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Sustainable Agroecosystems
Institute of Agricultural Sciences
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Assessing and building of Resilience in Western farming systems

Master thesis

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Executive Summary

Nowadays, our World Food Production System is challenged by two societal trends: globalisation and climate change. Those two trends do not follow a development along a stable trajectory and thus generate unpredictable and uncontrollable shocks. To cope with this complex situation and insure food security, *resilient farming systems* are needed. This means that there is a need for systems able to recover, reorganise and evolve following external stresses and disturbances.

To support the building of farming systems' resilience, projects must know where to start and with whom to work. For that purpose, farming systems' resilience assessments by means of a resilience assessment tool are being carried out. However, currently, those assessments are limited to developing countries since the sole available *farming systems'* resilience assessment tool, called *Self-evaluation and Holistic Assessment of climate Resilience of farmers and Pastoralists* (SHARP) and created by the *Food and Agriculture Organization* (FAO) of the United Nations, has been designed for developing countries only. Not being able to assess farming systems' resilience elsewhere is a significant issue given that the majority of the world's arable land is under "modern"/Western farming systems which are systems that are particularly vulnerable to climate change as well as other stresses due to the homogenisation and reduction of diversity in such systems.

Thus, to fill this gap, the main aim of the master thesis was to propose an adaptation of the existing SHARP tool from a developing countries context to a developed/Western countries context. The methods included a literature research on farming system resilience, discussions with numerous experts as well as collaboration with the SHARP team from the FAO to whom the tool belongs.

The new SHARP tool version elaborated through this study enables the SHARP tool to be now used to assess the resilience of developed countries as well. Given the limited timeframe of this study and the complexity of the adaptation, the new version could only be tested by twenty-five farmers from the Canton of Vaud of Switzerland. Nevertheless, this pilot test allowed to check, for the first time, the acceptance of the tool by Western farmers, to provide precious feedback for the finalisation of the tool and to verify whether coherent results come out. Even if the results from the test are not statistically representative, the analysis of them already points out a way to support the building of farming systems' resilience which is supported by literature and recent studies, namely: a shift towards diversified agroecological systems.

Acknowledgements

I would like to thank each person who has made it possible for me to complete this thesis.
First of all, I would like to thank my referee, Prof. Dr. Johan Six, who supervised the study and my co-referee, Dr. Dominique Barjolle, who has given me great support from beginning to end, has brought me into contact with numerous experts and has been available to answer my questions as well as to give me valuable input throughout the time span of my thesis. Through their replies and feedback, I have learned and progressed.

Secondly, I would like to thank John Choptiany, Maria Hernandez Lagana, Suzanne Phillips, Anique Hillbrand, Benjamin Gräub, Rémi Cluset and David Colozza from the *Food and Agriculture Organization (FAO) of the United Nations*, for their support and collaboration throughout my thesis. Additionally, John Choptiany and Maria Hernandez Lagana spent a lot of their time to revise the adaptation of the tool and were available any time I needed to discuss specific issues with them. Furthermore, I would like to thank Daniele Conversa, also from the FAO, for his substantial work of computerising each adaptation I brought to the SHARP tool and Vincent Demotz from the *École Polytechnique Fédérale de Lausanne* for developing a macro to enable the analysis of the collected data from the surveys. With their collaboration, it was possible to adapt the existing FAO SHARP tool from a developing countries context to a context of developed/ Western countries.

Thirdly, I am very grateful to all the experts who have given me insightful input to adapt the SHARP tool either through email exchanges, skype meetings or personal interviews. Dominique Kohli, Ika Darnhofer, Raphaël Charles, Philippe Droz, Marc Schut, Hannah Worbs, Johan Six, Dominique Barjolle, Jonas Jörin, Pascal Mayor, Samuel Oehninger, Samuel Forestier and Richard Bourguignon have all invested a lot of their time to guide me throughout the adaptation of the SHARP tool's questions and scoring. I am also truly thankful to the thirty farmers who participated in the surveys that allowed me to pre-test and then test the adapted SHARP tool. The time they have given to this pre-test/test and their feedback are precious for the finalisation of the adapted tool and the progress of future projects.

Last but certainly not least, I would like to thank the team from the *Service de l'agriculture et de la viticulture du Canton de Vaud* who also contributed to the completion of my thesis by providing me with a pleasant working environment. A special thank you goes to Aurélie Heinis and Sylvain Boéchat for their support during the weeks of the surveys.

Initial proposal

Assignment for Master Thesis FS-HS 2016 for Florence Diserens	
Name of student	Florence Diserens
Title	Assessing and identifying ways of building resilience of Swiss producers within the Food System
Background	Nowadays, a serious challenge faced by humanity is the achievement of a sustainable agriculture system that provides enough food and services for present and coming generations in a time where the world's population continues to grow, climate change is happening and environment degradation accelerates (Gerland et al.,2014; Altieri et al., 2014). In parallel with population's growth, the dietary preferences for resource-intensive food products increase (Foley et al., 2011). This is significant since today, the citizen-consumers are the ones that determine the direction that the agro-food system undertakes. Each purchasing decisions can be seen as a new form of political participation where each consumer is "voting with his dollar" (Schweizer, 2015; Johnston, 2008). Thus, the agricultural production is embedded in a system where all stakeholders are interconnected and can influence each other. With regard to the farmers, to meet future global food demand, they will have to produce more with less (Pittelkow et al.,2015). The Western or "modern" agricultural system plays a major role in addressing this challenge since most of the world's arable land is under "modern" farming systems (Altieri et al., 2014). Large NPK fertilizer inputs, excessive use of pesticides, intense soil disturbance and monocultures are examples of practices that have been developed to favour simplification and uniformity to maximize yields (De Gryze et al., 2011). However, the ecological homogeneity found in most Western countries puts the world's food production in jeopardy. For instance, this homogenization increases the vulnerability of crops to insect pests and diseases exacerbated by climate change (Perfecto et al., 2009). The latter is significant since Switzerland, as well as most Western countries, is affected by climate change: weeds and insect attacks will occur more often, water supply will decrease in summer, heat waves will increase, which will increase the demand for irrigation and depending on the region, frequent precipitation will worsen soil erosion (i.a.) (Wiedmer et al., 2015). Thus, to cope with this situation, farmers must be climate-resilient. Resilience in agricultural systems is a function, amongst others, of the level of diversity like e.g. intercropping/ agroforestry/crop rotation (Lin, 2011). Hence, Switzerland recognized the importance of biodiversity and adopted a policy for 2014-17 with a new direct payment system bound to a concept of "Proof of Ecological Performance" (Wiedmer et al., 2015). However, in a national context where the viability of agriculture relies mainly on public money, discussions are questioning the environmental effectiveness of this policy (ProNatura 2011). Furthermore, when looking at the other Western countries, little has been done to improve the adaptability of industrial agro-

