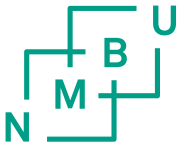
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Abstract

The *Beaufortain* is an alpine valley, located in *Savoie*, internationally known for the production of *Beaufort* PDO cheese since 1968. The arrival of the *Projet Alimentaire Territorial (PAT*) in 2020 has set in motion a collective reflection on the structuring of a more localized food system and therefore more adapted to climate change. This study responds to the request of the *Association d'Animation du Beaufortain (AAB*) to establish a market gardening scenario on communal agricultural land. The thesis follows a qualitative and participatory approach, combining semi-directive interviews and a group interview. It traces a short history of market garden production in the valley, where the presence of gardens remains strong. The study presents the characteristics of a market garden micro-farm in a mountain area, defined mainly by a double activity at an altitude of 800 m or more, the use of an agro-ecological technical system adapted to the specific soil and climate conditions, as well as a global life project, linked to a strong territorial anchorage. It identifies the obstacles to its development, such as the difficulty of accessing agricultural land, the complexity of supply and demand, as well as a lack of structuring of the territorial market gardening sector. The study is action-oriented. The main lever for action is the creation of an educational and tourist market garden that would involve local actors and citizens. Other levers are identified such as promoting a diversity of farms on the scale of the valley, co-constructing change by mobilising a multitude of actors. The thesis contributes to the reflection on the dynamics of food relocation in a PDO cheese production area.

Acknowledgments

A thesis in Agroecology is a collective work, synonymous with discussions, cooking recipes and dreams "from the field to the plate". My first thanks go to my colleagues of the Association d'Animation du Beaufortain (*AAB)* who facilitated my integration in the territory. Thanks to Emmanuelle Boisset and Lucas Da Silva, for their trust, their sense of humour and their commitment. Thanks to my supervisors, Perrine Vandenbroucke and Tor Arvid Breland, for their encouragement, experienced feedback, and scientific support. I thank all the participants in my interviews for their time and knowledge sharing. Thanks to Pierre and Katel for their welcome and support. I thank my friends from Msc Agroecology, Lucy and Anna, for their precious advice that enlightened my path. Thanks to the mountain, for its beauty and silence.

Table of Contents

List of key abbreviations, figures, tables and appendices

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AAB: Association d'animation du Beaufortain (Organization for the animation of Beaufortain)

PAT: Projet Alimentaire Territorial (Territorial Food Project)

PDO: Protected Designation of Origin (Appellation d'origine protégée)

CA73: Chambre d'Agriculture de Savoie (Chamber of Agriculture of Savoie)

Chapter 1: Introduction

1.1 Context and objectives for the study

Mountain ecosystems are defined by *"climatic and topographic harshness (especially the slope), the recurrence of natural risks, physical isolation and social marginalisation due to the topography and the distance from the centres of power and decision-making*" (Bruley 2020). These climatic and social conditions do not favour vegetables cultivation. However, it is possible to grow vegetables in mountain areas. The Alpine territories are historically characterised by cheese production recognized by quality labels (Protected designation of origin, PDO), the *Beaufortai*n is a valley in the French Alps, with a strong identity as a cow breeding territory, that is being challenged to respond to contemporary economic and ecological challenges. A *Projet alimentaire territorial* (*PAT, literally translated as "territorial food project"akin to "food policy councils")* was introduced in the agglomeration community (Arlysère) of which Beaufortain in 2020, by the law for the future of agriculture, food and forestery (2014)[1]. The introduction of the *PAT* has brought local stakeholders into a reflection over more localized and sustainable food systems, particularly since local food circuits have a real potential to reduce greenhouse gases emissions (Allain et al, 2015). Epaud (2022) defined *PAT* as *"a national mechanism with local expression"* with facilitation and logistical coordination as key elements. In this context, the 10 elements of Agroecology (FAO 2018) can be used as a are guides towards the transformation of the food and agricultural systems within a territory engaged in a political, social and ecological initiative such as the *PAT* of the territories. Agroecology promotes diversity at the territorial level, as a key element for maintaining food security and nutrition while conserving, protecting and enhancing natural resources (Wezel et al. 2016).

This research was carried out in the *Beaufortain* valley and responds to objectives defined in collaboration with the *Association d'Animation du Beaufortain*[2] (*AAB*). The *AAB* is a social centre with eight staff members who offers various social services to the *Beaufortain* community. Ten years ago, it set up shared, community gardens, and the municipality is just

[1] Loi n°2014-1170 du 13 octobre 2014 d'avenir pour l'agriculture, l'alimentation et la forêt. Article 39 : https://www.legifrance.gouv.fr/jorf/article_jo/JORFARTI000029573485#:~:text=%C2%AB%20Ils%20s'appuient%20sur%20un,II.

[2] https://www.AABeaufortain.org/

waiting for more structured plans from *AAB* before making available the entire municipal site (1.7 hectares). The *AAB,* with whom I partnered for this research opportunity, had goals to develop a market garden scenario on the communal site, taking into account the specificities of the mountains and the perceptions of local stakeholders on market gardening. Since scientific knowledge on market gardening in the French Alps is limited, the current research aims to highlight the characteristics of diversified market gardening on small surfaces in mountain areas. Further, I aimed to understand the levers and barriers for its development. Another objective is to define a market gardening scenario on a communal site. These objectives were developed in relation to the needs of the *AAB* and are directly linked to the inhabitants of the territory.

1.2 Literature review

The review is organised in three parts: (i) on the micro market garden farm (See appendix B), (ii) on the specificities of small-scale market gardening in mountainous regions, (iii) and on the barriers and conditions conducive to the development of local market gardening in France (See appendix B).There are no scientific studies specific to micro vegetable farms in the French mountains. To understand the characteristics of a micro farm and to build the interview guide this study relied on Morel's thesis (2016). This part deals with the socio-economic organisation of French micro vegetable farms. Morel defines four criteria: the inclusion in the territory, the organisation of work, the investment and the life project. In order to understand the specificities of the mountain context and the conditions under which market gardening is possible. The section examines the types of crops, development levers, outlets, and difficulties encountered by market gardeners in mountainous regions: India (Stobdan et al. 2017), Romania (Apadhidean 2004), Nepal (Céline et al. 2019), and Africa (Charlery de la Masselière, Nalileza, Uginet 2009). The third section deals with the socio-economic and political barriers and levers to the development of local market gardening raised by the literature. They have allowed me to become aware of the territorial issues at stake in the establishment of local market gardening, but also of existing initiatives such as the *PAT*, which create a context conducive to food relocalisation (Maxime et al. 2021; Baysse Lainé 2018).

1.2.1 Market gardening in mountain areas

The authors prove that the pedoclimatic conditions and the altitude of the mountains (1000 m to 3500 m) are compatible with vegetable cultivation. The scientific experiment in Romania at 1500 m in a glacial zone has shown that the environment favours certain species: allium family (onion, leek, garlic...), pisum sativum (cultivated pea), apium graveolens (celeriac), brassica oleracea (cabbage), lactuca sativa (lettuce), chicorium endivia (chicory), or evisticum officinale (lovage) (Apadhidean et al. 2004). It is possible to have a diversified production at high altitude, by introducing adapted seeds but also new lesser known species (Apadhidean et al. 2004; Charlery de la Masselière et al. 2009).

Table 1. Literature review on market gardening in mountainous geographical areas.

Reference	**Location**	**Altitude**	**Total surface**	**Type of crop**	**Types of vegetables**	**Favourable conditions for the development of market gardening**	**Market opportunities**
Stobdan et al. 2017	Ladakh Region, India	3 000 m	800 m2	Single crop in open field and in the greenhouse	Onion, cabbage, cauliflower, carrots, radish, beans, cucurbits, potatoes, peas, other	•Government support •Seasonal tourism •Abundant water resources •Fertile land: large vegetables •Few diseases and pests •Ideal climate for seed production •Peasant knowledge of market gardening •Role and involvement of women •Logistical constraints for bringing in other vegetables •Growing local demand for fresh vegetables	Direct sales: •Lodges •Local market •Farmers' cooperative to supply military troops
Céline et al. 2019	Pharak Region, Nepal	3 500 m	650 m2	Majority single crop in open field, minority in the greenhouse Rotation potato and cereals	Potatoes, tomatoes, cabbage, cauliflower, mustard, garlic, onion, coriander, carrots, radishes, squash, beans, cucumber	•Seasonal tourism •NGO support for the introduction of greenhouses •High cost of air transport to bring in vegetables •No road network •Complementarity hotel-restaurant •Development of farmers' knowledge (techniques, seeds) •Abundance of water resources •Economic	•Direct processing for the restaurant Direct sales: •Local market •Lodges
Apadhidean et al. 2004	Western Carpathian Mountains, Roumanie	1 150 m Specific conditions: glacial zone	n.s.	Single crop in open field and in the greenhouse	Onion, leek, parsley, carrot, parsnip, chives, garlic, peas, celery, cabbage, lettuce, garden chicory, lovage, tarragon, rhubarb	•Use of permeable roofing materials •Scientific experimentation with financial means	n.s.

Charlery de la Masselière et al. 2009	Montagnes Afrique de l'Est	1000 m	< 5000 m2	Agroforestry with coffee or banana trees	Cabbage, potato, carrot, banana, coffee, bean, sweet potato, pea, cassava, corn, tomato, passion fruit	•Inland highlands •Abundant water resources •Polycultural systems -Resilience of farms •Fertile soils (volcanic) •Pluriactivity •Road network that structures the sector •High financial returns •Increased external demand •State support for agricultural diversification •Complementary transport with other activities •Urban-rural interaction	Direct sales: •Rural and urban markets

Producers grow a wide range of vegetables for commercial purposes, which is why the most remunerative crops are favoured, often those that are adapted to the environment and the population's diet. For example, in Wanale in East Africa, producers give priority to potatoes, carrots, cabbage and passion fruit (Charlery de la Masselière et al. 2009). In India, market gardeners prefer to grow storage vegetables (onion, cabbage, carrot, potato) that will store and then consume in winter (Stobdan et al. 2017).

We observe that market gardening plots vary between 650 m² and 5000 m², these are small areas as producers are often pluriactive. In Nepal, most producers have small inns and market gardening represents a complementary activity (Céline et al. 2019). In East Africa, the study talks about food agriculture, the diversification of vegetables makes it possible to ensure an additional income, and it is often small-scale coffee producers who are dependent on market prices "when prices fall, they abandon their coffee plantations" (Charlery de la Masselière et al. 2009). This is a resilience strategy that provides security and allows the family to meet its needs. In Ladakh, Indian farmers are choosing to cultivate more densely to enhance the value of their small plot (Stobdan et al. 2017).

In these remote areas, producers make strategic choices to extend the production period. For early yields, permeable cover materials such as tunnels or greenhouses are needed for crops that need more heat (Apadhidean et al. 2004). In Nepal, farmers grow tomatoes, cucumbers, string beans, cabbage, cauliflower and mustard in small greenhouses (50-80 m²), with a production period of 12 months in the greenhouse compared to 9 months in the field. Greenhouses also allow crops that are not well adapted to the environment to be planted, for example, in Nepal, some people are developing tomatoes under glass as this crop is popular

with tourists and well valued (Céline et al. 2019). In Ladakh, researchers have noted that preparing plants in greenhouses extends the season by almost two months, as most vegetables mature earlier. In winter, Indians store their vegetables in special structures to have vegetables all year round (Stobdan et al. 2017). The low temperatures in the mountains require a precise and strategic cultivation schedule. In Nepal, producers rely on tourist peaks (Celine et al. 2019).

Nevertheless, there are obstacles to the development of market gardening. In East Africa, the pressure on land due to the high population is very fragmented and difficult to access, and the producers manage on their own, "too often in a survival mode", to structure the market gardening sector on a social and economic level. The author calls for "better integration of farmers into society" (Charlery de la Masselière et al. 2009, p.329). In Nepal, it is the labour force that is the problem, as children go to study in the cities while family helpers are the main labour force (Céline et al. 2019).

In the case of market gardening in French Alps, few studies have been conducted in France. Moreover, similar questions can be asked: Are there crops adapted to mountain areas? What would be the impact of greenhouses on the French mountain landscape? What does the farm of a doubly active market gardener in France look like? Is there political support?

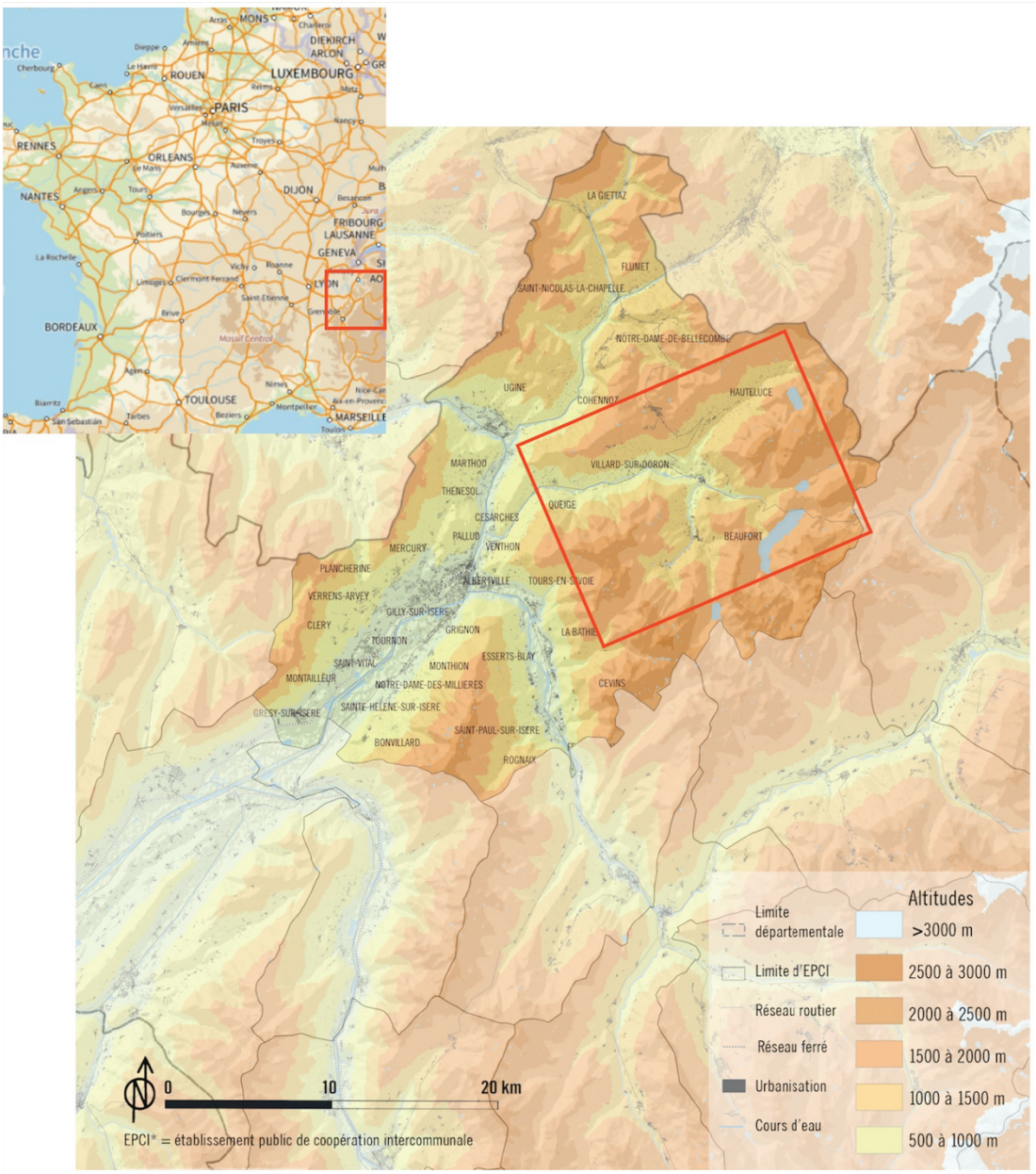
1.3 Case study and context: agricultural space and climate change in the French Alps

Today in the Alps, the impacts of climate change are numerous and are already being felt. Warming has accelerated since the early 1980s, when the average altitude of the 0°C isotherm rose by 400 m. Overall, the Alpine arc will experience more extreme weather events, such as heavy precipitation events or droughts. Scientists have questioned the resilience of tourist infrastructures (huts, ski lifts, etc.). As a result of droughts, livestock production systems are exposed and farmers lack hay to build up winter stocks (Nettier et al. 2010). It is always difficult to predict the future, however a study on climate change and natural hazards in the Alps has listed a series of events that are likely to accelerate (Einhorn et al., 2015):

- Continued glacial retreat and permafrost degradation
- Alpine river flooding
- Landslides, mudslides and boulder falls
- Summer drought

Figure 1. Map of the geographical situation of Arlysère Agglomeration, with a focus on the Beaufortain valley.

