- Leveraged $7,621,305 of new private sector investment.
- Helped 8,402 farmers to apply improved technologies or management practices.
- Trained 10,370 individuals.
- Helped 1,160 medium and small enterprises—including—to apply for value chain finance.

LIVCD also had a few beneficiaries in the region who benefited from training, technical assistance and apiaries through cost sharing.
LIVCD also recently closed its 6 year project and some farmers benefited from trainings, technical assistance and mechanical harvesters, which list can be provided.

- **USAID - LINQ**

The $5.9 million USAID-funded Lebanon Investment in Quality (LINQ) project, implemented by Land O'Lakes International Development, increases domestic and export sales and the competitiveness of value-added agribusinesses. LINQ partners with high-potential agribusinesses, processors and growers of fresh produce to improve productivity, product safety, and quality while creating new market linkages. LINQ develops an 'acceleration plan' for each of its partners to identify the resources, such as technical assistance, investment, grants, and worker training, needed to overcome constraints.

- **Technical assistance**: Depending on the agribusinesses' need, technical assistance may include product innovation development, facilitation of market linkages, improvements to production technology and quality, and analysis of business investment opportunities. This support is provided by local or international volunteers, paid consultants, and remote mentoring, including expertise leveraged from Land O'Lakes Inc., a premier U.S. agribusiness.
- **Investment grants**: For agribusinesses to become or remain competitive, they need to invest in new equipment and facility upgrades. They also need to revise and develop products that respond to the marketplace. The acceleration plans co-developed with the LINQ team guide agribusinesses on where to make crucial upgrades that would take their businesses to the next level. When perceived risk in these new technologies is high, LINQ may match grants to help partners make the necessary investments.

Expected achievements:

- $2.5 million in new private sector investment.
- 900 individuals to benefit from the project.
- 20% average increase in domestic and export sales of beneficiary firms.
- $500,000 in commercial loans accessed as a result of USAID's assistance.

8. Proposed project outlines

The backbone of the project would be the olive oil value chain and the objectives would be the increase of the olive oil income through quantitative and qualitative improvement from one hand and on the other hand increasing the income of the land through the introduction of complementary intercrops. The final

objectives could be to make agriculture more profitable to the current stakeholders and to attract new blood from the newer generation.

- **Olive oil**

The starting point would be the olive oil value chain and the income increase would be targeting three levels: quantitative, qualitative and added value.
The dunum production would be increased through a series of trainings including Global GAP, pruning, fertilization, harvest & postharvest process, milling and storage and olive oil quality (chemical and organoleptic).
Intercrops would mean increased irrigation and fertilization and when coupled with global GAP and proper pruning, the quantity of produced olive would become almost stable on a yearly basis.
The starting point would be the olive mill, provide it with an organic certification and link it to already existing organic olive producers which could be identified through Mr. Youssef Khoury IMC (Mediterranean Institute of Certification).
Other beneficiaries can be non-organic olive producers who are interested in becoming organic producers through the proposed program which production would be upgraded throughout the project.

- **Oreganum s.**

Intercropping which would mean increased irrigation and optimized fertilization would mean three crops per year with a minimum of 300 grams of leaves per plant. Four major products can be provided by this value chain:

Green thyme: composed by the leaves and the flowers

Dried thyme: dehydrated green thyme with the ration of 1 to 3

Thyme water: the distillation process can produce 1 L of thyme water per three Kg of green thyme, which can be used in food industry or mixed with sugar to provide winter food for bees.

Thyme essential oil: through the distillation process, this oil can be obtained and used in the ration of one drop per liter of olive oil to provide scented olive oil.

Mr. André Hamawi from the Kobayat cooperative, an LIVCD beneficiary possesses an important experience in this field. Also, Oreganum s. seedlings can be provided by nurseries in Southern Lebanon.

- **Chickpeas**

As stated before, chickpeas would provide natural nitrogen fertilization to the soil; seeds can be provided by LARI in large quantities and can be eventually processed into organic hummus dips.