	ecosystems to changing patterns of precipitation, temperature and extreme meteorological events (Rosenzweig and Hillel, 2008). Therefore, it is necessary to adapt the SHARP tool to the Western food production context in order to assess the present farmers' situation (and potential vulnerabilities to climate change) to target interventions and better communicate with the involved stakeholders.
Objectives	• Adapt the SHARP tool from FAO, which is currently designed for developing countries, to a context of developed countries, specifically western Switzerland. • Assess the present resilience situation of Swiss producers in a specific region in Switzerland. • Analyse the results and identify the needs of the Swiss producers in a particular region to become more resilient. • Address the identified gaps in identifying the relevant stakeholders who can take responsibilities to build resilience of the farmers.
Research questions and hypotheses	• How to build the resilience of the Swiss farmers, and who are the main stakeholders who could contribute to improve it? Hypothesis: - Building resilience of the farmers depends of their current resilience in 3 main dimensions: economic, social (including governance) and environmental. - The SHARP-tool can help the farmers to make a self-assessment and to start a reflective process of resilience building. - The SHARP-tool may help to identify the gaps and the relevant stakeholders in the food system, who could contribute to farmers' resilience building.
Theoretical approach and methods	The assessment of the current resilience of the Swiss farmers will be achievable by using the SHARP tool from FAO which consists of an approximately 2 hours self-assessment survey. The tool was designed for developing countries so first it has to be adjusted to the Western context. So after being adapted, the SHARP tool will be given to the selected farmers. The tool is directly connected to the FAO data centre so after having done the self-assessment, a first analysis of the resilience level can be determined and shared straightaway with the farmers. Once all self-assessments are completed, a deeper analysis and comparison between the farmers of the selected region will be done. The deeper analysis will allow for the identification of ways to build resilience of Swiss producers within the Food System.
Expected results	• Literature review of the concept of Food System resilience • Adapt the SHARP tool and methodology from FAO for farmers in the developed countries and especially Switzerland • Self-assessment of the farmers from Canton of Vaud in Switzerland • Data analysis from the surveys • Feedback on the adaptation and use of the SHARP methodology and tool • Feedback discussion (identification of needed innovations to solve the highlighted problems)

Declaration of originality

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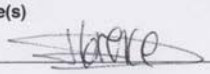
Zurich, 15.01.2017	

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Table of contents

List of figures

List of tables

I. Introduction

1. Background

Nowadays, a serious challenge faced by humanity is the achievement of a sustainable agricultural system that provides enough food and services for present and coming generations in a time where environmental degradation accelerates and at a time when the impact of the two societal trends - climate change and globalisation - are ever more acknowledged (Altieri et al., 2014; Darnhofer, 2014; Gerland et al., 2014).

Given that more than 40 per cent of the Earth's land surface is used for agriculture (FAO, 2007), farmers and herders play a major role by managing vast areas of land and the natural resources found on them (OECD, 2008). At the same time, farming systems are essential in securing the survival of humans because they produce food and fibre as well as ecosystem services (Darnhofer et al., 2010b). Given the importance of farming systems in addressing the above mentioned challenges, it is even more challenging considering that the majority of the world's arable land is under "modern"/Western farming systems which are systems that are particularly vulnerable to climate change and biotic stresses due to their ecological homogeneity (Altieri et al., 2014). In such farming systems, practices such as large NPK fertilizer inputs, intensive use of pesticides, intense soil disturbance and monocultures are often present and are examples of practices that have been developed to favour simplification and uniformity to maximize yields and mechanisation (De Gryze et al., 2011).

However, the homogenisation of "modern" farming systems found nowadays in Western countries and their vulnerability puts the world's food production in jeopardy (Perfecto et al., 2009). The two present trends, climate change and globalisation, generate biophysical, social and economic conditions that are increasingly volatile, unpredictable and uncontrollable and thus do not follow a development along a stable trajectory (Darnhofer, 2014). Hence, to cope with this situation, *resilient farming systems* are needed. This means that there is a need for systems able to recover, reorganise and evolve following external stresses and disturbances (Adger, 2000; Carpenter et al., 2001; Gunderson and Holling, 2002; Walker et al., 2004).

Resilience in farming systems is a function, amongst others, of the level of diversity like for instance, intercropping, agroforestry and crop rotation (Lin, 2011). Hence, Switzerland recognised the importance of biodiversity and adopted a policy for 2014-17 with a new direct payment system bound to a concept of "Proof of Ecological Performance" (FOAG, 2015). However, in a national context where the viability of the farms relies mainly on public money, the environmental effectiveness of this policy is put into question (Pro Natura, 2011). Furthermore, when looking at the other Western countries, little has been done to improve the adaptability of industrial agricultural systems to changing patterns of rainfalls, temperature and extreme meteorological events (Kimball, 2008).

For all these reasons, it is useful to have a tool adapted to the Western agricultural production context in order to assess the present farming systems' resilience to be able to then target interventions supporting the building of resilience and better communicate with the involved stakeholders. For this purpose, in a first step, this study will adjust the ***S****elf-evaluation and* ***H****olistic* ***A****ssessment of climate* ***R****esilience of farmers and* ***P****astoralists* (SHARP) tool which was designed by the Food and Agriculture Organization of the United Nations (FAO) for developing countries to a context of developed countries, specifically Switzerland. Surveys in the Canton of Vaud will then be carried out to test the adapted tool in order to see if it can be used on a larger sample.

2. Objectives

Throughout this study, the following objectives were addressed:

- Adapt the SHARP tool from the FAO, which is currently designed for developing countries, to a context of developed countries, specifically Switzerland.
- Test the adapted tool with farmers of a specific region of Vaud.
- Analyse the results and identify the needs of those farmers to become more resilient.
- Address the gaps in identifying the relevant stakeholders who can support the building of resilience of those farmers.

3. Research questions and Hypotheses

The research questions of this study are the following:

- Which sections of the investigated Vaud farming systems are the least resilient and the most resilient?
- Where are the gaps hindering the farming systems from being more resilient?
- How can the resilience of the investigated farming systems be built?
- Who are the main stakeholders who could contribute to improve the farming systems' resilience?

Below are the corresponding hypotheses:

- The SHARP-tool may help to assess the current farming systems' resilience, to identify the gaps and the relevant stakeholders in the food system who could contribute to the building of farming systems' resilience.
- The SHARP-tool can help the farmers to make a self-assessment and to start a reflective process of resilience building.
- Building resilience of the farmers depends of their current resilience in 4 main dimensions: environmental, economic, social and governance.