Source: Auvergne Rhône-Alpes Énergie Environnement



Agricultural land covers 31% of the Savoie department (*Observatoire des territoires de la Savoie 2020)*. The Chamber of Agriculture (2020) counts 5030 dairy catlle farms in Savoie and Haute Savoie. Savoyard agriculture is pastoral, "*pastoralism includes all livestock activities that develop the spontaneous forage resources of natural areas by grazing alone"* (*CA73 2012*). During the summer months, the animals leave for the high mountain pastures and this is an important feature of the extensive cattle-dairy system and is the predominant type of agriculture in the valleys: Bauges, Beaufortain, Tarentaise, Vanoise, Haute Maurienne

(Observatoire des territoires de la Savoie 2020). In these valleys the main resource is grass, which represents 86% of the agricultural land. Dairy production is well promoted by quality signs such as protected designations of origin (*PDO*) which cover a limited number of communes and has strict specifications with a logic of forage autonomy (Barrioz. 2021; Observatoire des territoires de la Savoie 2020).

The Beaufortain is a valley located in the department of Savoie in the Auvergne-Rhône-Alpes region. The valley covers 27,054 hectares including 4 communes: Beaufort, Hauteluce, Villard-sur-Doron, and Queige, which has a total of 4,279 inhabitants (De Varine, 2006, Insee 2019). The Beaufortain is part of the Arlysère agglomeration[3] (39 municipalities), with Albertville as the reference centre, and five town centres: Grésy-sur-Isère, Frontenex, La Bâthie, Flumet and Beaufort. There are 18 km from the canton capital, Beaufort, to Albertville, including a 10 km gorge with 150 bends, a usual isolation, and a marker of chosen marginality for some Beaufortain inhabitants (De Varine, 2006; Barrioz, 2019).

The average altitude is 1660 metres (minimum 350 m, maximum 2920 m at the Aiguille du Grand Fond). It is a mineral landscape, we speak of the "10 pebbles of the Beaufortain", from a Hercynian crystalline base" (Dorioz 1998). The massif is located between Mont Blanc to the north and Belledonne to the south. Since 2013, the Alpine Geofestival takes place, an educational and festive event that aims to inform people about "the link between human activities, biodiversity and the soil with its geology" (Broucker et al. 2013, p.80). In the Beaufortain, the average slope is greater than 5%, except in the small alluvial plains of Beaufort and Villard. This topography makes it possible to distinguish three types of agriculture (De Varine, 2006):

- mechanised and intensive on the alluvial plains
- laboriously mechanised and intensive on the lower slopes
- extensive in the mountain pastures

The territory benefits from complementary economic fields: hydroelectricity, tourism and agriculture. The Beaufortain has a hydroelectric network of 4 dams, this complex represents the consumption of 450,000 inhabitants (*Brochure le Beaufortain*). It is also a tourist

[3] "The agglomeration community is a public establishment of inter-communal cooperation (EPCI) grouping together several municipalities forming, on the date of its creation, a whole of more than 50,000 inhabitants in one piece and without an enclave around one or more central municipalities of more than 15,000 inhabitants." (http://geoconfluences.ens-lyon.fr/)

destination, both in summer and winter, with the presence of two ski resorts*: Les Saisies* and *Arêches-Beaufort.* Mountain activities are varied: downhill skiing, ski touring, cross-country skiing. In summer, hiking, cycling and the heritage never cease to attract. It is a population basin where the purchasing power is higher than the French average (Chamber of Agriculture Auvergne Rhône Alpes 2020).

The sense of collective work is part of the culture of the Beaufortain, it is also a reflection of a good understanding between the political and agricultural actors, accompanied by strong political choices. The field of research is also active within the territory. In 1998, Dorioz worked on the mountain pastures. Faure on the Beaufort AOP in 1999. In 2006, De Varine studied its cultural, social and economic development. In 2017, Durrande Moreau used the case of *Beaufort PDO cheese* for wrote a review on using a *PDO* agri-food product to innovate in tourism. More recently, in 2015, three students from Isara, under the direction of Philippe Fleury, conducted a *MAESTRO* study on local food. There have also been collaborations between *INRAE*[4]*,* the dairy cooperative (*COOP*), the *Société d'Economie Alpestre de Savoie* (SEA), and the sentinel alpine network. The citizens have always been actors in the territory, with a strong dynamic of associations, in 2006, there were more than 90 active associations, including the *Association d'Animation du Beaufortain (AAB*), created by Hubert Favre in 1973, the *AAB* is the main tool for active participation of civil society in the development of the territory (De Varine, 2006). In the framework of *AAB*, the magazine "*Ensemble"* is published every four months, and gives an overview of life in the area, the magazine has existed since 1962.

1.4 Research questions, announcement of the plan

The first research question concerns the survey of market gardeners. It focuses on the socio-economic and agronomic elements that characterise the micro market garden farm in a mountain environment.

- What are the characteristics of local market gardening in mountain areas?

The second question is addressed to local actors and inhabitants who work and live in the *Beaufortain* area. It will be a question of determining the main barriers and levers to the

[4] INRAE: National Research Institute for Agriculture, Food and Environment in France (Inrae.fr)

development of market gardening, which will make it possible to measure the interest of local actors, to characterise the perception of market gardening, and to find a consensus between the stakeholders and the inhabitants for the best scenario of communal land use and management.

- What are the barriers and levers for the development of market gardening in *Beaufortain* valley?

The chapter two explains the methodology used, including the theoretical framework, survey methods, and data processing. The chapter three presents the results. First, I will present the mountain context, a set of specific constraints, at the level of the vegetable farm. It will answer to the first research question, on the characteristics of market gardening in the mountains. The market gardeners were referred to by imaginary first names, as there were only eight of them, this humanise the results. From 3.4, a second part based on the second research question, determines the main barriers, levers and representations of market gardening development in the *Beaufortain*. Chapter 3 will end with elements related to the action for the development of market gardening in mountain areas. Based on these elements, chapter four will discuss the results in relation to the literature, and present the limitations of the study. A short conclusion will conclude the thesis.

Chapter 2: Methodology

2.1 A qualitative and participatory research approach based on grounded theory

The association (*AAB*) gave me a lot of freedom and facilitated informal exchanges, which allowed me to live a real experience of the territory. It allowed me to experiment with different methodological tools. These tools allowed me to structure a multi-level study for observe the territory from different angles: agricultural, political and civic.

To conduct my qualitative research, I relied on grounded theory. According to Glaser and Strauss, grounded theory involves anchoring the theory in the data (and not in other theories, assumptions or untested hypotheses). Grounded theory does not start from preconceived ideas, it conceptualises a phenomenon by appealing to the practical knowledge of actors, it is a representation of the real world. I did not try to prove the hypothesis on the objects of the survey. The research was conducted in a chronological cycle, there is a circular interaction

between data collection and analysis, e.g. findings raised with local actors, then they were interviewed with the inhabitants in the group interview. The conceptual reasoning seeks to move from theory to the formulation of an explanatory hypothesis. In grounded theory, the selection and sampling of participants is guided by the 'theoretical saturation' of data which means that there is no more data available from which to develop categories of analysis (Laberge 2012; Digard 2011; Perrelet 2019; Gélineau 2001).

According to Bruley, the participatory approach allowed for the creation of questions and reflections within and between participants. Gélineau's thesis identified three main areas of work in participatory research: (1) the production of critical knowledge, (2) awareness-raising that promotes the appropriation of this knowledge, and (3) action. The group interview is a method of enquiry that is part of a participatory process. It allowed the creation of scientific knowledge by taking into account the interests of the inhabitants. In contrast to individual interviews, the group interview allowed for an overview and critical analysis of the situation by the inhabitants, as well as an insight into their needs and aspirations. (Bruley 2021; Gélineau 2001; Vendel 2017). In my case, one of the purposes was action through the design of a market gardening scenario for a communal site. This communal site is a public land, it is a portion of land is held by the municipality, currently maintained from year to year by a breeder.

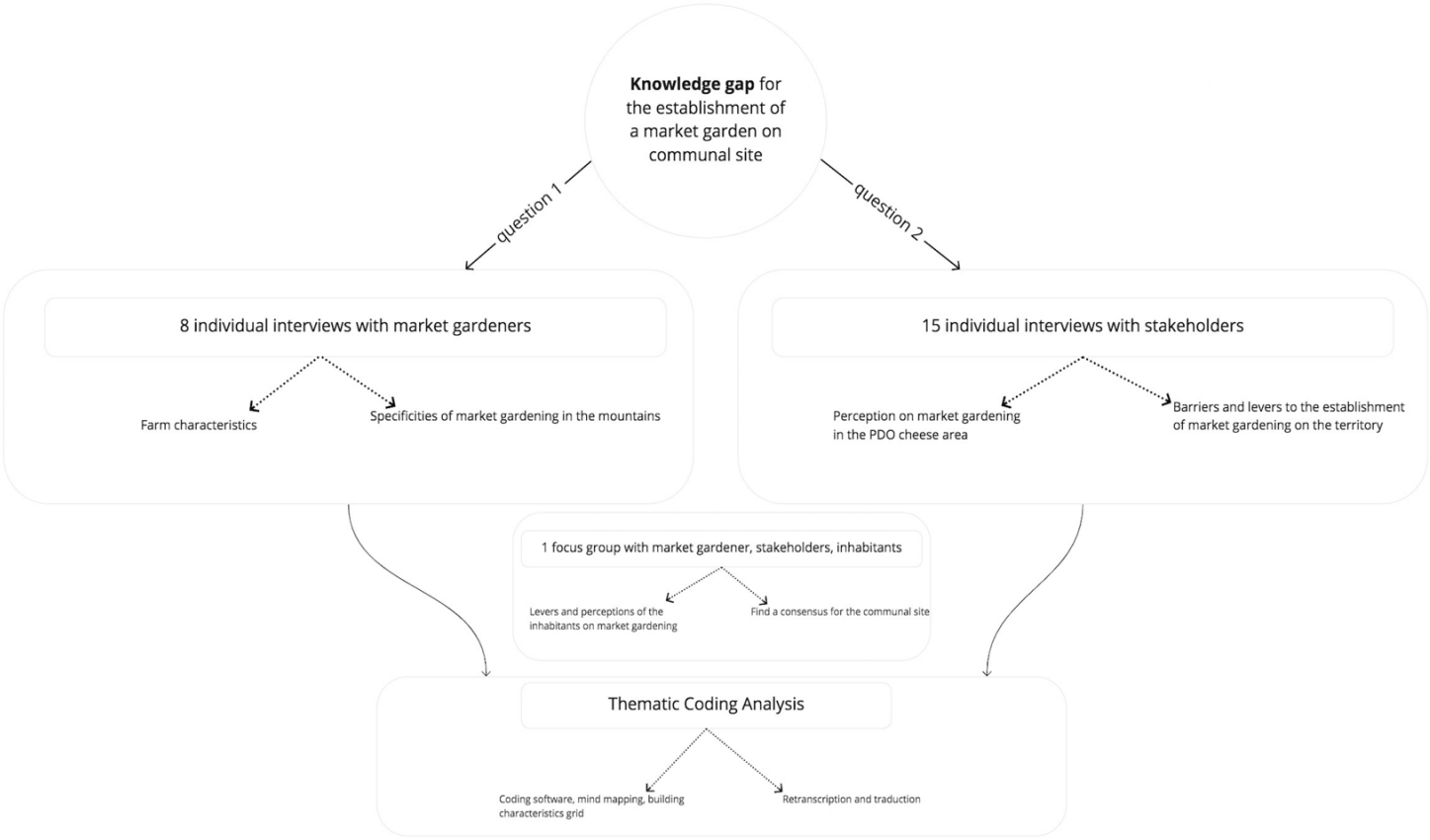
2.2 Survey process and methods

I mobilised different survey methods to vary the modalities of expression, individual and group. I built my research in three chronological cycles, this temporal structure allowed me to delimit the data collection according to the two research questions. I collected my data through semi-structured and group interviews, and participant observation which are the most used inductive and flexible methods in qualitative research. These methods look at the social reality instead of looking for the correct answers, they look for meaningful explanations of a problem. Qualitative research allowed me to describe a phenomenon in its natural context in a precise and detailed way (Savoie-Zajc 2007; Kohn, Christiaens 2014).

I contextualised my research historically using the literature (De Varine 2006) and non-directive interviews with four retired farmers. The objective was to understand the agricultural trajectory of the Beaufortain region with its past of self-produced market gardening. These

interviews enabled me to create the chrono-systemic frieze (Appendix 1). The duration of the interviews varied between 1 and 2 hours.

Figure 2. Methodology used from data collection to data analysis.



I chose the semi-structured interview as my main method of gathering information. The semi-structured interview is a guided interview, the guide gives a certain flexibility and freedom of speech to the respondents because its framework can change its order during the interview. I wrote two interview guides, one for each research question. I organised all the themes I wanted to address according to the research questions, in the form of questions or words, having an interview guide reassured me while establishing a malleable framework, which allowed the interview to run smoothly (Lugen 2015). I used the literature review to design the guides. The first guide for market gardeners was composed of about 50 specific and technical questions. The second guide for local stakeholders consisted of about ten questions. The duration of the interviews varied between 45 minutes and 1.5 hours.

I interviewed eight market gardeners, six men and two women. The interviews were conducted in March, at the end of winter, and all but one of them took place on the farms. The selection of the market gardeners was done with the *AAB*, and with the help of the other market gardeners via the snowball effect. Their main production had to be market gardening. They had to be at an altitude of at least 550 m, and some had to have sloping cropping systems. The selected farms had to be no larger than 3.5 ha. I approached the market gardeners by email to make an appointment. The participants were asked to give their consent, including for recording and taking photos. We started the interview sitting down with a hot drink. I would bring back a sweet treat as a thank you to build trust. After discussing the first two parts of the interview, we would go around the farm where I would ask the questions for the third part on the technical system.

The first guide was in three parts:

- Can you introduce me to your background?
- Can you introduce me to the farm?
- Technical choices in mountain areas

I interviewed fifteen stakeholders from the agricultural sector and from governance (See Appendix D). The market gardeners helped me to identify the agricultural stakeholders. At the level of the *Beaufortain*, I met three mayors and two elected officials in charge of the agriculture commission, and two actors attached to the *Beaufortain* dairy sector (*COOP, GIDA*). At the level of the *Arlysère agglomeration*, I met the *PAT* project manager. At the level of the Savoie department, I met the head of the Savoie departmental territorial directorate (*DDT*)[5] Service and and eight actors involved in of agricultural sector. During the interview, the participants were asked to give their consent for the recording. For the stakeholders who worked in the Savoie department, I specified that my research concerned the Beaufortain territory.

The second guide was in two parts:

- Identifying the barriers and levers to the development of market gardening
- Characterise the perception of market gardening in the Alpine valley

[5] The Departmental Directorate of Territories (DDT) contributes to the sustainable development of Savoie, by being a local public service that translates public policies by adapting them to the challenges of the territory (Savoie.gouv.fr)

During my research, I perceived a lack of cohesion between the local actors and the inhabitants although they had common ideas, which is why I decided to organise a focus group. I contacted some market gardeners and local actors I had met, and a list of inhabitants interested in food and agricultural issues in the area was drawn up with the *AAB*. The interview brought together fifteen people: one market gardener, ten inhabitants, three local elected officials, and the project manager of the territorial food project. The objectives were to discuss the barriers and levers raised during the previous interviews, to define the actions to be implemented for the development of market gardening, and for the participants to leave with something positive and constructive. This group interview was open to everyone, and two weeks beforehand, a poster was distributed in the town of Beaufort and on social networks.