- **Sumac**

As stated before, not much work has been done on sumac before, but it could easily be planted around the olive orchards or simply in parts of the selected pieces of land.

- **Beekeeping**

Being an important component of the proposed project, beekeeping interacts with most components, for it will it will increase Oreganum s. and chickpeas production through pollination; it will also benefit from the Thyme water as a natural winter feed, it will also produce added value honey based on Thyme nectar. Moreover, beehives can produce royal jelly instead of honey by killing the queen, with proper training, or it could be doubled in hives number through special techniques instead of producing honey. Technical trainings and decision making trainings may also provided by experts.

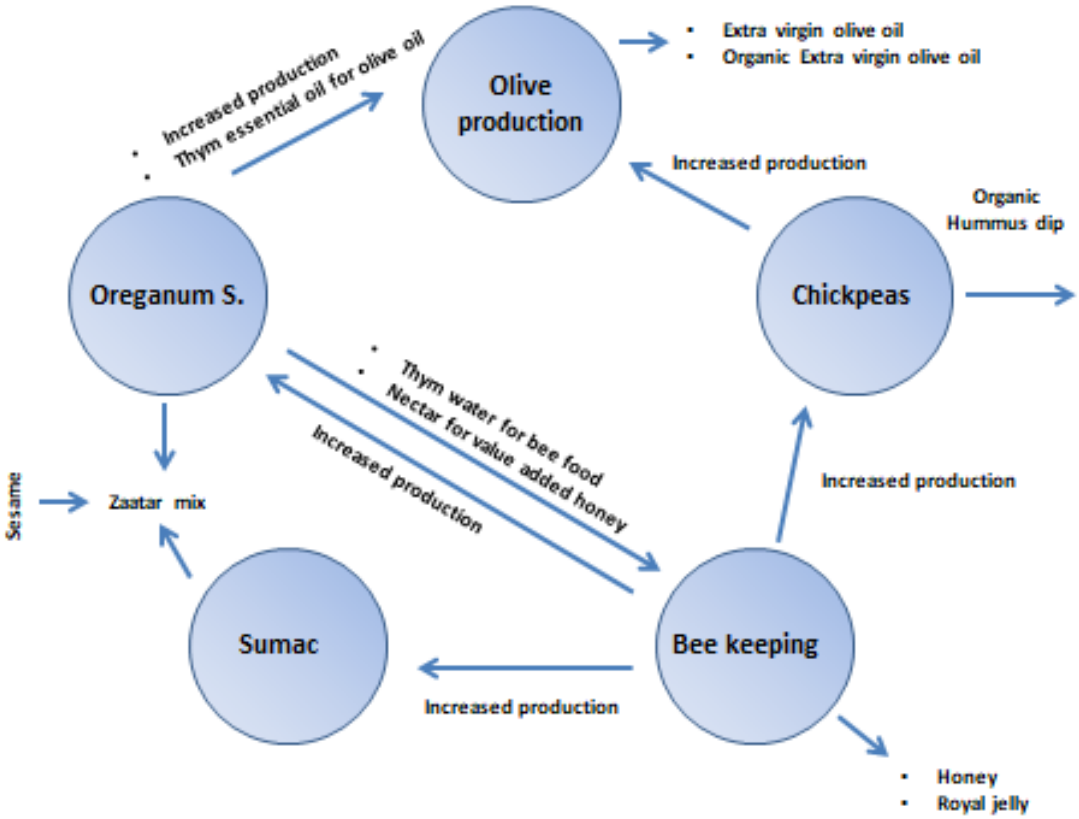


Figure 1: Diagram of interaction between project components

9. Beneficiaries Needs Assessments

Contacting cooperatives from the region helped identify the needs and the impact assessment of the project's intervention. Interviews were conducted with Mr. Asaad Najem, president of the Aitanit association, Mr. Bechara Kheir, owner of a major olive oil mill, Mrs. Ibtissam Barakat, president of the Wadi Al Taim cooperative for marmalade and jam processing and Mr. Joe Saad, vice Mayor of the town of Rachaya, who is also an agricultural expert. On the other hand, the two major bee cooperatives were also contacted: Mr. Ali Abou Fares, president of the Qaraoun cooperative for bee keeping (13 members) and Mr. Souheil Kadamani, president of the cooperative for bee keeping and honey production improvement in Rachaya (47 members) who also own a honey brand (جبل الشيخ).