4. Methods

The assessment of the current resilience of the Vaud farmers has been achieved by using the SHARP tool from the FAO which consists of an approximately 2 hour self-assessment survey. The latter includes close-ended questions (often with a "Yes/No" followed by more thorough questions if the answer is "yes"), open-ended response to expand if desired, one (or more) mandatory self-assessment of adequacy question(s) and one (or more) mandatory self-assessment of importance to farming systems question(s). There are 53 question categories which cover five assessment areas: environmental, social, economic and governance as well as a fifth called "Production systems and practices" that gives general information about the farm/farming system. To quantify the responses, there is a pre-defined scale coded into a score out of ten. So, each closed question can have a maximum of 10 points (highest resilience) and a minimum of 0 (lowest resilience). For each of the 53 question categories, the end result is obtained from an average of the several questions of each category (Choptiany et al., 2015).

The tool is an android software application that can be used on any device that runs android and has been designed for developing countries. Thus, first it had to be adjusted to the context of developed countries and specifically to the context of Switzerland. After being

adapted, twenty-five farmers were selected from the Vaud Canton to test the adapted tool to check if the tool worked well and to see if it suited to the Swiss farmers' reality.

The computerised tool generated immediate results on the farmers' tablets so after having done the self-assessment, the farmers could straightaway discuss their results with each other. They could compare themselves with the others and discuss what makes one more or less resilient than another and where are the common issues.

After twenty-five self-assessments were completed, a deeper analysis and comparison between the farmers of the selected region was done. The deeper analysis made it possible to answer the research questions and to guide the finalisation of a Western-version of the tool.

5. Expected results

The expected results from this study are the following:

- Literature review of the concept of farming systems' resilience
- Adapt the SHARP tool from the FAO for farmers in developed countries and especially Switzerland/Vaud
- Test the adapted tool with a sample of farmers from Vaud in Switzerland
- Data analysis
- Feedback on the adaptation and use of the SHARP methodology and tool
- Feedback discussion
- Discussion about resilience in the Swiss/developed country context

6. Structure of the thesis

The thesis is divided into six chapters. **Chapter 1,** the introduction, presents the study with a contextualisation followed by the objectives, their corresponding research questions as well as hypotheses and expected results. **Chapter 2** sets out the theory of farming systems' resilience and compares the SHARP tool with existing tools. **Chapter 3** describes the methods used in this study. This included a stepwise approach of Western farming systems' resilience assessment as well as a description of the existing farming systems' resilience assessment tool SHARP and its adaptation from a developing countries' context to a developed countries' context. The adapted SHARP tool was tested with twenty-five farmers from the Vaud Canton and the results are presented in the fourth chapter. **Chapter 4** begins with background information on Switzerland and the Canton of Vaud to contextualise the sampling and ends with the results from the test. Those results are then discussed in the fifth chapter.

Chapter 5 discusses several points: (1) SHARP's resilience assessment approach, (2) the obtained results, (3) ways to build farming systems' resilience and (4) the future perspectives for the adapted tool. **Chapter 6** ends the thesis with the conclusion.

II. Theoretical background

1. Farming system's resilience

In order to manage the resilience of farming systems, the latter must be understood as systems made of semi-autonomous subsystems that interact with each other and that belong to the environmental, economic and social domains (Darnhofer et al., 2008).

1.1 Defining Resilience

Resilience is defined in several ways since it is a term used across different disciplines (Choptiany et al.,2015). However, for this work the focus is on resilience in a socio-ecological system, more specifically, farming system's resilience.

1.1.1 Resilience of socio-ecological system (SES)

The concept of resilience has been transferred from the field of ecology to the economic and social field (Allison and Hobbs, 2004). Agroecosystems, or in other words, farming systems, are in between those different fields and, even though there are some differences, they can be considered as social-ecological systems (SES) since humans manage and use communities of plants, animals, their biophysical environment and their interactions (Gomiero et al., 2006; Van Apeldoorn et al., 2011). Thus, a farming system is an SES since it is a unit composed of the farmer (with his/her social and cultural capital such as mental models, preferences, goals, abilities, etc.) and the physical farm (with its natural and economic capital such as land, animals, crops, buildings, finances, etc.) (Darnhofer et al., 2008). This identification allows to apply the social-ecological resilience concept of Gunderson and Holling (2002) to farming systems (Darnhofer et al., 2008).

The strict meaning of resilience in ecology concerns the ability of a system to regain the *status quo* after a major shock. On the other hand, in social and economic contexts, resilience is understood as the ability to embrace change, with a capability to adapt to largely exogenous events. This difference in definition can be explained by the fact that economic and social systems are constantly changing due to scientific, financial, governance, lifestyles and resource management changes (McManus et al., 2012).

The socio-economic resilience mentioned above goes hand in hand with the definition of Resilience that has been adopted in the SHARP tool, namely:
"Resilience is the ability of a system to recover, reorganise and evolve following external stresses and disturbances" (Adger, 2000; Carpenter et al., 2001; Gunderson and Holling, 2002; Walker et al., 2004).

1.1.2 Resilience vs. sustainability

According to Walker et al. (2004), resilience thinking offers a vision of sustainability, which is not reduced to stability. Thus, the concept of resilience appeals to the notion of sustainable and dynamic development (Carpenter et al., 2001; Kremen and Ostfeld, 2005). Resilience focuses on the capacity to change and bring to light the shortcomings of focusing on stability along with the command-and-control approach of classical resource management which will be further developed bellow (Holling and Meffe, 1996).

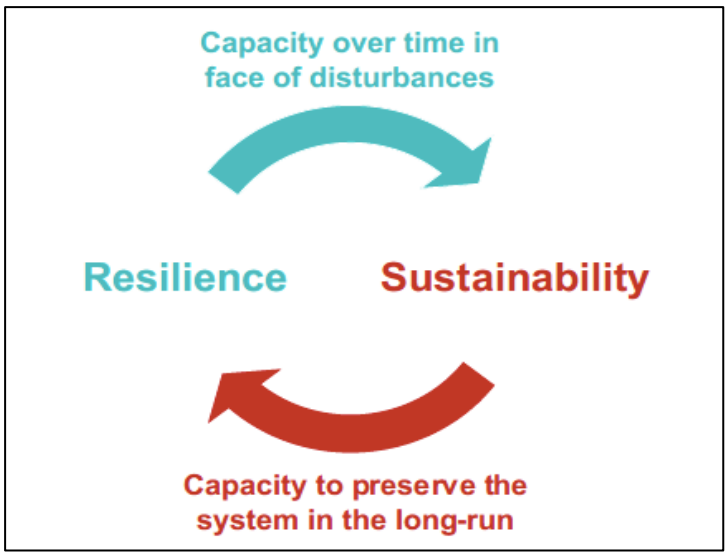

Figure 1: Resilience and sustainability as complementary concepts (source : Tendall et al. (2015))

Therefore, the concept of resilience accentuates the adaptive capacity required to achieve sustainability. In other words, resilience is a prerequisite for being sustainable (Milestad and Darnhofer, 2003). They are complementary concepts (Maleksaeidi and Karami, 2013; Tendall et al., 2015) (see Figure 1). Sustainability implies retaining the capacity of a system to operate in the future. This point is also one of the conditions required to maintain resilience. Furthermore, resilience forms an essential part of what permits sustainability since resilience insinuates the capacity to continue providing a function over time despite disturbances (Maleksaeidi and Karami, 2013; Rees, 2010; Tendall et al., 2015). According to Brand and Jax (2007) and Anderies et al. (2013), sustainability can be considered as the measure of system performance and resilience can be seen as a means to achieve it, at times of disturbance (Tendall et al., 2015).