The focus group created a dynamic exchange, saves time, and brings out social representations (Baribeau et al. 2010). There is a facilitator who structures and the group that reacts around an object of discussion. I designed the interview based on the data from the previous rounds. First, I presented the portraits of the market gardeners I met to show a change in agricultural practices for the food relocation of the territory, then I introduced the objectives of the workshop. I asked four questions that illustrate certain barriers and levers for the development of market gardening in the Beaufortain, in connection with images. Each question led to a 15-minute discussion between the participants, during which time I noted the collective response in the form of a mind map on a flip chart. After the interview, a report was sent to the participants. The interview lasted 2.5 hours.

The questions of the group interview:

- Market gardening in the Beaufortain, yes, but...on what scale and for what outlets?
- Market gardening in the Beaufortain, yes, but... is it economically relevant?
- Market gardening in the Beaufortain, yes, but is it complementary to livestock farming?
- Market gardening in the Beaufortain, yes, what are the benefits for the region and its population?

2.3 Data processing: coding and thematic analysis

Interviewees were recorded using a dictaphone and active note-taking. First, the interviews with market gardeners were transcribed wholly in French using a software, *Trint*. Further, the

interviews with local stakeholders were transcribed manually in French using some shorthand. In both cases, the aim was to have transcripts as faithful as possible to the recordings.

Codification:

The transcripts were codded individually with a different software according to the cycles. The analysis started by consisted of extracting fragments of text from the interview transcripts speech to create that gave me codes. The codes that appeared were closely related to the questions in the literature-based interview guide. The codes that came up the most frequently were those that appeared the most in interviews. These codes therefore represent key elements of the interviews, and the data collected. The verbatim transcription of the Cycle 1 interviews allowed me to organise the codes and themes vertically and formally, with a coding software, *Delve.* The rougher transcription of the cycle 2 interviews led me to organise the codes and themes in the form of a mind map, with a mapping software*, Miro.*

Categorisation:

The codes enabled me to determine 10 themes for Cycle 1: personal ventures; difficulties and advantages of market gardening in the mountains; economic viability; legal aspects; technical system; production; marketing; diseases and pests; local solidarity; work organization. The codes enabled me to determine 3 themes for Cycle 2: barriers to the development of market gardening; leverages for the development of market gardening; perceptions of market gardening.

Linking:

The links between the themes and codes were made based on my understanding of the research sample, the territorial context, and my interpretations of the current situation in order to answer the research questions. The themes and codes were crossed (making connections between the codes) which created an overview of the data. The overview of the data served in the deeper analysis of the codes between them. This gave me a subtle understanding of the data: I understood that some codes were the result of another code. Since there were two separate research questions, I crossed the themes for cycle 1 and cycle 2-3 separately.

Table 2. Example of thematic analysis with the theme "Personal ventures".

Theme	**Codes (numbers represents *verbatim that appear in the interviews related to the code*)**	**Verbatim in the interviews**
Personal ventures	Investments and subsidies (19)	*"The first year, we had to put in about €8/10,000 worth of equipment, the first greenhouses, and irrigation."* *"I applied for DJA installation aid (around €34,000)."*
	Progressive installation (14)	*"The first three years I went in a little bit at a time and made some money."* *"We have an approach where we really wanted to do it gradually so we didn't scare ourselves too quickly."*
	Reconversion (13)	*"I started my approach at the age of 35, with a whole first professional life, that is to say almost 20 years when I had a good income and a family situation that allowed me to do so."*
	Food autonomy (8)	*"The first idea, and like the peasantry of the past, is to keep the essential and sell the superfluous, that's it, so already the idea of what I ate during the whole year."*
	Within or outside the family (8)	*"It's outside the family framework."*
	Free up time (6)	*"We like to go away on Sundays, we live well with our children, we try to remove everything that blocks us."*
	Little expenditure (4)	*"We have very few expenses, apart from rent, insurance and charges."* *"We don't have big turnover, we don't have big expenses either."*
	Transmission (3)	*"When we welcome trainees because I was welcomed on a traineeship to inform me"* *"We don't have the level yet, but to do training in all that, I think it's really a side that interests us!"*
	Passion for soil (3)	*"Live soil farming is a personal taste for soil life."*

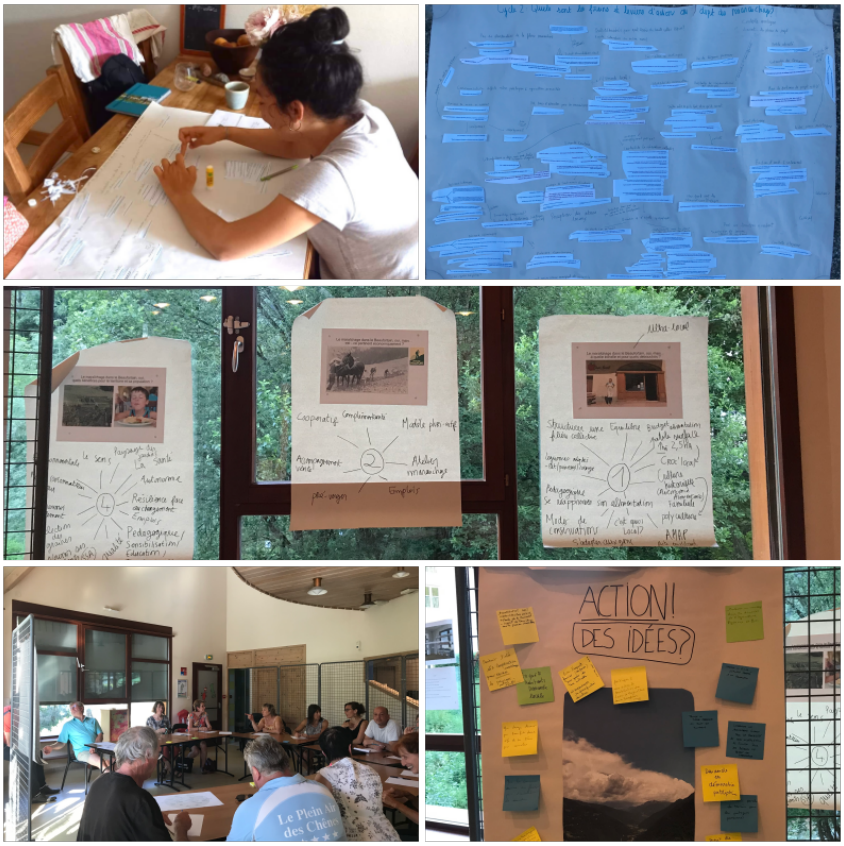
Theme-based description:

For Cycle 1, linking themes together allowed me to make a selection between primary and secondary themes, those that directly answered the question and others that were less relevant. For example, I combined a primary theme with a secondary theme to write the results "Work organization in line with a personal venture". The subsections (3.1.1.,3.2.1,ect…) reflect the connections between the themes. I developed tables with data specifically from farms that

allowed me to compare and have an overview of the characteristics of the farms in the research sample.

For Cycle 2, I created three summarizing mind maps in paper format, based on the individual mind maps that were generated based on the themes, codes, verbatim. I complemented these results by integrating data from the posters made during the group interview. The three summary mind maps highlighted seven themes: existing agriculture; meteorological and topographical context of the mountains; internal and external political leverages and obstacles; economic land pressure; market opportunities; lowland complementary; and the perceptions of local actors and inhabitants on market gardening. These themes enabled me to write the subsections (3.4, 3.5,3.5.1.,ect …).

Figure 3. Paper format mind mapping work and data posters from focus group (© Déborah Lamy).



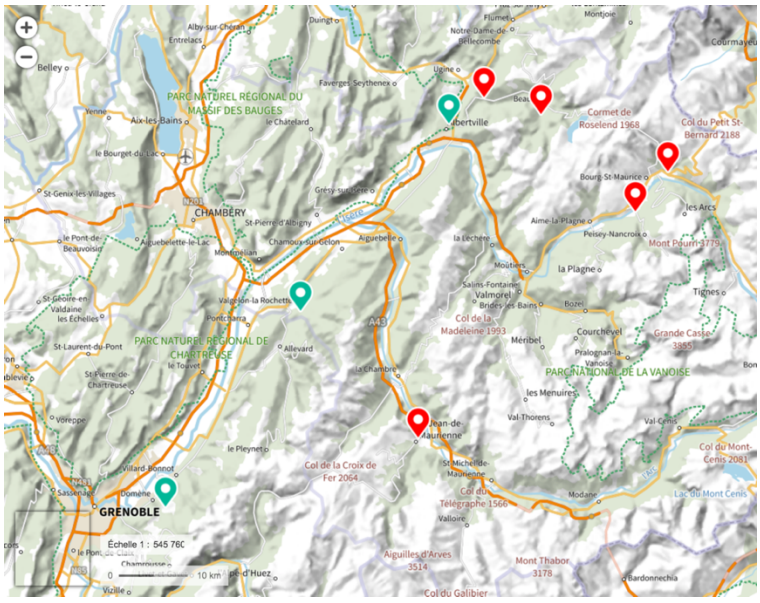
Chapter 3: Results and analysis

The results are divided into two parts, one for each research question. They end with an analysis section.

3.1 Technical and economic characteristics of mountain micro-farm market gardening

The eight market gardeners interviewed were distributed between the low mountain (plain) and the medium mountain (valley), from 550 m to 1200 m altitude. They cultivated vegetable areas of between 500 and 8000 m2. They can be considered as micro-farms by recent literature (MMBio[6] redefined at maximum 7000-8000m2 of market gardening per worker). For four of them, their vegetable farming was their main livelihood, so they are defined in the study as single active. Four were double active (including one farm in the process of being installed), meaning the combination of two professional activities over the year. The smallest plot is that of the market gardener who is active all year round. Two were set up within a family framework by changing the initial production from livestock to market gardening, and six were set up outside the family framework. Half of them rented their land, the others were owners.

Figure 4. Map of the location of the farms. The green colour represents the market gardeners in the plain, the red colour represents the market gardeners in the valley. Source: Geoportail.



The market gardeners set up with start-up capital and sometimes a bank loan. Five of them received the *DJA* [7]funding (The average amount of the DJA is approximately €32,470 in 2021). For the initial investment, the majority mentioned three main investments: the irrigation

[6] MMBio national project: Organic vegetable microfarms: technical and economic references for diversified, multiperforming organic vegetable microfarm systems. http://qfq.itab.asso.fr/action.php?id=2495 Project led by ITAB and funded by CASDAR, from 2019 to 2022. (Morel 2021)

[7] DJA: Funding for the young farmers, on condition that they have agricultural professional capacity, and has drawn up a business plan over 4 years that reflects the development of an economically viable installation project that will enable a sufficient agricultural income to be generated. (agriculture.gouv.fr)

system, greenhouses and a work vehicle. Most chose to spread these investments over four years. The installation was done gradually, some market gardeners started on a small plot and then doubled the surface area over the years. The single active market gardeners began to earn an income in the third or fourth year after setting up. Five market gardeners had the professional diploma of farm manager in organic market gardening (*BPREA*[8]). In couples, the farm manager was declared as a joit contributor, and the spouse was declared as an employee or collaborating spouse. The status of the farms were individual enterprises. The study found an average of 1.5 *FTE*[9], except for Paul who was double active all the year. Some market gardeners divided their work time between trainees, family helpers, or by hired a part-time employee, and they hired trainees to share their knowledge. I found that the average yield in tonnes of vegetables was 17.5 tonnes per farm per year (average of five farms that could provide this information). The average price per kg of vegetables was 3 € for most of the market gardeners.

Table 3. Characteristics of the eight vegetables farms.

Legend: FTE: Full time equivalent, AB: Organic Agriculture (x): without label, AT: Animal traction

Farmers name	Years since installation	Altitude	Double activity	Total surface	Cultivate acreage in vegetables	Share of greenhouses in cultivated area	Slope level of the terrain	FTE	Land access	Mechanization level	Sales period months	Commercialization modes
Sophie et Thierry	2	1000 m	Yes	n.s.	5000 m2	Less than 5%	Between 5% and 10%, and flat terrain	1	Rented (Family farm)	Low	6	1 market, restaurateurs, collective catering
Marylene et Damien	9	700m	No	2,56 ha	1500 m2	14%	Between 10% and 20%	1,5	Rented (Terres de liens)	Non-mechanized	8	1 market, 1 farm sale, annual salary system with 8 families, collective catering
Joseph	2	550m	No	1,9 ha	7000 m2	14%	Between 10% and 20%, and flat terrain	1,7	Purchased	Non-mechanized	7	2 markets, 1 CSA
Julien	10	560m	No	1,8 ha	5200 m2	16%	Flat terrain	1,8	Rented	Non-mechanized + AT	9	3 CSA
Romain	7	650m	No	1 ha	4000 m2	33%	Between 10% et 20%	1,5	Purchased	Non-mechanized	7	1 market, 1 CSA, 4 restaurants, collective catering
Paul	6	1200 m	Yes	2500 m2	500/600 m2	Less than 5%	Flat terrain	0,5	Purchased	Non-mechanized	5	1 direct selling at the farm, collective catering, local shop

[8] BPREA: The BPREA is a Level IV diploma of the Ministry of Agriculture which confers the Agricultural Professional Capacity. (chambres-agriculture.fr)
[9] FTE: full-time equivalent is a unit of measurement of a workload or, more often, of a work or production capacity

Marie et Antonin	11	900m	Yes	1 ha	8 000 m2	Less than 5%	Flat terrain	2,25	Purchased (Family farm)	High	7	1 market, farm baskets, restaurant owners, organic shops, collective catering
Alexis et Antoine	1 (in progress)	700m	Yes	3,5 ha	1680 m2	12%	Between 5% and 10%, and flat terrain	1,7	Rented (Communal land)	Low	4	2 markets, 1 farm sale, restaurant owners

3.1.1. A constraining environment

According to market gardening technician at the *Savoie* Chamber of Agriculture (*CA73*), there was little land suitable for market gardening in the Alpine valley, "*which is why project holders with small surfaces have different workshops adapted to the slope, such as medicinal plants or small fruits, which require little rooting and little watering*"[10]. The main technical constraints were the depth of the soil, the slope, and access to water. Moreover, some exposures were more favourable than others, an eastern slope benefits from the morning sun, whereas a western facing plot remains humid. For the technician, exposure and altitude were less restrictive factors. However, contrary to my belief, the results show that the highest altitude market gardeners cultivated on flat land and not on slopes. I understand this as follows: They settled in the family setting, or had more financial means (thanks to the double activity) which allowed them to access flat land. Moreover, the slope would add another difficulty to the altitude.

The technician (*CA73*) considered that beyond a 10% slope, growing vegetables became complicated, *"The steeper it is, the shorter the beds to be worked, with paths in the middle to prevent water from running off"*. In my study, three market gardeners three gardeners grew on slopes between 10% and 20%. Marylene cultivated on a sloped terrain of more than 10%, *"growing on a slope is compatible with diversified market gardening on a small area with little tillage"*. Romain didn't see his sloped terrain as a constraint, *"I stoop less, sometimes it has its advantages, on the other hand, you mustn't leave your soil bare, if it rains heavily, it can be washed away quickly"*. I observed that some market gardeners relied on tools such as motorised wheelbarrows to harvested their vegetables on slopes or animals that maintain very steep terrain.

[10] The quotations coming from the interviews with farmers or stakeholders will be written in italic, in order to inform the reader that these were the words from the meetings.

Figure 5. Photos of the farms visited (© Déborah Lamy).

Some market gardeners described that depending on the altitude, the temperature differences between day and night were greater. According to Paul, yields were less satisfaying for *"hot"* vegetables (tomato, eggplants, pepper). Indeed, the study observed that the diversity of vegetables could vary depending on the locality. For example, Paul grew about 15 types of vegetables at 1200 m, whereas Marylene, at 700 m, grew about 70 different types.