Data provided by the directorate of cooperatives at the Ministry of Agriculture through FTL's Michel Yanni show that through active cooperatives, over 60 beekeepers can be reached and over 436 farmers can be reached involved in at least one of the five proposed value chains. According to our interviews, below are the challenges faced by them and the needed help:

- **Producers**

There are over 500 potential target producers who are facing several challenges affecting the quality and their profitability. Major challenges are lack of mechanization, low productivity level, high production cost, low sales numbers and lack of technical follow up. The areas of intervention would be to introduce Integrated Crop Management (ICM) standards which are more realistic than Global GAP standards. It is also advisable to introduce mechanization, especially in olive picking to avoid inducing damage to olive trees. The lack of information causing low sales numbers is probably due to a lack of information, which could be solved through a platform providing agricultural products prices in the Bekaa and which is being developed by the CCIAZ. It is also possible to decrease production costs through strenghthening intra and inter cooperatives collaboration and equipment sharing.

For beekeepers, the interviewed persons have access to more than 250 beekepers in the region and all over the Bekaa valley. Their cooperatives include around 10,000 beehives with a production ranging between 7 and 8 Kg per beehive. They stated that many small beekeepers have benefited from the LIVCD project which provided beehives based on cost sharing; they have also received trainings and many of them have developed their trade and have become owners of around 200 beehives, which is a decent income for farmers. Two needs were raised by the cooperatives owners, the first is to have a center for bee queens breeding and selection which could start with an investment as low as 30,000 USD; the

second would be to increase the surfaces of scent producing trees such as Acacia, Eucalyptus, etc. in abandoned range lands.

- **Processors**

According to the interviewees, there is a whole production line in the Rashaya region for olive oil which starts with pressing and ends with bottling and labeling, there is also a valorization of milling byproducts into combustion briquettes; however, solutions need to be explored concerning the liquid waste. Thyme, sumac and other agricultural products mills are currently expanding; therefore, it might be interesting in investing in an organic olive oil presses and production lines. Honey production is very developed and there are very active cooperatives gathering honey from producers and packaging it, while performing quality seal checks; however, further investments could be done on quality guarantees including organic products.

Interviewed persons are already selling all their products and noted that there is an increasing demand for honey both locally and internationally; however, it is still difficult for them to export to Europe due to quality assurance issues. The national market relies on trust, therefore, every producer is keen on presenting their own products, but there is a large potential for larger markets if a quality seal is set up. For the processing part, including honey extrusion, wax production, and honey filling, the needed equipment is available and only minimal investments may be required for training or for quality tests.

- **Distributors**

The recurrent statement for the interviewees is that they are ready to introduce any needed production or processing techniques and to produce any suggested product as long as there are markets for these products with fair prices; hence the importance of dealing with a partner with good marketing knowledge and with access to external markets where value added products are well paid for. Moreover it is important to deal with a partner guaranteeing a fair distribution of the income for the different value chain stakeholders with a complete respect of fair trade standards.

Concerning the relation with the consumers, the major problem faced by producers is the crystallization of the light colored honey, which could be confused with adulteration; the dark colored honey does not suffer from that chemical reaction; therefore, there’s a need to provide consumers with the right information and with the seal of quality to prevent any adulteration.

10. Supporting entities

- **LARI**

LARI can be a supporting entity for the project through two of its centers: the Tal Amara center and the Hasbaya branch. The institute provides technical assistance and quality insurance tests and labs for mycotoxine, water, feed and food, mushrooms, seed production and olive oil. The institute also has a Near Infra Red (NIR) machine which can provide results about food composition in a very short period of time.