This goes hand in hand with the definition of agricultural sustainability given by Garibaldi et al. (2017), namely: “Sustainability in agricultural systems incorporates concepts of both resilience (the capacity of systems to buffer shocks and stresses) and persistence (the capacity of systems to continue over long periods), and addresses many wider economic, social and environmental outcomes.”

1.1.3 Resilience and the adaptive cycle

To understand how to manage dynamic farming systems, a farm must be seen as an SES that moves through the adaptive cycle and co-evolves with its environment (Darnhofer et al., 2008). A resilient system is one that can navigate the adaptive cycle, i.e. that can persist despite change (Darnhofer et al., 2014) (see Figure 2).

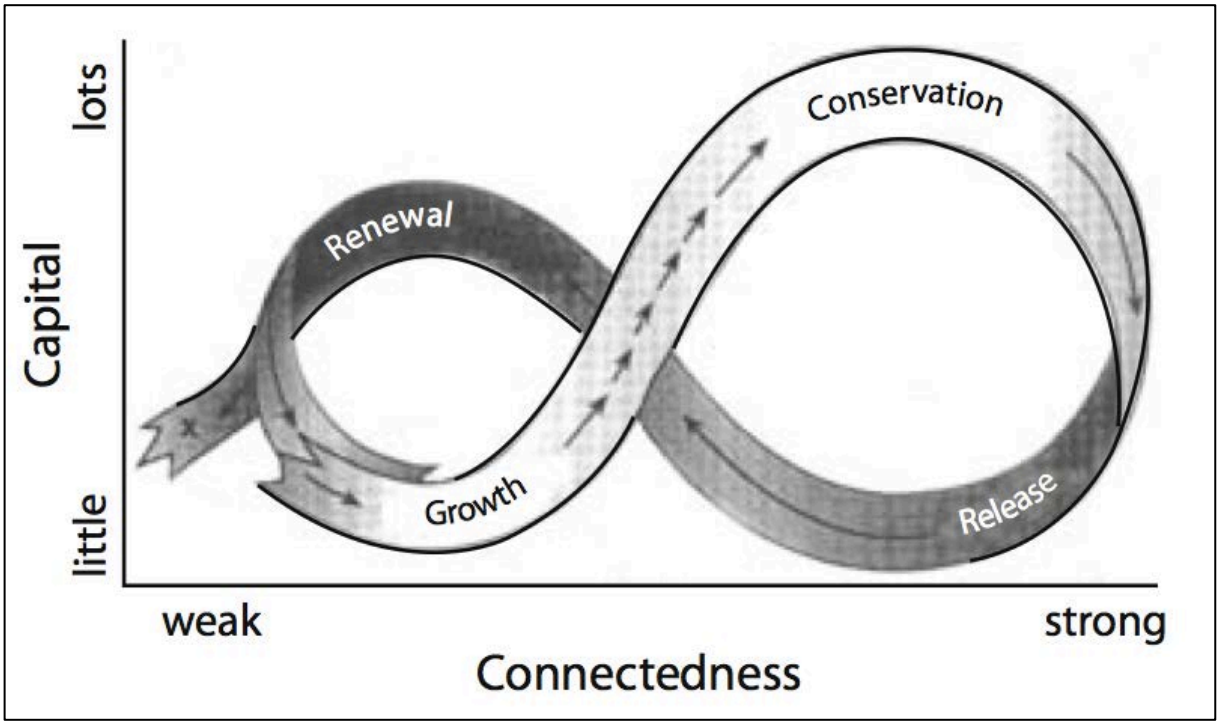

Figure 2: The adaptive cycle (source: Chapin III et al. (2009))

The adaptive cycle is composed of four phases: (1) release/system disruption, (2) reorganisation/renewal, (3) growth/exploitation, (4) conservation. The system is initiated usually when it experiences a disturbance, e.g. a wildfire where trees die and productivity decreases. This **release phase** occurs in hours to days and is usually followed by a **renewal phase** (months to years) where there is the opportunity for change. In the case of a forest it would be the phase where seedlings take root and new policies for managing the forest emerge. After the second phase comes the **growth phase** where, e.g., environmental resources are incorporated into living organisms and policies become more and more regularised. This phase depends on what has been established during renewal. Later , when it reaches a steady-state where interactions among components of the system become more specialised, the system reaches the **conservation phase**. In the example of the forest, it would be when light and nutrients decline in availability which leads to plant specialisation and when management rules aimed to maintain this constancy are established. This 4th phase is vulnerable to disturbances, so if a shock happens it will provoke a new release in the adaptive cycle (Chapin III et al., 2009).

If a system is not resilient, it might break down and will not be able to navigate through the cycle. According to the above example, if accumulated resources that determine ecological potential (such as species critical in maintaining structure and function) are completely or largely eliminated/extincted, recovery would be impossible and the system would slip into a different, degraded state/system. This exit from the cycle is represented on the left side of Figure 2 (Gunderson and Holling, 2002).

1.2 Key aspects and attributes of Resilience

Resilience is difficult to operationalise because its nature is abstract, multi-dimensional (Cumming et al., 2005) as well as very context specific. Besides Cumming et al. (2005), other authors have also admitted the difficulty in measuring resilience and have therefore suggested alternative approaches which often tried to define “the resilience of what to what”. However, in the context of agroecosystems, resilience is an emergent property of the system that arises from the unique interaction between farmer, farm and the context. Thus, there are no two same systems which means that what makes one resilient may not necessary work for the other (Cabell and Oelofse, 2012).

So, according to Darnhofer et al. (2010a), farming systems might be too complex and variable in time and space for resilience models to be defined by “resilience of what to what”. Instead of measuring resilience itself, they suggest finding sets of surrogates or indicators to assess resilience. In this way, “rules of thumb” can be used by farmers and facilitators to guide not only farms but also the industry sector, the national agricultural system and the interconnected parts of the international food system towards a more resilient orientation (Darnhofer et al., 2010a). Cabell and Oelofse (2012) have designed heuristic rules of thumb, which are applicable across scales of time and space, and which are named *behaviour-based indicators* of resilience in agroecosystems (Darnhofer, 2014). They will be further discussed later in this chapter.