3.1.2. Crops favorable to cultivation in mountainous zones

In the mountains, due to the high altitude and significant rainfall, "*vegetables grow very fast and they suffer less from droughts*", reported one market gardener during our interview, Marie. The majority of market gardeners collected water from natural springs for irrigation. In *Tarentaise*, farmers used an irrigation system installed by the municipality, which led river water directly to the fields at a low annual cost. However, a technician at the *Savoie Chamber of Agriculture* (*CA73*), specified during our interview that access to water can be more complicated in some places than others. He did not specify why this was the case.

Market gardeners in the Beaufortain produced their storage vegetables in open-field settings, vegetables that have been historically produced in this region and continued to be appropriate for this context with a short growing season. According to one market gardener in the valley of the *Beaufortain*, he had a satisfying yield per square meter for his winter storage vegetables: potatoes, leeks, cabbage, and chard. This farmer, Paul, rotated his vegetable parcels in a five year cycle: two years of potatoes, one year of root vegetables, one year of cabbage, and one year of squash. Even if they were not the most profitable, Thierry and Sophie grew mostly open field vegetables, because "*it's less work and we can store them*". According to Marie, "*you shouldn't try so hard to grow early vegetables in the mountains, it's better to respect the seasons, the soil, and adapt to the short season by having a double activity*". Growing vegetables for winter storage allowed for longer sales. The double activity farmers were able to deliver potatoes until February or March. On the other hand, Romain chose to produce fewer storage vegetables because he had no storage building, thus his selling season ended in November.

Some single active market gardeners produced small fruits: raspberries, currants, blackcurrants, which were an adapted crop that needs a cold period in winter. I observed that small fruits allow to valorised the sloping places where the cultivation of vegetables was complicated. The market gardeners, who had just set up shop, have planned to plant six raspberry beds and one strawberry bed. However, berries could take a long time to produce, *"the raspberries produced two years after planting"* explained Marylene.

3.1.3. A diversity of agronomic systems

Market gardeners cultivated organically (two were not certified). Interviewees highlighted that six market gardeners were inspired by market gardening techniques such as: market gardening on living soil (farmer-led movement 2012), bio-intensive (Fortier 2014), permaculture (Hervé-Gruyer 2011), and biodynamic farming (Steiner 1924). Two double active market gardeners had a motorised technical system.

The majority of market gardeners had a system of crop beds (20 m long, 80 cm wide). The study observed two forms: surrounded by wooden cladding, or delimited by grass or *BRF*[11] (Ramial fragmented wood) paths. The study found that the single active market gardeners had about sixty of them. Interviewees described that this system facilitated organisation and

physical work, especially on sloped terrain, where the wooden boards create a terrace system that retains water and nutrients. According to Alexis, it was one of the specificities of bio-intensive farming, *"even if these beds do not optimise space, the production figures are higher than with traditional techniques, we were at 14 euros per square metre, whereas traditional crops are at 10 euros, it allows us to have a higher yield in a context where the season is short".* From interviews, it was determined an average, on a square metre: market gardeners grew three crops in greenhouses and two in the open field.

The majority of market gardeners experienced crop combinations: radishes and carrots, lettuce and herbs under the tomatoes. Only a couple of market gardeners practice crop combinations in a "professional" way by referring to the permaculture book "*Vivre avec la terre*" from the *Ferme du Bec-Hellouin.* They used to plant a short crop under a long crop, *"to make sure that there is always something alive in the soil"*. Two single active market gardeners practiced agroforestry on a small plot, sometimes with trees over 30 years old interspersed with vegetable crops, so that the shade didn't interfere with the crops.

Two single active market gardeners were members of a *GIEE* (Environmental and Economic Interest Group) on conservation agriculture applied to market gardening on living soil *(MSV: Maraîchage sur sol vivant in French)* has been created in 2019, supported by *ADDEAR* (Organization for the development of rural and agricultural sectors). According to Faury (2021), *MSV* is a combination of practices based on reduced tillage, soil coverage, integrated weed management and organic matter additions. This technique required a lot of organic matter, mainly *BRF (*ramial fragmented wood) but also compost, dead leaves, damaged hay, straw. The organic material is covered with woven or plastic sheeting. The *MSV* brought carbon rather than nitrogen to the soil, it was a change from the usual model that arouses interest among the market gardeners. According to them, organic matter allowed for better water retention, and this moisture protects the life under the soil. Their motivations were a personal taste for soil life and drought mitigation.

It was observed that all the market gardeners have tried green manures to covered their soil: vetch, oats, phacelia, lentil, chickpea, pea, buckwheat, faba bean. However, due to a restricted rotation system, the green manure crop didn't have time to grow. Snow covered the soil quickly, which limited the action of green manures (except in greenhouses). Moreover, it added to the physical workload for the non-motorised market gardeners who had to manually remove it.

From interviewees, it was found that the double active market gardeners had a smaller greenhouse area (5% maximum) than the single active (average of 18% and 33% maximum). The double active grew tomatoes, eggplants, peppers and herbs in greenhouses, one market gardener only for their own consumption. While the greenhouses of the single active allowed them to ensure a minimum of 7 months of production. For example, the study observed: salads, leeks, spinach, carrots, onions and radishes in greenhouses of some single active gardeners at the end of March. They chose mostly ogive greenhouses (pointed at the ridge with many hoops) which allowed snow to fall on the sides. However, some questioned the impact of greenhouses on the mountain landscape, they chose to set them up in hidden places. Half of the farmers had a nursery, often starting the plants in January in their house. Julien had a 200 m2 greenhouse-nursery, as he chose to produce 100% of his plants.

According to the interviews, there were few diseases and pests on the crops. The gardeners mentioned powdery mildew and blight, but these were minimal and under control. They were surrounded by refuge areas (woods). According to Romain, this biodiversity would help regulate the plot. Marie added that "*the cold winter season plays a positive role*". Nevertheless, some market gardeners had difficulties with the management of pests (hare, vole, slug, roe deer, wild boar, deer and doe), they installed fences to slow down the biggest ones.

According to the market gardeners, organisation was the mainstay of market gardening. Firstly, this organisation is translated into an adapted cultivation calendar with a precise cultivation plan for the planting weeks. This is done either manually or digitally with the help of specific software. Secondly, some considered that it was important to plants its crops in terms of zoning, a permacultural principle that advises planting crops according to the use zones of a site. According to Romain, a long observation of his plot before planting crops was an element of his success.

3.2 Socio-economic characteristics

3.2.1. Economic viability based on the double activity and diversification in medium mountains

Above an altitude of 800 m, market gardeners found an economic equilibrium in the double activity. Furthermore, some market gardeners were double active in the first years of their installation to become single active, this is the case for Alexis and Antoine. The majority of the

market gardeners saw the double activity as an advantage. "*We are happy to have this break, we don't get tired of the job*" explained Marie. It was also a financial security because there was the prospect of the winter job which ensured part of the financial needs.

This double activity was practiced in two different ways:

- The double activity all year round. Paul worked in the water department of the town of Beaufort.
- The double activity during the six winter months. Marie did odd jobs such as census taking, Antonin was a ski instructor. Sophie worked with children.

From interviews with market gardeners, I understood that the arrival of early frost in the valleys shortens the production season. At an altitude of 1200 m, Paul defined a very humid climate *"specific to the Beaufortain valley"*, which represented seasonal market gardening for about 5 months. At an altitude of 900 m in the valley bottom, they could have the last frost in May and the first in October, which allowed them to have between 5 and 6 months of production. Around 700 m altitude, the season market gardening varied between 7 and 8 months. Market gardeners located in the lower mountains (500 m) had a longer marketing season, between 8 and 10 months.

The study identified six marketing channels (the numbers refer to the number of market gardeners): the market (6), basket sales or CSA (4), collective catering (5), restaurant owners (3), farm sales (3) and local or organic shops (2). Marylene's production system is adapted to precise quantities, *"To avoid losses, you have to think upstream about your marketing channels and characterise the demand".* The market gardeners sold their produce within a close geographical area (in the municipality or border municipality at the place of production). However, I noticed that a single active market gardener from the plain valued his production by selling his early vegetables on the markets in the valleys (explanations with stakeholder interviews in part 3.5.3.). Whereas the market gardeners in the *Beaufortain valley* (who grow more storage vegetables) are the ones who sold the most to collective catering. Collective catering allowed them to sell large quantities quickly, but I understand that this is less valued.

According to the gardeners, the ability to create an income depended on the value of the vegetable. Some market gardeners produced vegetables with a high added value, such as mesclun, lettuce or vegetables in bunches. Then, market gardeners had one or more workshops

in addition to the market gardening activity, sometimes for their own consumption or for created an additional income. For a double active gardener, the sale of seedlings was a profitable workshop, which represented a good part of his turnover. I noticed that some workshops allowed them to occupy the steeper parts of their land: orchard, berries, chrismas tree, or animals. Most of them had fruit trees (apple, pear, plum, cherry, kiwi and fig trees). Some worked with breeders to had animals on their plots (ewes, chickens): animal workshops were a way to found autonomy in their technical system (manure) but also in their food for reach self-sufficiency (animal products).

Table 4. Production systems in addition to market gardening. Numbers represent the number of market gardeners engaged in the additional productions, out of eight in the total sample.

Orchard (5)	Berries (4)	Plants (3)	Chickens (2)	Processing (2)	Flowers (1)	Christmas trees (1)	Lambs (1)

3.2.2. A work organization in line with personal ventures

According to the interviews, market gardening was a reconversion for the market gardeners. Could we talk about reconversion for Paul who is double-active year-round? I understood it was more the expansion of the family garden than the establishment of a new activity. For him, the first goal was to produce food for himself, and then to sell the surplus, like the "*peasantry of the past*". Behind the majority of the installations, I observed that there was a political approach linked to ecological convictions. Thierry went from being a breeder to a market gardener *"I started with cows and all my life I fought to feed cows, now I have decided to feed people".* Like Thierry, Julien started late "*with a whole first professional life where I had a good income and a family situation that allowed me to do so".* For the youngest gardeners, it was often after a high degree*,* Joseph said *"I graduated as an energy engineer, I worked for two years as an engineer. I immediately felt the need to work outside, to do a useful job*".

From interviews, I identified various reasons for choosing to settle in the mountains: stayed close to the relatives, to relocated food to the area, to being self-sufficient and to enjoyed a pleasant living environment (access to nature). The majority of market gardeners lived a simple life, with few big expenses, that's why they were not looking for a big turnover. The purpose of micro-farms is not to maximise profits, but to lead a life in accordance with convictions and

needs (Morel 2016). Then, having free time was one of the wishes that was often expressed. For example, single active market gardeners choose to rest in January or February.

After installation, the majority of farms remain linked to the agricultural structures that accompanied them (Soukup 2020). The market gardeners point out that it was essential to train, to meet other market gardeners and to exchange with the agricultural structures of the territory. Some of them get helped from the *AFOCG*[12] in terms of compatibility, others regularly exchange with the *SAFER*[13] (Land development and rural settlement companies), and some were members of unions or associations. Some considered these structures as real partners in the implementation of their project. Nevertheless, half of the market gardeners underlined that the road was an obstacle to participate in the events of the agricultural structures, the car journeys were expensive and longer in the mountains.

3.3 Analysis of the characteristics of local market gardening in mountain areas

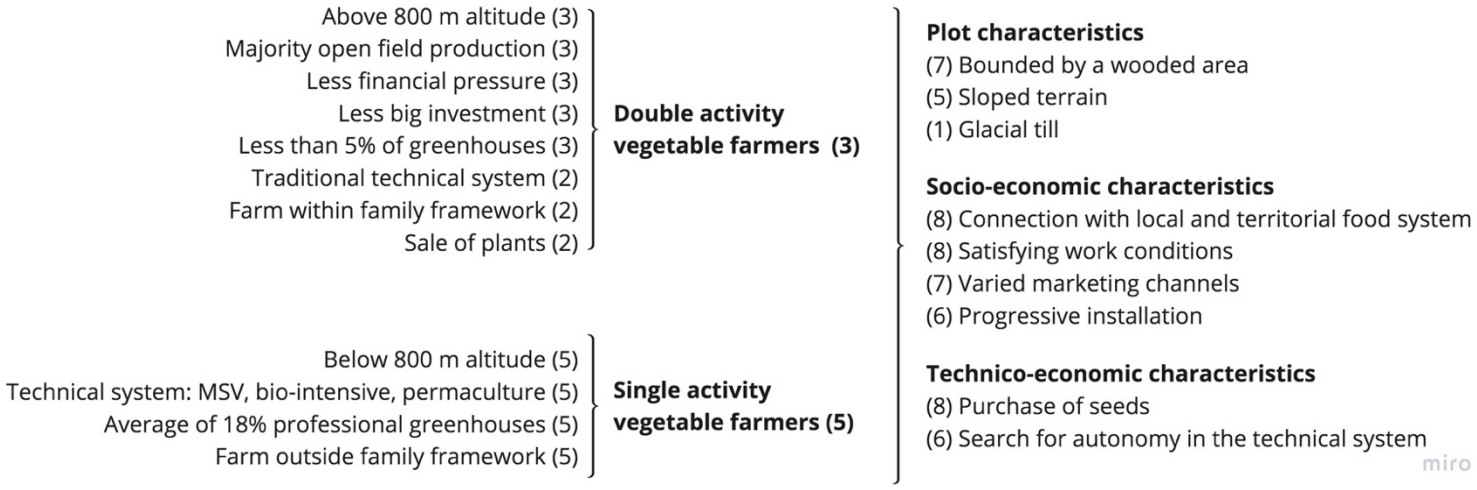
The results show that at the farm level, the practice of market gardening created a diversity of crops, which could be a source of resilience and autonomy for the market gardeners. In this way, these production systems based on proximity and diversity can be seen as taking part in a global agroecological framework (FAO 2018). Within their farms, the market gardeners created synergies and circularity between their complementary production systems, such as vegetable gardens, orchards, chickens, and other animals. At the territorial level, the market gardeners were concerned with participating in the local economy, and developing solidarity with local residents through direct sales. These actors shared their knowledge for agroecological innovation within the framework of a farmer's collective, the Economic and environmental interest group (*GIEE*) on the *maraîchage sur sol vivant* (market gardening on living soil *MSV*).

The characteristics highlighted two types of models: the double active market gardeners in the mid-mountain area, and the single active market gardeners in the low mountain area. The results show that the isolation of some farmers led them to seek autonomy in their technical system (for example by using local organic matter and manure, low motorisation, propagation of plant starts). Nevertheless, none of the market gardeners saved their own seeds, even though

[12] AFOCG: Association de Formation Comptabilité et Gestion (Accounting and Management Training Association)
[13] SAFER: Sociétés d'aménagement foncier et d'établissement rural (Land development and rural settlement companies)

the mountainous region context is a very specific growing context. This raises questions about the interest in reproducing seeds adapted to the mid-mountain region, in particular for the *Solanaceae* family.

Figure 6. Characteristics of double-activity market gardeners[14], of which eight were interviewed. Numbers represent the market gardeners that correspond with the different characteristics.



In fact, the practice of market gardening in the alpine valley is more complex and costly than elsewhere. The mountain topography amplified the pressure on land, and the agronomic and climatic constraints (slope, frosts, depth of soil) did not attract market gardening projects. The results show that the installation of market gardeners in the valley has been facilitated by the family framework or by political structures (Terres de Liens[15] and municipalities).

Under what agronomic and economic conditions is market gardening microfarms in mountains possible? Key factors were highlighted by the market gardeners:

- Growing on flat or slightly sloped terrain (maximum 20% slope)
- Adapting the cultivation calendar to the weather conditions
- Growing adapted crops
- Organizing outlets adapted to the production

[14] In the figure, I considered Alexis and Antoine as single active gardeners because they are starting their activity, and they was "temporary" double active.
[15] Terre de Liens: French citizen movement with ambitions is to remove the burden of land acquisition from farmers, as well as to work towards the preservation of agricultural land (*terresdeliens.org*)

- Facilitate physical work (maintaining sloping areas with animals, perennial crops, increasing crop density)
- Work in double activity or additional workshops in medium mountains (from 800 m altitude)

Indeed, there are no precise scientific figures for the minimum agricultural area for the economic viability of a micro-farm in the mid-mountain region, given that it is based on double activity. However, according to the two market gardening technician (*ADAbio, CA73)* the minimum size would be 1.5 ha to 8000 m2 of net cultivable area "*with greenhouses*" for the economic viability of a single active market gardeners.