LARI also has a large seed bank and can provide local chickpeas seeds in large quantities to be used in the project.

- **Universities**

It is possible, through Dr. Afram who is a lecturer at USJ's Ecole Supérieure d'Ingénieurs d'Agronomie Méditerrannéenne (ESIAM) to contact Dr. Maya Kharat the director to host an eventual competition or boot camp for the proposed value chains and business ideation. LIU and the LU in Western Bekaa can also be important partners for youth involvement.

11. Beneficiaries outreach and selection

Potential beneficiaries can be contacted through LARI network, most farmers and cooperatives are part of its weather early warning messaging system. Direct contact can be reached through the villages' very active social clubs, which can also provide the space for meetings and trainings.

The starting point would be the identification of potential olive oil mills with upgrade possibilities and link it to organic olive famers. Certainly, targeting cooperatives is more efficient as long as doesn't leave individual farmers out of the project.

LIVCD collaborated with 5 cooperatives and one mill in the target region, including Kfarmeshkeh, Rashaya and Dair Tanit.

The collaboration proposition with beneficiaries would be based on two levels: the first would be technical assistance (TA) and follow up presented by the implementer. The second part would be a cost sharing equipment assistance with ratios changing according to the beneficiaries' response; it would include mechanical harvesters, pruning equipment, irrigation system and seedlings (except for olive trees). Demo plots can also be proposed for interested beneficiaries, especially for Sumac production since there is little information about it.

It is also important to identify the optimal land size for the irrigation system cost per dunum decreases with increasing surface.

12. List of key contacts

Name	Position	Institution	Contact details
Dr. Dany Obeid	Bee keeping Expert	Lebanese University	70 19 51 34
Dr. Sabine Saba	University of Balamand, Institute of the Environment	Project manager of Sustainable Action for Bioenergy Production in Koura (SABioP)	03 98 54 69
Dr. Michel Afram	General Director	Lebanese Agricultural Research Institute (LARI)	Lari@lari.gov
Eng. Amira Youssef	Director – Hasbaya center	Lebanese Agricultural Research Institute (LARI)	70 83 64 42
Eng. Dany Yamouni	Project coordinator	Lebanese Agricultural Research Institute (LARI)	03 00 49 81
Eng. Mariana Yazbek	Gene Bank Manager	International Center for Agricultural Research in the Dry Areas (ICARDA)	76 70 57 80
Eng. Michel Issa El Khoury	Director – Abdeh center	Lebanese Agricultural Research Institute (LARI)	03 66 04 16
Eng. Roland Andari	Olive oil value chain expert	USAID (LIVCD and LINQ projects)	03 59 09 20
Eng. Said Gedeon	Deputy General Manager, Head of Services and Agricultural Development Department	Chamber of Commerce Industry and Agriculture of Zahle	03 62 22 52
Mr. André Hamawi	President	Kobayat COOP	76 35 02 71
Mr. Youssef Khoury	Director	IMC (Mediterranean Institute of Certification)	03 10 34 16
Mr. Asaad Najem	President	Cooperative Dar Tanit	03 61 29 71
Mr. Kamal Saykali	President	Cooperative Kfarmishki	03 24 83 56
Mr. Bechara Kheir	Owner	Olive Oil Mill	03 32 24 78
Mrs. Rabah XXXX	President	Cooperative Najmat Sobh	70 56 14 10
Mrs. Ibtissam Barakat	President	Cooperative Wadi Al Taim	71 34 94 10
Eng. Joe Saad	Vice President	Municipality of Rashaya	71 20 02 03
Mr. Ali Abou Fraes	President	Cooperative of beekeepers in Rachaya	03 03 90 26
Mr. Souheil Al Kadamani	President	Cooperative for beekeeping and honey production improvement in Rachaya	03 85 69 08