1.2.1 Key aspects of Resilience

In the numerous definitions of resilience in the literature, there are common aspects of resilience that are used in the understanding of resilience for farm management. The following three key aspects of resilience have been identified:
(1) Buffer capacity, (2) Adaptive capacity and (3) Transformability. Those three aspects refer to the various degrees of change (see Figure 3) (Rusito et al., 2011).

According to Carpenter et al. (2001), the *Buffer capacity* is the magnitude of shock that a system can absorb and remain within a given state. *Adaptive capacity* is then defined by Crawford et al. (2007) as being, in farm management, the degree to which the farm-system is capable of responding to change. It is reflected, amongst others, in the learning aspect of the system's behaviour (Rusito et al., 2011). And finally, Walker et al. (2004) describe *Transformability* as the capacity to create fundamentally new systems when ecological, economic or social conditions make the current existing system untenable. Transformation is the only option if disturbances from the highly dynamic environment push a farming system beyond what it can tolerate. Therefore, resilience is not only about "persistence to change" but includes as well taking advantage of opportunities that stem from disturbance in terms of farming system reconfiguration or transformation (Rusito et al., 2011).

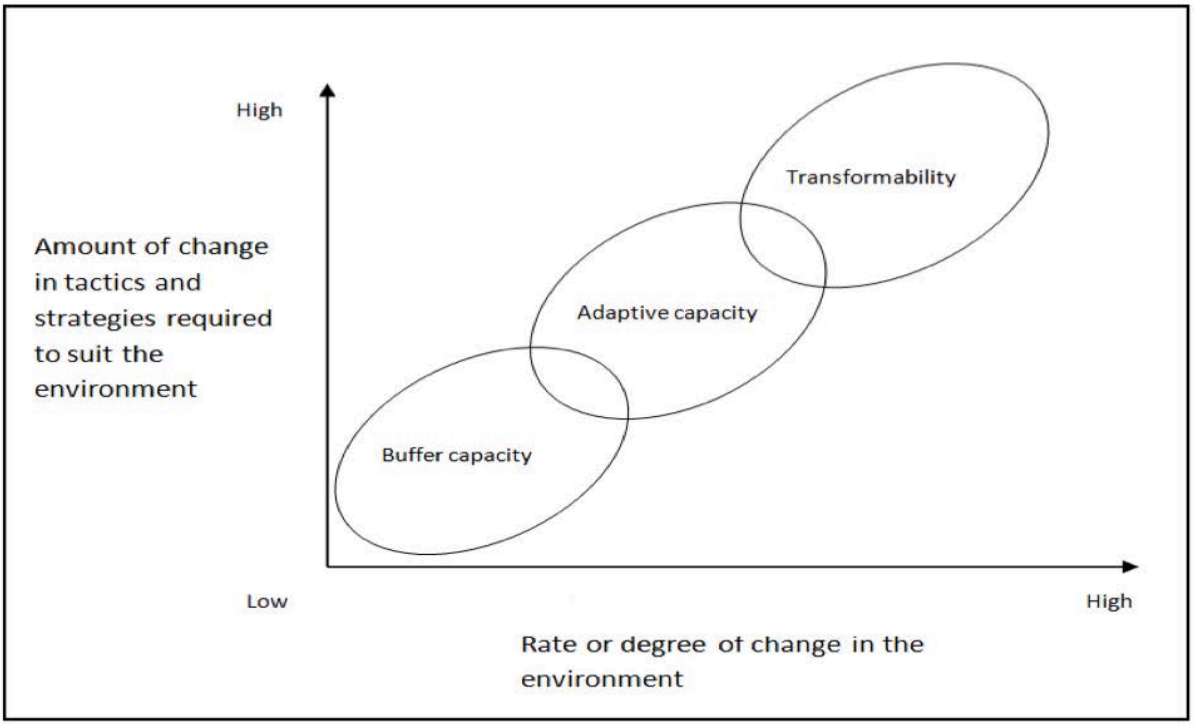

Figure 3: An illustration of the continuum of change, buffer capacity, adaptive capacity and transformability (source : Rusito et al. (2011))

1.2.2 Key attributes of resilience

Based on the key aspects of resilience mentioned above, a "predictive theory of resilience" is needed to assess resilience to consecutively make recommendations on how to build resilience. However, it remains a challenge to achieve this goal (Darnhofer et al., 2016). Indeed, according to Carpenter et al. (2001), important attributes of resilience in social-ecological systems might not be observable in a direct manner, but must be deduced indirectly (Darnhofer et al., 2016).

Darnhofer et al. (2016) enumerates the main authors of the literature on resilience that have attempted to identify resilience surrogates: *"the four critical factors for building resilience and adaptive capacity in social-ecological systems"* of Folke et al. (2003), *"the ten heuristics to study and manage the dynamic evolution of linked social-ecological systems operating at multiple scales"* of Anderies et al. (2006b), *"the 14 propositions that are likely to play a role in the ability of social-ecological systems to absorb disturbances in either their ecological or their social domains"* of Walker et al. (2006), *"the seven generic policy-relevant principles for enhancing the resilience of desired ecosystem services"* of Biggs et al. (2012) and *"the 13 behaviour-based indicators for agroecosystems"* of Cabell and Oelofse (2012).

From the diverse authors, there are the following common key resilience attributes:
(1) System diversity, (2) Redundancy (3) Appropriate connectivity with the context/cross-scale linkages, (4) Self-regulation/self-organisation, (5) Capacity to learn/combine different types of knowledge, (6) Sense-making, (7) Social capital and social networks (Berkes, 2007; Crawford et al., 2007; Darnhofer et al., 2016; Folke et al., 2003; Hamel and Valikangas, 2003; Lengnick-Hall and Beck, 2009; McCann et al., 2009).

Concerning the resilience assessment of farming systems, one must consider that farming systems need certain properties to recover, reorganise and evolve in an unpredictable future (Choptiany et al., 2015). To assess these properties, Choptiany et al. (2015) selected the previously mentioned *13 behaviour-based indicators for agroecosystems* of Cabell and Oelofse (2012) and used them for the conception of the resilience assessment tool, of the Food and Agriculture Organization (FAO) of the United Nations, called SHARP (see Appendices 3 and 4). The latter stands for *Self-evaluation and Holistic Assessment of climate Resilience for farmers and Pastoralists* and will be detailed in chapter III.