According to the interviews, the economic viability of micro-farms relied on direct sales. I observed with the commercialization modes that some double-activity market gardeners are less concerned about profitability, but also that there is not enough of an outlet for their storage vegetables on the market, which leads them to sell their production to collective catering, local shops or to turn them into soup. In fact, the literature highlight that these outlets are limited because the demand represents a niche of consumers (Vonthron 2021). The interviews showed that in certain territories these outlets are saturated and do not allow the establishment of new market gardeners. This is why some market gardeners mention the need to set up an adapted vegetable supply chain that would supply the region more widely (supermarkets, restaurant owners, collective catering). According to the literature, a sustainable agri-food project must be based on an economic dimension to redistribute fair value to producers. The exchange must be based on functional proximity (fewer intermediaries), geographical proximity (less distance) and relational proximity (commitment to shared quality) (Gatien-Tournat, Fortunel, Noël 2016).

3.4 History of vegetable production in the *Beaufortain*

In the interviews, a certain scepticism was present among local actors towards the development of market gardening in the mountains, which is why this study used a timeline (Appendix 1). I developed this timeline from non-directive interviews with four retired farmers and with the help of the literature (De Varine 2006). This work of recontextualisation was the anchor for understanding the current context, and being able to talk about the local history with the local elected officials.

The timeline analysed the key moments in local development linked to the evolution of agriculture in the Beaufortain region and provided a temporal vision that allowed us to visualise the cause-consequence relationships (Bergeret et al. 2015). It has been thought out around key events and major social dynamics with the evolution of the agricultural production system in relation to land use as the central element. It allowed the study to identify three main periods:

- 1950s - 1965s: traditional period with subsistence farming, intergenerational lifestyle, diversified livestock and crops, value of ploughing, barter and exchange, creation of the CAP
- 1965s - 1985s: value of money, beginning of mechanisation, anchoring of the dairy cooperative (*COOP*), PDO Beaufort, establishment of agricultural structures, development of associative life, specialisation in dairy production, rural exodus
- 1985s - 2022s: expansion of farms, arrival of large-scale distribution, individuality of the population, decrease in the budget dedicated to food, decrease in the number of farmers, development of short circuits, new types of agriculture, land pressure, appearance of droughts with climate change

The Beaufortain was a territory "*where agriculture was rich, that's why development came later"* explained a breeder. Until the 1960s, people in the mountains lived in isolation, with little dependence on external resources. Most families were at the same time *"farmers, stockbreeders, cheese makers, butchers, hunters, but also carpenters, cobblers, lumberjacks, carpenters, basket maker"* (Rousselot-Pailley 2012, p.2). The farms were polyculture-breeding on a small area, with diversified breeding and crops. In the summer months, the families helped each other with the work in the fields (mowing, haymaking, threshing cereals etc.), and ploughed the slopes by animal traction or by hand to produce cereals (barley, rye, oats, wheat), potatoes or beetroot. There was a harmony between the cycle of the seasons, the populations and the animals. As for the cultivation of vegetables, *"we have never used the term market gardening, but historically we have always grown vegetables, even on a large scale"* explained a market gardener. For the breeders, it was common to have a plot of potatoes, on the sloped terrain, the soil was raised using a manual technique. "*Each family tended to have its own potatoes. I would say that there are still a third of the farmers who still do it, ploughing a piece for potatoes. They rotated the meadows, then the potatoes at the head of the crop rotation"*

mentioned another market gardener. As for fruit trees, there was mainly quince, apple, pear, plum and cherry trees (Rousselot-Pailley 2012).

In 1957, Joseph Viallet and his group created the Beaufortain dairy cooperative, a joint project that came into being in 1961. The cooperative helped rebuild agriculture after desertification and the creation of dams. Maxime Viallet explained that "*the real solution for society and for mountain agriculture is to establish farmers as partners and craftsmen of nature to make quality products*" (De Varine, 2006, p.51). In 1968, it was the creation of PDO on the Beaufort cheese (demanding specifications, image linked to mountains and alpine pastures, gentle use of animal breeds).

The 1960s and 1970s saw the beginning of mechanisation, with the arrival of the motorised mower, which made it easier to mow on slopes, while specialised tractors led to the abandonment of mowing on difficult terrain in favour of grazing. In 1961, the establishment of the dairy cooperative facilitated the work of farmers and intensified milk production, with farms specialising in livestock and grass cultivation (Bergeret et al. 2015). At the same time, the political context favoured intensive agriculture with the creation of the CAP and the development of the agri-food sector. In the Beaufortain valley, large-scale distribution was established in 1992. The budget dedicated to household food is decreasing, as are the vegetable gardens.

Since the 2000s, droughts have multiplied, while at the same time there has been an increase in ecological awareness at the citizen, agricultural and political levels. The 2000s saw the arrival of farms specialising in goat and sheep farming. In 2019, in Beaufort, agriculture employed 9.3% of the population, which represented 55 active people (*Insee 2019*). The *Beaufort cheese* is "*a niche market that has allowed us to stand out*", explained a farmer, ensuring a good remuneration for the farmers. Currently, the farms were constantly growing with the arrival of joint farming groups (*GAEC*[16]) and the intensification of specialisation, nevertheless, the average herd is 30 cows. The support of small farms was one of the subjects that mobilises the local political sphere of the Beaufortain. This dairy specialisation had its limits, because of the enlargement of farms and motorisation, the sloping land was less well maintained, sometimes left uncultivated, and retired farmers explain that *"the landscape of the*

[16] GAEC: Joined agricultural group

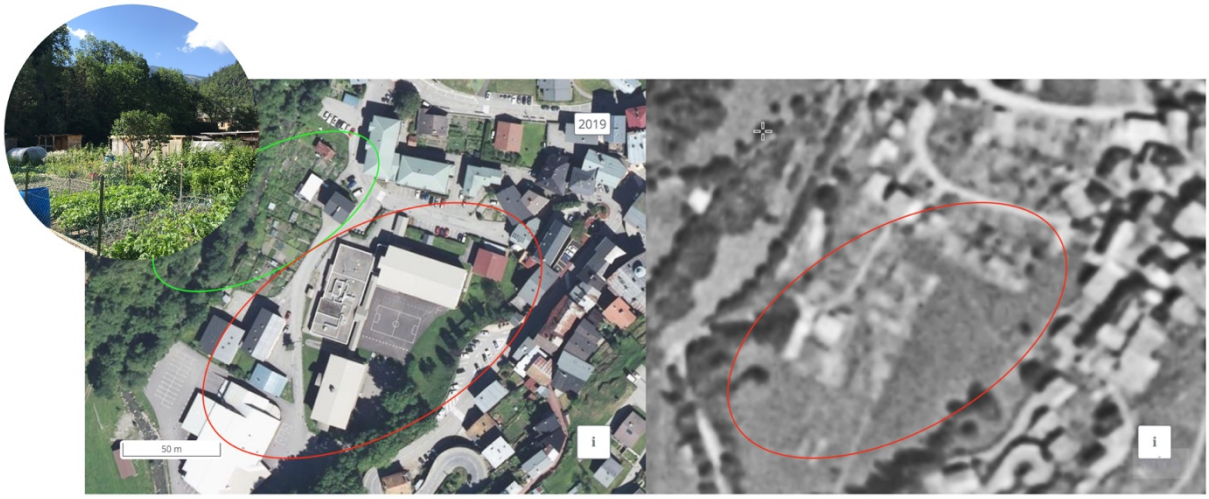
valley has changed". The abandonment of the peasant way of life to leave room for leisure with the development of ski resorts, and for associative life. According to one mayor,*" In 15 years, the tonnage of Beaufort had increased from 3000 to 5000 tonnes in 2021".* According to the president of the *COOP, Beaufort cheese PDO* is "*mature market that can increase by 1 to 3% per year, no more, this increase is held by genetics, but not by the extension of the surface area because everything is occupied*". The *COOP* is quite strict on the increase because it was a niche market.

In 2020, the Savoyard valleys had 470 wine growers, 77 horticulture and nursery companies, 220 market gardeners, 150 tree growers and 19,600 ha of cereals. We could speak of diversified small-scale plant production (Chamber of Agriculture Rhône Alpes 2020). In 2022, there are 250 market gardeners in Savoie and Haute-Savoie "*of which 30 make 90% of the turnover"* explained a technician from the Chamber (*CA73*). The agricultural structures (*ADDEAR, ADAbio*[17]*, CA73*) feed a dynamism towards the development of market gardening in Savoie. Since 2020, there are two double-active market gardeners in the Beaufortain. Paul in Queige in 2016, Thierry and Sophie in Arêches-Beaufort in 2020. These installations have enabled the central kitchen in Beaufort to start being supplied with local open field vegetables. The *Projet alimentaire territorial (PAT)* has facilitated the installation of citizen initiatives such as the "Croq'Local" grocery shop and there is a weekly farmers' market in Beaufortain Valley.

In addition to a supply from conventional shops, I have observed that some families still had a vegetable garden. Some store their winter vegetables in the cellar, others use recent techniques such as sterilisation, freezing or lacto-fermentation. Historically called the "*cortis*", there have always been vegetable gardens in the Alpine valleys: "*potatoes, carrots, onions, shallots, leeks, lettuce, radishes, celery, red beetroot, chard (or poir), pumpkins, courgettes, squash, spinach, green beans, cabbage, tomatoes, parsley, basil, raspberries, blackcurrants, redcurrants, strawberries and rhubarb*" (Rousselot-Pailley 2012 p.2). To illustrate, here is a comparison of two aerial photos of Beaufort town centre between 1950-1965, and 2006-2010. The college had replaced the private gardens, except for a small part (green circle) which continues to be cultivated.

[17] ADAbio is an association created in 1984 for the development of organic agriculture in *Savoie,Haute-Savoie, Isère and Ain.*

Figure 7. Vegetable gardens of Beaufort town centre 2019, 1950-1965.
Source: Aerial images - IGN go back in time



3.5 Social and political context of the *Beaufortain*

A circle of inhabitants showed a strong desire for food autonomy, initiated by *MAESTRO*[18]*(*Tutored active placement and use of engineering tools), a study carried out in 2015 on local food in the Beaufortain, titled *"What we produce and what we consume in the Beaufortain"*. The majority of the stakeholders interviewed specified that the food autonomy in the valley was utopic, because it did not seem possible to meet the needs of the current population. The study observed a real societal expectation for food systems relocalization, and therefore an encouragement from the State by creating mechanisms to achieve these goals. According to the head of the Savoie *DDT* service, "*state funding encouraged innovations that present new agricultural practices through the deployment of various projects financed by the FEADER*[19] *or the CAP"*. However, according to the market gardening technician from the Chamber of Agriculture *(CA73)* there were few resources given by local authorities to communal market garden projects, the reason why market gardeners respond less to calls for municipality projects. He also highlighted a problem of communication between the elected representatives and the market gardeners.

According to a mayor in the region, market gardening in the valley was not incompatible with current systems, "*but it must be co-constructed, and seen as an initiative that does not disrupt existing agriculture; we produce a quality product with local resources, but we are also*

[18] MAESTRO: A group work (6 weeks) of students which consists in responding concretely to "real cases" given by organizations of the agricultural and agri-food sectors. The students benefit from material resources and methodological support from Isara teachers (Isara.fr)
[19] FEADER: European Agricultural Fund for Rural Development

capable of producing locally, to feed ourselves, products that correspond to the needs of the population and that we explain that there is a coherence. It has to be concerted and argued so that it is accepted by everyone". Everyone had to find an interest for it, in order to work in the long term. In *Savoie*, the commune of *Bourg-Saint-Maurice* would like to set up a communal market garden and asked the *SEA*[20] (*Syndicat d'économie alpestre in French*) to play a mediation role with the Beaufort defence syndicate, explained an elected official. This example illustrated that to take action, the establishment of market gardening required a real dynamic of political, scientific, agricultural stakeholders.

A mayor specified that it was necessary to anticipated the food transition, which was initiated with the *Projet alimentaire territorial (PAT)* in *2020.* The *Arlysère PAT* was built around 7 axes[21] aiming at relocalizing the food system and proposing quality food for all, defined in 27 objectives including short, medium and long term actions. The *PAT* was conducting a logistical experiment that brought together a set of actors (market gardeners and dairy cooperatives) to supply collective catering using existing operators. The PDO cheese was privately funded by cooperatives that manage a common good, and it was necessary that they answered together to the food issues of the same territory.

According to the interviews, there was a lack of political support for the establishment of market gardening. *"I am asking politicians to open their eyes to possible scenarios in 20 or 30 years' time, elected representatives must want to dream about something else, and it must not be purely economic"* explained the director of *ADAbio*. For three agricultural stakeholders, there was a lack of training for elected officials on agricultural issues, and therefore a lack of anticipation related to future energy and climate issues. They emphasised the need for a network between agricultural and political actors so for created an intelligence between all the operators in order to be able to think about agriculture over a certain period of time. All the local elected officials were aware of the climate issues, but the study identified a cultural barrier linked to the agriculture in place and other concerns that did not favour market gardening. For two mayors, there was no opposition but no desire to install a market gardener on communal

[20] SEA: Association who works to keep alpine techniques and culture alive and evolving in harmony with urban centres. It bases its action on human activity in the mountains and the three fundamental elements of grass, water and trees. (Echoalp.com)

[21] The strategic orientations of the *Arlysère PAT:"* Encourage the development of quality agriculture: Continue the structuring of short circuits in collective catering: Promote the use of local quality products within the tourist industry: Raise awareness/educate people about healthy: Quality food and fight against food insecurity and encourage the accessibility of quality products for all" (rnpat.fr)

land. Elected officials point out that the existing dairy-cattle context should not be *"destabilized"* and that the commune did not have control over the agricultural organisation of the area. According to a mayor, agricultural projects were thought out and reflected upon by the farmers, there has been a rupture between the agricultural world and the rest, and above all a divorce between ecology and agriculture.

An elected official and the president of *GIDA*[22] (Farmers groupement Intercommunal de Developpement Agricole) explained that the "agglomeration policy" was not aware of the agricultural problems of the valleys, *"We may have 300 or 400 metres of difference in height, but we are not in the same world, we have different constraints, it is difficult to be in a two-speed agglomeration"*, said an elected official. However, the *Arlysère PAT* aimed to create action frameworks adapted to the municipalities in the form of small internal systems with local synergy with local actors.

How to strengthen the links between territorial actors? An agricultural actor specified that the *PAT* should work in collaboration with the *PLU*[23] because "*it is by multiplying exchanges that the territory will manage to adapt to future challenges"*. All levels intersect, *"there must be intelligence between all the operators"* explained the *PAT* project leader. In fact, local elected representatives and agricultural actors from all sectors must worked together with the *PAT* to meet the challenges of food relocation.

3.5.1. A territory where livestock farming predominates

It was observed that the *Beaufort cheese* was considered as a stable foundation based on agriculture adapted to the resources of the area. There is no question of criticising this model, but rather of questioning its capacity to reinvent itself by taking into account current issues related to food relocation.

According to the majority of the stakeholders interviewed, the *Beaufortain* is an area of livestock farming that was not destined to be transformed into a market gardening area. The local elected representatives affirmed that the dairy cooperative was a strength for the territory, a powerful collective tool that maintained the economic viability of the farms in place. Behind the cooperative, there were economic and human issues that must not be destabilised, "it is the

[22] GIDA: Groupement Intercommunal de Développement Agricole in french
[23] Plan local d'urbanisme (Local urban planning)

first private employer in the valley". The *Beaufort PDO* is a mature and niche market, but still quite fragile for some elected reprentatives. It is a sign of quality with restrictive specifications that required a high degree of forage autonomy, which is why it mobilised the majority of the available agricultural land. In this hyper-specialised agricultural context, there were fewer and fewer small farms. This explained that the local political preoccupation was not focused on the development of local market gardening but rather on supporting the takeover of small individual dairy farms.

Figure 8. Agricultural surfaces dedicated to estive heath and permanent grassland in the Beaufortain.

Source: Observatoire des Territoires de la Savoie 2019

The *Beaufortain valley* is visited for its scenery and its agriculture, as preserved landscape. For some local elected officials, professional market gardening was synonymous with greenhouses. In interviews, one politician questioned the presence of greenhouses: *"It would damage the landscape of the valley, we must not force crops that have no place here"*. Furthermore, the majority of political and agricultural stakeholders explained that there was a lack of economic relevance in growing vegetables professionally in an area where the price of milk was very attractive for farmers. The agricultural actors explained that the political context was not very favourable for the development of small vegetable farms.

In the context of price inflation, a local elected official perceived the limits of *Beaufort cheese*, *"people tend to go for less top-of-the-range products, if there is a need to make choices and go*

for the essential, it is a bit dangerous for the territory". In order to build a more resilient territory, two agricultural stakeholders think that it would be necessary to move towards more agricultural diversification, without disrupting the existing agriculture. According to the head of services at the *DDT,* the diversity of farm models allowed for a form of territorial resilience. Could a dairy farm be used for market gardening? It could *"be a complement, depending on personal desires. Having a market garden plot requires physical and manual labour, and if it is not properly remunerated, it is not sustainable"* said a breeder *(also GIDA President).* Currently, his farm had to pay back investments and he had no time to devote to market gardening, however he said that this could be a development option for the future. The president of the *COOP (*Beaufort dairy cooperative) explained that farms "*tend to specialise more and more, if you want to have something economically viable, you have to concentrate on one activity".*

From the interviews, the study found that the dairy hyper-specialisation on the territory was a controversial factor for the development of market gardening. It could be a lever in the development of market gardening or a real barrier if certain agricultural actors oppose this innovation. Nevertheless, an economic balance will have to be found for it to develop.

3.5.2. Land ownership and access: tension between farmers and non-farmers

According to the majority of stakeholders interviewed, the limited agricultural land that existed in the valley of *Beaufortain* was "reserved" for the production of milk to produce *Beaufort* cheese. Furthermore, it was reported that it was difficult to find space for other types of agriculture than breeding and milk production in this mountainous area. Some actors considered that adding a new type of agriculture could create even more tension in agricultural land use, and that the square meters of agricultural land available were favorable for raising cattle to make *Beaufort* cheese. Nevertheless, all the local elected representatives that were interviewed questioned the intensive presence of Beaufort: *"The priority is Beaufort cheese but that could change"*, mentioned a local mayor at the level of municipality. In the *Beaufortain*, the pressure on land use was related to the existence of small, disparate parcels. This meant that the landowners had fragmented plots, making it difficult for farmers to purchase and secure land.

Multiple actors interviewed mentioned that the ideal land for market gardening was also strategic land for established agriculture. In the studies survey of market gardeners, a link

was observed between the land used for market gardening and what was considered 'poor quality' land. New farmers in the territory were often located on land that was difficult to farm. The mountainous topography created strong competition for access to land on flat areas. Agricultural technicians in the territory pointed out that cattle farmers could not afford to lose space for their hay production, as this would jeopardise the viability of their farm. The valley bottoms were easily mechanised, giving these zones high competition for agricultural use. The study observed, they were most occupied by livestock farmers. When not occupied by livestock farmers, these lands were often developed into residential zones. A specialist on the *Beaufortain* territory employed by the French Land development and rural settlement company (*SAFER*) indicated that the main non-visible consumption of agricultural land was parcels that were sold with vacation homes to private individuals.

According to the specialist at *SAFER*, communal land[24] for agricultural purposes and sloping plots would be the spaces that could be freed up most easily. For example, the communal land of Beaufort (where the action-research is oriented) is rented from year to year by a breeder to the commune, the breeder uses this plot to make hay. According to the local mayor, "*if we take away land from a breeder, we have to find him the same surface area elsewhere*". This verbatim raises questions: Does the mayor have to find another forage plot (in line with the *Beaufort cheese* specifications)? Is this a tradition or norm specific to the *Beaufortain*?

In the *Beaufortain*, this would be the municipalities with many hillsides that are not maintained, meaning more available and less desirable land. Two municipal elected representatives specified that they had difficulty finding farmers who were ready to maintain the hillsides, and thus wondered about the development of these sloped terrain. They mentioned a possibility to produced small fruits and berries, in order to *"turn our handicaps into assets*" said a mayor.

To gain farmland, the mayor of a local municipality discussed the possibility of clearing forests. However, the head of services at the Departmental territorial directorate (*DDT*) pointed out that these were forests with high environmental value, related to what exactly? This clearing could be done on the margins, but it was not so obvious and very expensive.

The creation of Local Installation and Land Committees (*CLIF*) in 2020 in the surrounding department, *Savoie,* presented new opportunities related to land use, access, and the

[24] "Communal property is undeveloped land, which belongs to the private domain of the communes and, according to Article 542 of the french Civil Code, to the property or proceeds of which the inhabitants of one or more communes have an acquired right" (Senat.fr)

conservation of agricultural lands (*Communauté de communes Cœur de Savoie*, 2022). According to two actors interviewed (from *ADDEAR* and *DDT Savoie*), the *CLIF* committees were places to gather multiple actors in the sector, to discuss and mediate issues, to anticipate the cessation of farmers' activities, and to take into account the size of farms and the needs of each exploitation. In addition to the appearance of *CLIF*, a *Savoie* agricultural land use group (*GFA*[25]*, Groupement Foncier Agricole des Savoie*) with 39 farmer[26] partners was created in 2022 in order to protect agricultural lands. The aim of *GFA*, composed mostly of cattle breeders, was to raise funds to invest in agricultural hectares and thus facilitate the creation of farms or strengthen existing ones (Casanova 2022).

3.5.3. Characterising local demand by considering complementarity with the plain

First, the plain refered to the low mountain of the *Arlysère* Agglomeration (*Albertville, Ugine, Grésy sur Isère*). According to the majority of stakeholders interviewed, it was necessary to think on the scale of the agglomeration for the production of local vegetables. How local was a vegetable? This question was often raised in the interviews. The person in charge of the mission *PAT* explained that "*local means the* Rhône-Alpes *region and the border departments for collective catering organisations*". This point of view considered vegetables from the Beaufortain to be ultra-local. This remains a definition that belongs to everyone.

During the focus group, residents and local elected officials agree that it was important to have a detailed knowledge of local needs before setting up market gardening in the valley. What outlets for what needs in the *Beaufortain valley*? According to the local elected officials interviewed, they did not have a clear idea of the local demand for vegetables. They pointed out that the autonomous production from the garden of the inhabitants should not be neglected, "*the outlets are limited because there is already a citizen production"* mentioned one mayor. Was it one of the reasons for the professional marginality in the valley?

Multiple actors interviewed mentioned that the context was attractive because it was a territory with high purchasing power and a year-round tourist population. According to market gardeners interviewed, there was a strong purchasing power in the *Beaufortain* valley which allowed them to promote their production on the markets *"where selling is easy and there is*

[25] The GFA is a Société Civile Foncière whose purpose is the preservation of agricultural land.

not much competition" said a gardener. The market gardening technician from *the Chamber of Agriculture (CA73)* specified that early vegetables arrived later in the mountains, and consumer habits have changed, the population looking for diversity and regularity throughout the year. It was observed that some market gardeners from the plain sold their vegetables in the valley because they had the early vegetables before the mountain market gardeners. Some stakeholders mentioned that the complementarity with the plain for the sale of local vegetables is well established and left little room for the development of market gardening in the valley.

From interviews, I understood that there has always been a complementarity between the valleys and the plains for agricultural production. The president of the *COOP* (*Beaufort cheese* dairy cooperative) and some elected representatives mentioned that the proximity of the plain for vegetable production was more suitable than bringing vegetable production back to the valley. However, the interviews with the market gardeners pointed out that there were territorial disparities. Julien cultivated in the plain and he explained that there were six market gardeners and that the customers who eat organic and local produce are satisfied. *"The next market gardener who wants to set up will have to think carefully about his outlets"*. Depending on the sector, the installation of market gardeners could even pose a problem. According to the market gardening technician from the Chamber of Agriculture (*CA73*), the vegetable sector was marginal and lacks structure and organisation, unlike dairy or meat sectors in *Savoie*.

According to two agricultural stakeholders, the consumption of local and organic vegetables concerned a niche of the population, which explained a rapid saturation in rural areas for this outlet. An elected official and the president of *GIDA*, local market gardening posed a problem for society, as the household budget for food had decreased significantly. *"The agricultural sector will reconsider its position on the subject when the proportion of the household budget devoted to food will really increased* (…) *There is a delta between what people say and what they actually do, there is a demand for local products, but the Covid crisis has shown that there is a high level of consumer volatility"* explained the president of *GIDA* (also a breeder). According to one mayor, one solution could be to offer food stamps to local agriculture. During the focus group, some inhabitants shared a lack of citizen dynamism towards initiatives such as the *CSA* or the Queige farmers' market. The *CSA*, for example, has stopped due to a lack of volunteers to run it.

During the focus group, the inhabitants perceived the supply of food for collective catering as a lever for the development of market gardening in the valley. However, four agricultural actors

(CA73, ADAbio, ADDEAR, COOP) and two elected representatives mentioned that this was a complicated market to approach. According to the market gardening technician from the *Chamber of Agriculture (CA73)*, it was not the cost of the product that posed a problem but its processing. The collective catering industry received processed vegetables, and there was no longer the space and knowledge dedicated to processing raw produce. Another barrier is taking into account the local vegetables available; in most central kitchens, menus were drawn up two weeks in advance by a nutritionist. Then, it was an outlet that did not give enough value the production for the market gardeners met. According to an interview with the cook at *Beaufort College*, the collective catering industry had obligations to buy from public markets, which have more accessible prices, which is why they cannot give preference to local producers. Then, the peak of production is during the summer when the canteens are closed.

From interviews, I understood that the central kitchen in Beaufort, which supplies two schools and the college, was in a "fragile" situation. However, I identify the maintenance of the Beaufort central kitchen as a lever for the development of market gardening in the *Beaufortain* valley. According to the person in charge of the mission *Arlysère PAT*, the departmental policy aimed to enlarging the kitchens located in strategic places in the plains to facilitate the supply of small canteens, and guarantee a reduced cost.

3.5.4. Social functions of market gardening

According to the interview with a market gardening technician at the *Chamber of Agriculture* (*CA73*), there was a new agritourism dynamic based on market gardening, music and catering in the *Maurienne* valley, *"it's a farm that is reinventing itself with multiple workshops"*. These social functions of market gardening in the valley were supported by some of the political actors interviewed, who are nevertheless reluctant to adopt the micro-farm model for agricultural production. For example, two mayors would encourage shared gardens in the valley rather than professional production. Multiple actors interviewed perceived market gardening in the mountains as a complementary and educational activity. According to the director of *ADAbio*, *"market gardening in mountain areas will not be a production that will lead to autonomy, but it has its place in the educational aspect, there was a gardening knowledge that is being lost, and it would be relevant to accompany the inhabitants in their production process"*. According to the market gardening technician from *ADAbio*, there was an educational desire on the part of the municipality when they set up a communal market

gardener, but she pointed out that an external facilitator is needed to manage these educational workshops because it was not up to the market gardener to organise them.

3.6 Analysis of the barriers and levers for the development of market gardening in the *Beaufortain*

The development of market gardening projects in the *Beaufortain* valley raised questions among the majority of stakeholders, even though there was a citizen desire to develop sustainable farms agriculture which supply food locally. At the end of my interviews, I wondered: Is it relevant to produce vegetables in the *Beaufortain*? According to the majority of the interviews, the vegetable production in the valley should not be a dogma because it will be limited.

Table 5. Barriers and levers identified by political and agricultural stakeholders.

	Barriers	**Levers**
Political	Access to agricultural land Lack of visibility on the demand for local and organic vegetables Cost of local and organic vegetables Impact of greenhouses on the landscape Collective catering (production peaks in summer, lack of staff training, lack of profitability for producers) Food vegetables production of local people	Co-construction with the dairy sector Moving towards a diversity of farm models Encouragement with state schemes (*PAT, CLIF*) Opening up to sloping land
Agricultural	Access to agricultural land adapted to market gardening Specialisation of dairy farms	Crops with low surface and water consumption Supporting open dairy farms in diversifying into market gardening

	Lack of structuring of the local market gardening sector Little means given by the communities Meteorological and topographical constraints Physical constraints of work Fewer project leaders in medium-sized mountains Locks and monopoly of the agri-food industry Ideological and cultural positions of certain agricultural actors and politicians	Cooperation between market gardening activities A touristic market gardening

The *Arlysère PAT* implemented in 2020, shows that we are at the beginning of the relocation of the food system. Moreover, I perceived that the local political sphere's desire to develop market gardening was still rather weak. From interviews, I understood that the monopoly of the dairy sector creates a lock in which hinders the agricultural diversification of the territory. The coexistence of agricultural models was complex, mainly because there is a lack of economic relevance in producing vegetables, while *Beaufort cheese* was very well valued. This complexity was reflected in a divide between stakeholders interviewed: there are those who perceived an incompatibility of agricultural diversification and others who considered that it was possible on a small scale to move towards a form of food relocation. This economic aspect left little agricultural land for market gardening. Regarding one of the new land use structures in the territory, the *GFA* group was composed of mostly cattle breeders, and therefore might not leave room for other types of farming in their initiatives for investments in agricultural land. This therefore was not a promising group to involve in activities for the diversification of the agricultural landscape.

3.7 What next? Action-oriented elements

Based on grounded theory, I used the individuals interview data to construct the group interview. Indeed, we discussed some of the barriers identified during the two research cycles. In an action research approach, the group interview allowed me to determine concrete action levers, especially to build a feasible scenario for the communal site.

3.7.1. Short vegetables food chain

The focus group highlighted the inhabitants' expectations for the development of local and organic market gardening. Acccording to the market gardener, there are accessible outlets, such as supplying restaurants and refuges, which consume large quantities of open field vegetables (potatoes, courgettes, onions, salads, etc.) during the tourist seasons. He mentioned that the relevance of professional market gardening in the Alpine valley is based on the structuring of a small market gardening sector such as a very short food chain for fresh vegetables, which would take the form of a collective platform (a place for storing raw vegetables) to facilitate distribution in the Beaufortain. This short food chain could be composed of double-active farmers and market gardeners who would produce a quantity of vegetables adapted to the chosen outlets. This would allow farmers to complement each other in terms of production, the pooling of work tools and the sharing of knowledge.

During the interview, I invited the participants identified actions to be taken to develop market gardening:

- Ask farmers about the possibility of providing land or interest in cultivating a plot of open-air market gardening
- Identify available and suitable land for market gardening projects
- Evaluate and characterise the local demand for open-field vegetables from restaurant owners, shelters, collective catering and supermarkets

This idea raised by the inhabitants is to be taken into consideration, however there are barriers at different levels, such as the additional workload that it would require from a breeder, the lack of market gardening projects in mid-mountain areas, or the complex economic dimension of the market gardening activity in the *Beaufortain* valley. That’s why this very short food chain must be part of a framework and federate the local stakeholders for it to be sustainable.