These 13 indicators are all coupled with the phase of the adaptive cycle at which the occurrence of each is most critical (see Figure 4). The thirteen indicators are used in assessing and indicating whether a farming system is able to navigate through the adaptive cycle or not. The more present are those thirteen behaviour-based indicators, the more resilient is the farming system. Accordingly, their absence or disappearance reflect vulnerability and movement away from a resilience state. In other words, if those indicators are absent, the system might break down (exit the adaptive cycle) (Cabell and Oelofse, 2012)(see Figure 4).

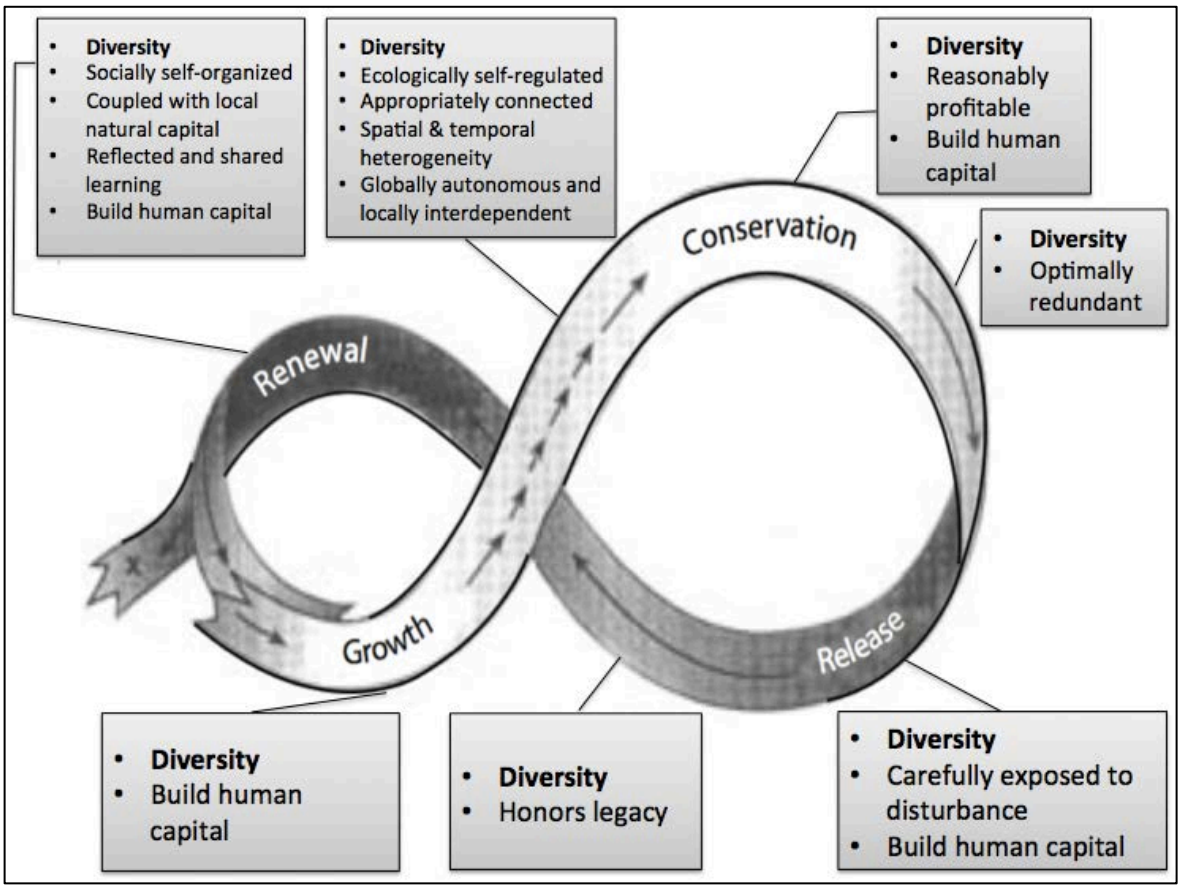

Figure 4: The 13 behaviour-based indicators of Cabell and Oelofse coupled with the adaptive cycle (adapted from: Cabell and Oelofse (2012); Chapin III et al. (2009))

To be resilient, one indicator that should be present throughout the cycle is *Diversity* (written in bold, see Figure 4). The key point of *Diversity* is that it provides in the renewal cycle the "seeds for new opportunities" (Berkes, 2007). It makes the system less vulnerable by enhancing the options for coping with shocks and stresses (Berkes, 2007). Concerning farming systems, diversity is needed in the environmental domain, as well as the economic and social domains. Biodiversity as well as diversity of income, sources of funding, insurances, savings and diversity of relationship types and information sources, to name only the main ones, all contribute to the diversity of farming systems (Darnhofer, 2010).

1.3 The purpose of Resilience thinking

Nowadays, the world food system is experiencing rapid and tremendous changes such as changes in climate, increasing economic disparity, political instability and shift of consumption patterns. Changes have always occurred since the beginning of agriculture but what has changed is the rate and magnitude of those social-political and ecological changes (Cabell and Oelofse, 2012). Thus, to insure food security and resource conservation, it is urgent to find new paths that will help to manage those changes and further disturbances (Ericksen, 2008; Gliessman, 2007).

A useful framework for understanding the dynamic relationship between humans and the environment is the theory of resilience in social-ecological systems. This theory provides models that increase the society's capacity to manage changes (Cabell and Oelofse, 2012). Considering the defaults of conventional farm management approaches (Holling and Meffe, 1996; IAASTD, 2008; Norgaard, 1987) as well as the lack of models that integrate ecological, social and economic sustainability over various temporal and spatial scales, resilience thinking is aimed at better understanding the interconnections and challenges involved in moving towards sustainable food production (Darnhofer et al., 2008).

1.3.1 A new understanding of the world

As introduced above, the concept of resilience becomes popular at a time when the impacts of climate change and globalisation are increasingly acknowledged. Those two trends have generated biophysical, social and economic conditions that are increasingly volatile, unpredictable and uncontrollable and thus do not follow a development along a predictable, stable trajectory (Darnhofer, 2014). Furthermore, farming systems are complex adaptive systems which means that they involve many components and agents that interact simultaneously and adapt or learn as they interact (Darnhofer et al., 2010a; Holland, 2006) . This draws a distinction from systems where interaction between components is fixed, i.e. where "rules of the game" stay the same over time. Indeed, in complex adaptive systems the linkages between elements change and agents change their perception as a result of learning so the "rules of the game" change over time and farming systems are in a continuous process of "becoming" (Scoones et al., 2007).