3.7.2. Scenario for the communal site

Main characteristics of the communal site:

- 1.70 ha of agricultural land (total surface)
- Flat land, and sloping plot (30%)
- Orientation (East) favourable to the cultivation of vegetables
- Located in the centre of Beaufort, close to the college
- Existing associative projects on the site: shared gardens (*Aab*) and educational project "*From seed to bread*" in connection with the historic mill (*Association Patrimoine du Beaufortain*)
- Municipal museum project underway in the historic farm (*Municipality of Beaufort*)

According to the interviews and taking into account the characteristics of the site, the possibility of setting up a market gardener with a purely agricultural vocation should be excluded. Firstly, the strategic orientation decided by the municipality for the farm building is aimed at tourism and not at agriculture. In addition, the size of the cultivable agricultural area would leave little room for a professional market gardener, bearing in mind that future developments to make the museum accessible may reduce this area. Then, the presence of professional greenhouses on a tourist site is hardly compatible with the political vision of the site. From interviews with market gardeners, I perceived that the choice of market gardening is often synonymous with a global life project, which is why setting up on a tourist site can be considered as a constraint for the project holders. From the interviews, I identified other obstacles to the installation of a professional market gardener:

- Lack of a definite outlet
- No storage space available
- No accommodation on the farm (cost of living in the valley)

However, from the interviews, I perceived a consensus between the local political and social actors (Municipality, AAB) on the setting up of an educational market gardening in connection with the middle school (Collège in french). First of all, the proximity of the land to the middle school, makes it an ideal place for education in connection with the associative sector (AAB). The financial involvement of the Aab (hiring a nature animator) is essential because it will allow the garden to fulfil two key functions: feeding and teaching. Indeed, the nature animator will not depend financially on the "productivity" of the market gardening, the sale of vegetables

will be a supplement for the Aab. This limited production of vegetables could be sold in the form of solidarity baskets or meet certain vegetable needs of the college.

During the focus group, teachers and employees of the middle school expressed their wish to involve the students in the process of an educational garden, by raising their awareness and communicating on sustainable food and agricultural practices. Moreover, the setting up of an educational garden would meet the priority objectives of a social centre: *"to involve the inhabitants in improving their living conditions, in the development of education and cultural expression, and in the strengthening of solidarity"* (*fede69.centres-sociaux.fr*).

The Sciences teacher (SVT: Sciences et vie de la terre in French) has been involved "fictitiously" by proposing educational sequences in connection with the five themes (See Appendix A). According to him, the garden would deepen students' skills in sustainable development and solidarity. For him, the garden should be scientific, like a mini agricultural experimentation laboratory. He determined some experimentations ideas: comparison of agricultural practices: bed with/without mulching, with/without ploughing, with/without cultural association on vegetable crops; vegetable growth in winter under greenhouse; agroforestry area; seed bank in the library.

Furthermore, the pedagogical garden would create new opportunities for the existing shared gardens. For example, shared events could punctuate the year (gardening workshop, agroecology courses, sharing moments, artistic moments). The educational garden could be conceived as resource spaces reflecting an active citizenship, engaged in the creation of a food landscape, and educating citizens about food and vegetable production.

Figure 9. Photos of the *Site de la Cayère* in *Beaufort* (© Aurelien Ghislain)

According to the literature review by Dupéré Poundja (2021), the implementation of an educational garden is not without obstacles. The main barriers to the sustainability are "*lack of time, lack of staff, lack of knowledge, lack of funding, and lack of space"*. Gardens become successful when they receive interest from teachers, when they have funding, human resources and when they are productive (Dupéré-Poundja 2021). In my case study, the pedagogical garden will have to federate three main actors: *the AAB, the college and the municipality of Beaufort*. To ensure its realization, they will have to work together to find common agreements. The sustainability and relevance of the garden depends on the agreement of the driving forces.

In conclusion, the scenario of an "educational" market gardening appears to be the main action lever of my research to develop market gardening in the valley, if it is carried out, it will also allow to accompany the young generation to project themselves in a change of model.

Chapter 4: Discussion

The agricultural context dominated by PDO milk production was highlighted as a controversial factor in the results section 3.5.1. The conditions for production under the PDO contract

specifications have common elements to certain agroecological principles: herds of cows of local breeds; 75% of the feed in hay and pasture coming from the geographical area (20% minimum in PDO); and other ancestral methods of production in connection with the food culture of the territory (*CDC Beaufort, 2010*). However, these contract specifications are mostly linked to the need for economic profitability, and seemed to restrict the Beaufortain agriculture from "innovating" based on agroecological principles (FAO 2018), such as integrating diversity, resilience, and circular and solidarity economic models.

Given that the contract specifications did not seem to be updated since 2010[27], it is questionable whether they remain contemporary to the current agricultural context. How can territorial actors rethink the possibilities for crop diversification within the production systems that follow PDO standards? What is the role of research in these efforts? After speaking with a diversity of actors, it became clear that there is no single, ideal farm model: the agricultural resilience of the territory is built on the diversity of farming approaches. The results highlight that there were missing links, mostly in terms of coordination and communication, between actors in the existing agricultural sector and those in the development of territorial food governance, such as the *PAT*.

Scientific literature proposes similar realities when it comes to territorial food governance. Based on the present findings and comparisons with relevant literature, the following recommendations are made as possible action proposals for the actors of the territory. Before engaging in these initiatives, the proposals would need to be completed and examined with subsequent studies.

4.1 Initiating multi-partner groups for the *PAT*

During the research and according to the literature (Epaud 2022), I perceived that a difficulty for the *PAT* could be to involve the historical actors in food relocation to avoid a top-down approach, while his is a key partner in ensuring the sustainability of the project. The examples raised in the results reveal that the main condition for the development of market gardening is the association of the multitude of actors around a common objective: to produce, distribute and consume sustainably. Epaud research (2022) highlights the usefulness of a multi-stakeholder governance in the *PAT* based on a food committee open to producers, processors,

[27] Cahier des charges de l'appellation d'origine « Beaufort » - version n°14 du 8/11/2010

distributors, consumers, associations, trade unions, local authorities, researchers and inhabitants. The committee meets once a quarter to discuss various issues. At the same time, task force working groups devise actions to respond to similar issues in my study: available agricultural land to set up a market gardener, improving the understanding of collective catering, or supporting farmers in converting to organic farming. The groups are led by a professional technician *(SAFER, AgroBio, Agenda 21*). Recently, the concept of "*Coopérative habitante du paysage"* (*CHP*) is an example of a territorial project that supports the *PAT* objectives by citizen initiatives and the actions that could result from them. This device is thought as a missing link placed next to and in relation to the institutional (Epaud, 2022). Based on the place-based concept of inhabiting the landscape, this kind of structure could take place in and with the citizen garden in Beaufort to address issues of transition and resilience. In fact, the educational market gardening is the main lever of action in my research, and it would be closely linked to the strategic orientations of the *PAT*. In this sense, Epaud (2022) describes citizen gardens as "*anchor points*" for territorial governance. They become complementary to the institutional objectives of the TAP, where *"civil society sets up [...] its own spaces for reflection and exchange and brings out into the public space the problems it wishes to see solved"* (Montero 2017 cited by Epaud 2022).

4.2 Putting the PDO sector at the service of food relocalisation

According to Napoléone et al. (2022), studying the impacts of covid-19 on French cheese PDOs was an opportunity to question these structures' capacity to be an actor in the food transition of their territory, taking into account the challenges of sustainable development to adapt to future crises. Depending on their level of commitment, a diversity of actors within PDOs may play a role in territorial cohesion, a key aspect in the transition of food systems. This study found multiple levers put in place by the PDO sectors in France, such as the development of new marketing channels, incentives to reduce milk production, and the reorientation of milk collection and production towards other products. In the case of the development of market gardening, the *Beaufort* PDO could accompany and support farmers who wish to cultivate a small plot of open field vegetables to meet local demand. Bringing a market gardening workshop into a non-market gardening farm would be a way of increasing the supply of local vegetables, bringing ecological and economic benefits, and would participate in a better distribution of land because it would be a way of exploiting land not dedicated to market gardening (Maxime et al. 2021). My present research underlines the compatibility between

sustainable tourism and food relocation in the results section 3.5.4. on social functions of market gardening. In a sense, this would mean that the *Beaufort* PDO chain could also be "at the service of sustainable tourism", by also becoming a real economic partner for the *PAT.*

4.3 Micro vegetable farm and sustainable tourism

The *Savoie* region is seeking to invent the tourism of tomorrow (*Demain Savoie Mont Blanc* 2021[28]). In such way, Durrande-Moreau (2017) recommended a strengthening of sustainable tourism of the *Beaufort PDO* in connection with agricultural relocation, not for a return to the past but to help reinvent the territory. Recently, Morel (2021) distinguished a new type of micro farm that often took an associative form with a diversity of socio-cultural activities around market gardening production. In a tourist context, this type of project would allow the citizenry to be considered and would benefit the tourist population, with environmental, economic and social advantages for the territory. These farms participate in a more ecological tourism, and are part of the agroecological transition of the territories. Political support for the market gardening is key element of the sustainable tourism network, it could also contribute to food relocation.

4.3 Limits and reflexion of the study

My research brought together agroecology and a social centre. This reminds us that agroecology has close links with local communities, which are constantly changing. Here, it was the inhabitants who shared their desire to make their territory more "agroecological". The social centre *(AAB*) listened to them by mobilising finances to hire an intern, a student in Agroecology. This step back questions the links between these two phenomena: What are the links between agro-ecological education and French social centres?

However, conducting scientific research in a social centre was not easy. I felt that there was a lack of scientific guidance in terms of methodology. My lack of experience in qualitative research reinforced these methodological difficulties which can be felt in the thesis. The translation from French to English added complexity to the work, which is why some sentences may lack finesse and precision. Furthermore, the collection of data, the analysis and

[28] An open and collaborative process carried out by the Savoie Mont Blanc Agency commissioned by the Savoie Mont Blanc Council, which was officially launched on June 2021, and whose first meetings will be held in early October 2022: https://www.demainsavoiemontblanc.com/

interpretation of facts, is linked to my own vision of the situation, and this can lead to conclusions and interpretations that may lack objectivity. Finally, my research is based on a limited sample of eight market gardeners, which does not allow me to generalise the results. Moreover, I consider that one of the main limits of the study is the reduced vision of the agricultural actors and farmers of the *PDO Beaufort* dairy sector. Furthermore, I would have liked to have met the actors of the large-scale distribution of the *Beaufortain.* I consider that there is a lack of interviews with these actors.

I have chosen to share my results in the form of a summary document in French at the *Aab*. It will contain the main results and an action plan for the learning garden. In addition, an oral presentation is organised in front of the stakeholders and the inhabitants.

Chapitre 5: Conclusion

In my results, a market garden micro-farm in French mountain area has different characteristics depending on its locality. The altitude has an impact on the meteorological specificities that shorten the production season, which is why some market gardeners are subject to double activity. All market gardeners are characterised by a territorial anchorage defined by direct sales to consumers. They use agroecological technical systems that are a source of resilience and autonomy at the micro-farm level. However, these types of farms are still underdeveloped (case of *Beaufortain*) because the context of PDO *Beaufort* cheese production does not facilitate access to agricultural land, which is costly and complex for the few market gardening project holders. In addition, the demand for local vegetables does not seem to be very high, which does not favour its development. The development of market gardening in mountain areas is more difficult, which leads me to ask myself: Is there room for all types of agriculture in a mountain area? Nevertheless, the results have raised different levers. A better structuring of the market gardening sector on a territorial scale would support market gardening. A reflection on the part of the PDO sector on the diversification of farm models would open up the possibilities. Political support and support from private companies for the development of pedagogical and touristic market gardening would be another lever.

A conference on the food and agroecological transition at the *Assises Territoriales de Nantes* 2022[29] (Nantes 2022), echoed the results of my research questions. According to researcher Catherine Dorot, the *PATs* have enabled a multitude of actors to rethink our agricultural landscapes. Since 2015, the increase in field actions: citizens, scientists and politicians have accelerated the restructuring of territories. Since 2020, we have been experiencing a series of crises that call on us to act in the right direction by integrating the social dimension, with "*the figure of the mayor as the great conductor*", explained the researcher. Nevertheless, a researcher at CREDOC[30] underlines that even if there is a renewed interest in local food, the paradigm of consumer society remains dominant, and the share of precarious people is not able to "do" otherwise. The researchers mentioned that the agro-industry was the missing link in the chain of joint mobilisation of all actors, while there is an over-empowerment of consumers and farmers. Reducing the share of animal protein, mobilising public actors and the agro-industry, encouraging the collective self-organisation of farmers, and educating people about sustainable food are all levers raised to accelerate the food transition. In this sense, the *Beaufortain* territory is at an advantage because its agro-industry is localised and cooperative and allows for local dialogue.

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[29] Nantes Métropole hosted the second edition of the Assises territoriales de la transition agro-écologique et de l'alimentation durable on 12 and 13 September 2022.
[30] CREDOC: Research Centre for the Study and Observation of Living Conditions (Centre de recherche pour l'étude et l'observation des conditions de vie)

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Appendixes

Appendix A. Educational sequences designed by the College's Science teacher

Appendix B. Continuation of the literature review

Micro vegetable farms

Microfarms are defined as alternative systems that run counter to the dominant industrial agricultural model, favouring above all collective ecological and social well-being rather than profit maximisation. Microfarms are part of a territory by feeding a local food system through direct sales. In a logic of non-dependence, there are four sales strategies: vegetable baskets, sales at the farm or in shops, sales at the market, and sales to restaurants or collective catering. The diversity of direct sales channels is part of the dynamic for a 'political consumerism' (Micheletti, 2004 cited by Loisel 2017). In a desire to be territorially anchored, producers invite people to come to their farms, by organising guided tours, agricultural training or by engaging with local associations. During occasional and physical work, they call on the citizen workforce, which makes possible moral support and sharing of know-how by the inhabitants of the territory (Morel and Léger 2016). In the agricultural context, there can be mutual aid between farmers, for the loan of tools, machines or buildings, for marketing, collective experimentation, but also for sharing knowledge (Morel and Léger 2016).

With a view to ergonomic efficiency and economic optimisation, micro-farms require a structured work organisation. The majority do not employ any employees. Those who do choose to hire employees put the health of the employees first, specifying the importance of communication and a good atmosphere as "keys to improving efficiency" (Loisel 2017). The same number of microfarms use volunteers (woofing, trainees) throughout the year, others only during peak production, and others choose not to use any (Morel and Léger 2016). Some market gardeners question the status of volunteer or low-paid workers, as this does not coincide with their definition of the viability of a micro-farm (Loisel 2017). The choice of technical system and vegetable crops grown is therefore linked to the organisation of work. The micro farms choose a system with a high density of crops: 11 of the respondents rotate crops throughout the year, and 6 practice intercropping (Morel 2016). The market gardeners make dead ends because some crops are less profitable than others, such as ware potatoes.

As for the investment strategy, there are a variety of approaches: public subsidies, bank loans, or no external financial support. Among the farmers surveyed, they either chose a progressive investment spread over several years, or they preferred to invest at key moments of development (Morel and Leger 2016). At low cost or high cost, there are those who favour self-

construction and spend less, and those who spend more by buying new products but gain working time. Half of the market gardeners favour buying second-hand, while the other half buy new. (Morel 2016).

By choosing a global life project, farmers place less value on money, they set themselves a turnover target, this minimum varies from 900 € to 1800 € monthly for one person. They do not farm but take care of a small area. They are driven by many things, such as the aesthetics of the living environment, autonomy, knowledge sharing or even flexibility of the time schedule (Morel 2016). The permacultural principle of "observe and interact" inspires some micro-farms (Holmgren 2002 cited by Morel 2016). For market gardeners, spending time observing is essential to understand the ecosystem surrounding their plot, it is an essential element for the good management of the farm. From the observation, comes the implantation of crops adapted to the type of soil (Loisel 2017).

The present research will highlight the characteristics mentioned such as the marketing system, the work organisation, the technical systems, as well as the global life project. They will be in a first grid of analysis at the beginning of the results where we will make the link with the specificities of the mountain: the double activity, the additional workshops and its meteorological and topographical particularities.

Barriers and conditions for the development of community market gardening

Land pressure is identified as a major barrier in the literature. The price of land and the reduction of agricultural land due to real estate pressure weigh on the development of local market gardening. The thesis by Baysse Lainé (2018) "Terres nourricières?: managing access to agricultural land in France in the face of demands for food relocation" questions a new distribution that would aim to take into account the diversity of types of agriculture but also to renew the ways of accessing land. Nevertheless, there are regulations and management tools to protect agricultural land and allow the installation of market gardeners. In the peri-urban area, it would be necessary to identify areas available for local food resources (Maxime et al. 2021). At the national level, the CAP[31] is a hindrance, because it directs land management to the detriment of a local food resource, it favours enlargement, land insecurity, the disconnection between capital, labour and land, or the restriction of uses (Baysse Lainé 2018).

[31] Common Agricultural Policy in Europe

Market gardening requires human and natural resources. Firstly, it needs labour, although it is attracting fewer and fewer workers. Indeed, the low attractiveness of market gardening is due to the physical drudgery added to a significant amount of working hours. Nevertheless, in some cases, it attracts volunteers, and volunteering is considered to be a support and a lever for the installation of agroecological market gardening (Hermesse et al. 2020). In a strained climatic context, market gardening requires water; in peri-urban areas, it relies on water from the drinking network. It remains to invent a new water management system for wastewater. Using the logic of closing cycles in peri-urban areas, there is talk of using organic matter for soil fertility, for example by using agricultural products that are not fit for consumption, which would contribute to a better use of agricultural by-products (Maxime et al. 2021).

The literature describes a global movement to reaffirm market gardening as part of a wave of food relocalisation, initiated by the *PAT* and reflected in an increase in market gardening workshops in rural areas (Loisel 2017). Through the actions of the *PAT*, local authorities are creating a context conducive to the installation of market gardeners. They carry out agri-food projects from production to food. In their projects, the economic stakes are not necessarily dominant; they think above all about structuring an agricultural economy and its local sectors (Serano et al 2021). Cooperation between different actors can help reduce certain constraints linked to the complexity of market gardening systems, but also to structure a market gardening sector on a territorial scale.

In order to support the local sectors, the collective catering outlet is coming up in political and public arguments. However, we can question its real potential, as scientists consider that there is "*a lack of knowledge on how to build sustainable partnerships between farmers and collective catering actors*" (Maxime et al. 2021, p.4). In addition, certain barriers have been identified: the peaks in market garden production (often in summer) are not compatible with the calendar of canteens (summer holidays), the vegetables requested by collective catering are not the most profitable for market gardeners, and local producers cannot guarantee a secure supply (climatic hazards).

As for local demand, the consumption of local and organic vegetables represents a niche. Vonthron's thesis (2021) on the geography of urban food landscapes highlights the logics of household supply: 'budgetary, relational, physical accessibility, efficient, recreational, product,

committed and avoidance'. Local market gardening could fit into the committed and relational logic. In order to develop local market gardening, it is necessary to be aware of the different expectations and needs of households. For a market gardening sector to be sustainable, it is necessary to characterise the demand in order to respond to it in a relevant manner.

The literature allows me to raise questions for my case study: How could dairy farming support the development of small-scale market gardening? Is there a local demand for ultra-local vegetables? The literature higlight new obstacles such as the complexity of selling collective catering and limited local citizen demand. The present research will try to understand citizen demand in a rural mountain area, and will attempt to examine the question of collective catering. The cooperation of actors is considered as lever. In my case study, we will see the actions of the *Arlysère PAT* which are in line with this logic of food relocation with the cooperation of multiple actors.

Appendix C. Interview guide

Guide d'entretien maraichers
S'assurer du consentement (photo et enregistrement de l'entretien, diffusion du mémoire)

1. Pouvez vous me présenter votre parcours ?

Professionnel

2. Motivations
3. Installation HCF (hors cadre familial)
4. Formation / études
5. Expériences professionnelles
6. Compétences

Personnel

7. Identité (nom, prénom, age)
8. Situation (couple, enfants)
9. Activités extraprofessionnelle
10. Milieu rural / urbain

Projet de vie global

11. Maraîchage en zone de montagne, qualité de vie (satisfaction), engagement associatifs, pratiques spirituelles
12. Pouvez vous me présenter la ferme ?

Eléments de caractérisation

13. Âge de la ferme
14. Statut juridique
15. SAU
16. ETP
17. Mode de production (bio)
18. Rendement, quantité produite

Comment s'est déroulée votre installation ?

19. Budget installation, stratégie d'investissement
20. Accès au foncier, accompagnement

Quels ont été les partenaires clefs qui ont maillé et accompagné votre parcours ?

Commercialisation

21. Transformation, canaux de commercialisation, activités sociales.
22. Période de vente, type de clientèle

Organisation du travail

23. Saison printanière, volontaires, aide familiale, rapport au travail (congés)

Intégration

24. Territoire, relation avec les producteurs laitiers (troc), solidarité entre maraîchers, partenaires (ADDEAR, recherche), pollution de l'air
25. Choix techniques en zone de montagne

Système technique

26. Motorisation, surface cultivée en légumes, part de serres (mobile), engrais verts, travail du sol, haute ou faible densité de plantation, association de cultures, fertilisation (fumier local, autonome)
27. Outils manuels (lesquels?), traction animale
28. Source d'eau, techniques d'irrigation

Est-ce que vous vous référez à des sources d'inspirations alternatives comme la permaculture, le maraîchage bio-intensif, l'agriculture naturelle, MSV ? (Schéma de zonage)

Cultures

29. Calendrier de culture, rotation, type de produits végétaux (semences paysannes, impasse, produit d'appel), plantes pérennes ou vivaces, variétés d'arbres, fruits rouges (quel rôle en montagne?), animaux

Est-ce que le système d'agroforesterie maraîchère est adapté en montagne ? (ombre)

Est-ce que vous travaillez à créer des microclimats favorables pour vos cultures ? (haie, buttes rondes, arbres)

Biodiversité

30. Zones refuges pour la biodiversité (haies, mares, vieux troncs, nichoirs, bandes fleuries), relation avec les abeilles (ruches), lien avec vos cultures

Contraintes et atouts en milieu montagnard

31. Spécificités, difficultés, techniques adaptés, savoirs paysans
32. Prédateurs en montagne, principales maladies

Quels sont les besoins en termes de structure couverte ?

Conclusion & ouverture

Si c'était à refaire… qu'est-ce que vous feriez autrement ?

Quels pourraient être les conseils à donner aux jeunes qui veulent s'installer en maraîchage en zone de montagne ?

Guide d'entretien acteurs politiques et agricoles
S'assurer du consentement (photo et enregistrement de l'entretien, diffusion du mémoire)

Objectifs :

- Identifier les freins et leviers au développement de maraîchage
- Caractériser la vision du maraîchage dans le Beaufortain
- Connaître le contexte territorial du maraîchage

Questions acteurs politiques :

- Considérez-vous qu'il y ait une place pour le maraîchage dans le Beaufortain ?
- Quels sont les principaux freins au développement d'un maraichage de proximité dans la vallée du Beaufortain ?
- Quels sont les principaux leviers au développement d'un maraichage de proximité dans la vallée du Beaufortain ?
- Selon vous, jusqu'où un légume est-il "local", faut-il réfléchir à l'échelle de l'agglomération ? (La question de l'échelle et de savoir où met-on le curseur dans la production de légumes locaux ?)
- Comment la volonté de relocalisation alimentaire au niveau de l'agglomération (*PAT*) est- elle retranscrite au niveau des communes ?
- Certains acteurs disent qu'il faut multiplier les échanges entre les opérateurs car tous les niveaux s'entrecroisent, qu'en pensez-vous ?
- Dans le contexte des enjeux actuels, à quoi ressemblerait une ferme dans le Beaufortain ?

Questions acteurs agricoles :

- Selon vous, quel est l'état actuel du maraîchage dans le Beaufortain ?
- Considérez-vous qu'il y ait une place pour le maraîchage dans les vallées alpines ?
- Quels sont les principaux freins à l'implantation de cultures maraîchères ?
- Quels sont les principaux leviers au développement du maraichage de proximité dans une vallée alpine ?
- Ressentez-vous une dynamique au niveau de l'installation de maraîchers ?
- La transformation des paysages tient de fait à l'évolution des habitudes alimentaires, il y a une forte demande en produits locaux, qu'en pensez-vous ?
- Selon vous, est-ce que les citoyens devraient se réapproprier davantage leur alimentation en légumes ?
- Dans le contexte des enjeux actuels, à quoi ressemblerait un avenir agricole souhaitable dans les vallées où la production laitière est dominante ? (Connaissez-vous des GAEC elevage-maraichage en montagne ?

Regard technique

- Quels sont les contraintes techniques du maraichage en montagne ?
- Existe-t-il des techniques de maraîchage en pente ?
- Dans le contexte du changement climatique (moins d'eau) techniquement, qu'est ce qui a l'air de se présenter comme avenir agricole ?

Méthode et participants :

- Entretiens semis-directifs
- Participants principalement issus de la gouvernance (mairie d'Arêches-Beaufort, Queige, et Villard sur Doron, PAT Arlysère)
- Participants issus du monde agricole, Safer, Addear, Adabio, Chambre d'Agriculture, Terres de Liens, Gida, Msa, Coopérative laitière

Déroulé :

- Introduction : présentation de l'étude et des objectifs de l'entretien, s'assurer du consentement (photo et enregistrement de l'entretien, diffusion du mémoire)
- Afin de les mettre dans le contexte, le participant sera amené à s'exprimer sur son lien avec et sa perception de l'agriculture sur le territoire

Données recueillis :

- Mesurer le degré d'intérêt pour le maraîchage
- Informations sur les actions mise en place pour le développement du maraîchage
- Mieux comprendre l'influence des politiques sur l'implantation de maraîchage

Appendix D. Focus group

Objectifs :

- Définir des actions à mettre en place pour le développement du maraîchage
- Les participants doivent partir avec quelque chose de positif et constructif

Méthode, participants et supports :

- Durée prévue 2h maximum
- Habitants, agriculteurs, acteurs agricoles et politiques
- Pas de limites de personnes
- Supports : images, documents écrits, paperboard

Participants :
1 market gardeners
9 residents (including 3 members of the AAB)
3 local elected officials
1 agricultural/food actor (TAP project manager)
3 social actors (middle school: SVT teacher, GEO history teacher, librarian)

Déroulé :

Introduction (20 min) :
Présentation rapide de chacun (nom, profession, avez vous un potager?)
Présentation des objectifs de l'atelier, présentation des maraîchers rencontrés
Un temps d'échange si les participants ont besoin de précision

Questionnement de groupe (60 min) :
Choix de photos/questions qui illustrent les problématiques du maraîchage dans le Beaufortain. Images en format papier qui sont accrochées au mur. Questions précises pour réponses précises. L'animateur posera les questions et facilitera l'échange entre les participants. Au cours de l'atelier, 4 questions ont été posées :

- Le maraîchage dans le Beaufortain, oui, mais…à quelle échelle et pour quels débouchés ?
- Le maraîchage dans le Beaufortain, oui, mais… est - ce pertinent économiquement ?
- Le maraîchage dans le Beaufortain, oui, y a t'il des complémentarités avec l'élevage ?
- Le maraîchage dans le Beaufortain, oui, quels bénéfices pour le territoire et sa population ?

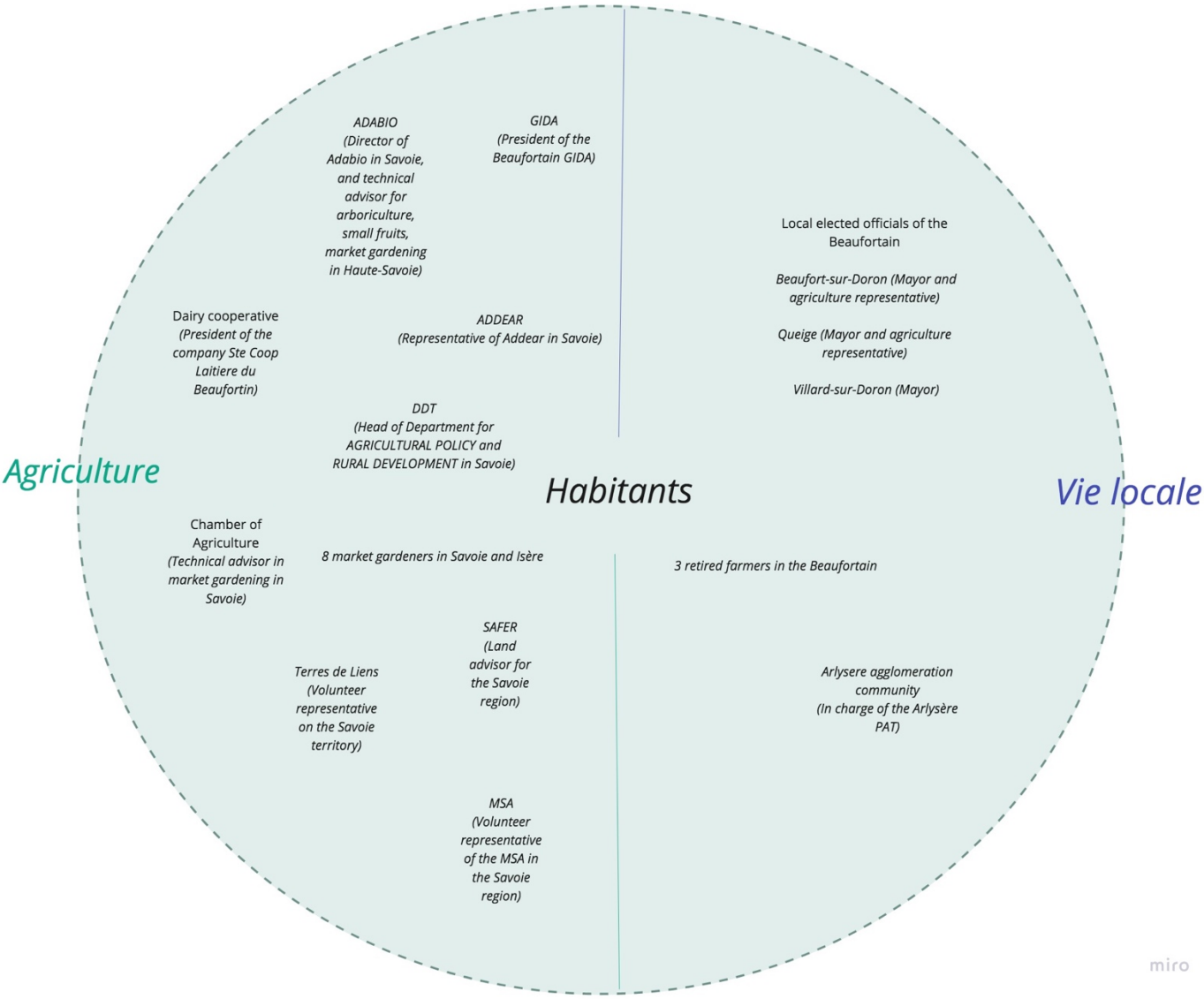
Conclusion (15 min) :
Définir une feuille de route avec des actions concrètes à mettre en place pour le développement de maraîchage pour chaque problématique discuté.

Remerciements

Données recueillis :

- Compte-rendu diffuser par mail

Appendix E. List of Interviewees and role



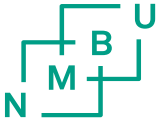
Appendix F. *Aab* communication posters of events during the thesis

Appendix G. The work on a farm in the *Beaufortain* in the 1960s-70 (© Colette Vibert from the movie *Les 4 saisons en Beaufortain*)

Appendix H. Chrono-systemic frieze tool

The frieze is a contextualisation tool and not a central element of my research. It was a methodological means of interpreting the non-directive interviews that provided me with key elements to contextualise the agricultural history of the Beaufortain. The timeline tool is often used in research on mountain trajectories. Chrono-systemic friezes are interested in processes of change, and are an object that testifies to a multidisciplinary inter-knowledge (Bergeret et al. 2015). The frieze is characterised by spatio-temporal boundaries where the political, social and agricultural ecosystem of a territory is related. This makes it possible to highlight the causal links where we observe the sequence of key events in a territory. In the methodological vocabulary for constructing a frieze "methodological terms (ingredient, event, sequence, motor) and theoretical terms are discussed, around the qualification of dynamic links and sequences (rupture, bifurcation, adaptation, adjustment, emergence, self-organisation, inertia, forcing, mutation, equilibrium...)" (Bergeret et al. 2015, p.20). One of the difficulties of the frieze is to choose what is most important to show as it has to be presented on one page and can be disseminated without explanation (Bergeret et al. 2015). The sequences of the frieze are: local development, external context, social dynamics, evolution of the agricultural production system, land use, and climate.

Figure A-1. Chrono-systemic frieze of local development and agriculture in the *Beaufortain*.



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