However, conventional approaches to farm management treats future developments as predictable and underestimates the complexity of the system and can thus be identified as a reductionist approach (Darnhofer, 2010). Such approaches focuses on the static issue of efficiently allocating scarce resources rather than the dynamic issue of how farmer preferences, markets and institutions change over time and thus neglect the fact that static optimising does not lead to adaptability (Darnhofer, 2010; Keen, 2001). Conventional approaches goes with the analytical assumptions of equilibrium thinking, centred on linearity, predictability, optimisation, homogeneity and simplification (Scoones et al., 2007). It goes along with the "command and control" approach that generates isolated and inflexible systems by having a one-sided focus on controlling a system to ensure efficiency (e.g. expressed in high and stable yields) (Holling and Meffe, 1996).

Therefore, in this rural change context that is uncertain and complex, it is inadequate to follow the conventional command and control approach that aims to predict what is going to happen in order to plan for it. Instead, the farmers need to be able to cope with whatever emerges (Boxelaar et al., 2006). Resilience thinking takes this complexity and unpredictability as its starting point (Walker and Abel, 2002) and so is a perspective for understanding, managing and governing complex linked systems of people and nature

(Anderies et al., 2006a; Folke, 2006). According to Folke et al. (2010), the dynamics and development of complex social-ecological systems can be addressed through resilience thinking. Thus, the concept of resilience addresses this new understanding of the world as being basically unpredictable. It emphasises the need to encourage the adaptability and transformability of a system rather than looking for optimal solutions. So it is a radical departure from the usual equilibrium-based approaches (Darnhofer, 2014; Shaw and Maythorne, 2013).

2. Tool comparison

Assessing resilience is needed to identify the vulnerabilities in social-ecological systems in order to take actions to create a more sustainable future (Berkes et al., 2008).

In order to know if any farming systems' resilience assessment tool existed already, a tool comparison from published tools was established. Table 1 enumerates the well- known ones. However, the weakness of the majority of them is that they are not meant to assess the resilience of systems. Moreover, for the few known tools that do assess resilience, most of them do not assess *farming systems'* resilience. The only known tool that assesses farming systems' resilience is the SHARP tool from the FAO.

This tool has several useful strengths. First, as mentioned, it suits the target group of this study, namely, farming systems. Second, the tool follows a holistic approach which includes the environmental aspects of farming systems, as well as the economic, political and social aspects (Choptiany et al., 2015).

Third, it is computerised. This makes it possible not only to have efficient data collection but also immediate results can be generated. Immediate results are important for farmers to get a direct feedback after a survey and allow them to discuss with each other. This last point is fundamental since it is through discussions and direct interactions with farmers that their farming systems' resilience can best be built (Choptiany et al., 2016).

However, the SHARP tool is currently only designed for developing countries. Knowing the fact that most of the world's arable land is under Western farming systems and that Western farming systems are also affected by climate change (Altieri et al., 2014), the need for having a farming systems' resilience assessment tool for Western countries arises.

Table 1 : Tool comparison (source : author's own elaboration)

Tool name	Spatial scope	Description	Characteristics		Sources
			Strength	Weakness	
RISE *Response-Inducing Sustainability Evaluation*	International (developing countries and developed countries)	➢ Developed by HAFL (CH) ➢ Evaluation of the sustainability of agricultural production at farm-scale	➢ Holistic ➢ Farm-scale	➢ No resilience assessment	Grenz (2012); Grenz et al. (2009)
SMART *Sustainability Monitoring and Assessment RouTine*	International	➢ Developed by FIBL (CH) ➢ Data base for companies to evaluate their sustainability performance ➢ In accordance with the FAO-SAFA Guidelines	➢ Based on SAFA ➢ Suited for several stakeholders, not only farmers	➢ No resilience assessment	FIBL (2016a, 2016b)
SAFA *Sustainability Assessment of Food and Agriculture Systems*	International	➢ Developed by FAO ➢ Global reference framework/ document for the assessment of sustainability in agriculture, forestry and fisheries value chains	➢ Holistic	➢ No resilience assessment	FAO (2016a); Choptiany et al. (2015)
SALCA *Swiss agricultural life assessment*	International	➢ Developed by Agroscope ➢ Measures the direct emission from field and farm ➢ Evaluates the potential environmental impact of a products or services	➢ Suited for farming systems	➢ No resilience assessment	Agroscope (2016)
RIMA *Resilience Index Measurement and Analysis*	Especially for developing countries	➢ Developed by FAO ➢ Quantitative approach ➢ Estimates resilience to food insecurity ➢ Tool to inform funding and policy decisions ➢ Dimensions of household weighted through econometric	➢ Resilience assessment	➢ Focus on households not farming systems ➢ Mainly designed for programme investors not for farmers ➢ Use of aggregate data so less accurate to field reality	FAO (2016b); RIMA (2016)

		model			
CREAT *Climate Resilience Evaluation and Awareness Tool*	International	➢ Climate risk assessment tool ➢ For water utilities ➢ Assists drinking water, wastewater, and stormwater utility owners and operators in assessing risks to utility assets and operations	➢ Integrates resilience aspects	➢ Focus on water utility owner not farming systems ➢ Risk and impact assessment more than resilience assessment	EPA (2016)
LEED *Climate Resilience Screening Tool*	International but more for developed countries	➢ Downloadable and flexible spreadsheet-based tool for Green Building	➢ Flexible	➢ Focus on Green Building not farming systems	SEED (2016)
ETH/SAE tool	International	➢ Developed by ETH ➢ Assess food system resilience ➢ Guidelines to support practitioners and facilitators in the process of building resilience in food systems	➢ Suited for several stakeholders, not only farmers	➢ Focus on food systems mainly ➢ Not computerised ➢ Scoring mainly through literature review	Tendall et al. (2015)
SHARP *Self-evaluation and Holistic Assessment of climate Resilience of farmers and Pastoralists*	Developing countries	➢ Developed by FAO ➢ Farming systems' resilience assessment tool ➢ Application for Android tablets ➢ ~2 hours self-assessment survey/ questionnaire	➢ Resilience assessment tool for farming systems ➢ Flexible ➢ Holistic approach ➢ Computerised /efficient data collection ➢ Convenient/ no need of experts ➢ Immediate results for farmers ➢ Discussion tool ➢ Participatory approach ➢ Useful to set priorities for projects ➢ Quantitative & qualitative approach	➢ Subjective assessment ➢ No measured numbers ➢ No measuring tool ➢ Not designed for developed countries	Choptiany et al. (2015)

III. Methods

1. Stepwise approach to assess resilience

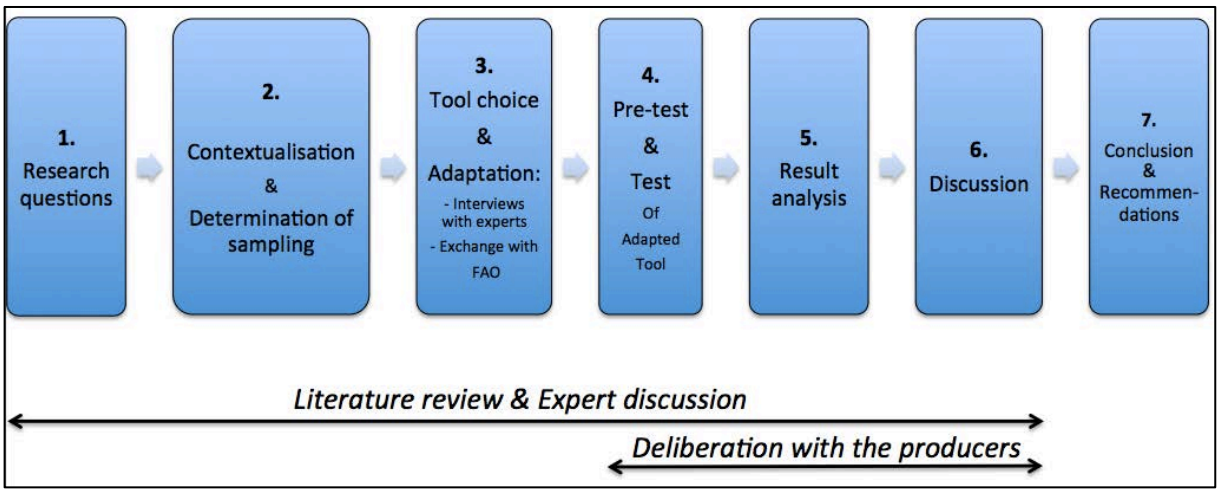

Figure 5: The seven steps to assess resilience in Western farming systems (source : author's own elaboration)

In order to assess the resilience of farming systems in Western countries, the following steps were undertaken (see Figure 5).

First, the objectives were formulated into research questions. **Second**, in order to frame the research, the context and sampling had to be defined. Since most of the world's arable land is under Western farming systems (Altieri et al., 2014), the context of the study focuses on developed countries. Furthermore, given the timeframe of the study, the sampling for the farming systems' resilience assessment was chosen locally, namely, from the Canton of Vaud of Switzerland. **Third**, a resilience assessment tool that was suited to the context and the targeted sampling had to be found. However, since the only farming systems' resilience assessment tool that was available was the computerised SHARP-tool from the FAO designed for developing countries, the tool had to be, firstly, adapted to the developed countries context. The adaptation has been achieved through a literature review as well as discussions with experts and collaboration with the SHARP team from FAO. Secondly, the adapted tool had to be translated from English into French to be usable in the Canton of Vaud of Switzerland.

Fourth, once the tool was adapted and translated, the tool had to be pretested with five farmers to see if a test with more farmers was feasible. This pre-test generated adjustments. So once the adjustments were integrated, the tool could be tested by 25 farmers. **Fifth**, once a computer scientist from the *École Polytechnique Fédérale de Lausanne* had elaborated a computerised macro, the generated data from the tests could then be analysed to see if the adapted tool worked well. **Sixth**, those results could then be discussed and **finally**, conclusions and recommendations could be given for the finalisation and future perspectives of this adapted tool.

The first to the sixth step were based on the literature review and discussions with fifteen experts from different fields. Additionally, the fourth to the sixth step were based on discussions with the farmers who participated in the test. All adjustments that were needed to adapt the SHARP tool to developed countries context can be found in the Appendices 4, 5 and 6.

2. SHARP tool

2.1 Tool description

2.1.1 Definition

SHARP is the abbreviation for ***S**elf-evaluation and **H**olistic **A**ssessment of climate **R**esilience of farmers and **P**astoralists.* As its name implies, it is a self-assessment tool for farmers and pastoralists in developing countries which on the one hand assess farmers' and pastoralists' ongoing state of resilience to climate change and on the other hand allows for the reflection of experiences to help tailor actions and interventions aiming at increasing their resilience. SHARP is conducted primarily at the level of individual farmer/pastoralist and combines an "academic" assessment of resilience based on the resilience indicators from Cabell and Oelofse (2012) with a self-assessment. Furthermore, it focuses not only on single crises but additionally on increasing climate resilience through a holistic approach over the long-term that may include several crises and continuous change (Choptiany et al., 2015).

2.1.2 Goal & Principles

Choptiany et al. (2015) define the goal of the SHARP tool as follows: "The overall goal of SHARP is to assess and increase the resilience of farmers and pastoralists to climate change." Thus, the aim of SHARP is to understand the present level of resilience of farmers and pastoralists while determining how their capacity to adapt can be increased and their vulnerability decreased in order to improve their climate resilience (Choptiany et al., 2015). To achieve this, the tool was constructed on the six principles from Figure 6.

The six principles of SHARP:

1. A holistic approach to understanding farm system resilience;
2. A farm / farmer centred approach integrated to understanding past and present contexts;
3. General resilience as a system property, while climate resilience as a specific property;
4. A participatory, flexible and knowledge exchange and learning approach to project planning, implementation and monitoring and evaluation;
5. Stakeholder engagement practices, and;
6. That climate resilience does not equal development.

Figure 6: The six principles of SHARP (source : Choptiany et al. (2015))

2.1.3 The purpose of SHARP at local, regional and national /international level

At the local level: SHARP assessments are meant to be undertaken by the farmers and pastoralists with expert's input remaining as little as possible. However, a training session is organised at the beginning of the survey to ensure that all facilitators (the ones who distribute/collect the assessments and provide assistance if needed) understand the questions in the same way (Choptiany et al., 2015).

Farmers and pastoralists should be able to use the information from the results of the assessment to determine which farm's area needs improvement and which activities/practices need to be changed consequently. Bigger changes could be then accomplished through future development projects. In parallel to the result analysis, as mentioned earlier, the assessment itself is a learning experience for the participants to reflect about their livelihood, which help them already to build their resilience (Choptiany et al., 2015).

At regional level: The results from SHARP assessments done by participants from Agropastoralist/Farmer Field School (AP/FFS) can also help to adjust or design AP/FFS curricula by incorporating locally-tailored capacity development which then leads to better climate resilience (Choptiany et al., 2015).

At national/international level: The results from SHARP assessments are aggregated into a database where the answers are given without naming the respondents (anonymous). This database can then be used by projects/programmes that want to improve their ability to meet local needs. Furthermore, those results can also help for monitoring and evaluation and can guide legal frameworks/institutions to increase climate resilience (Choptiany et al., 2015).

2.2 Tool methodology

2.2.1 The conceptual basis

To strengthen and enhance climate resilience, the design of the SHARP tool has followed a learning based approach rooted greatly in resilience thinking. Farming systems need certain properties to recover, reorganise and evolve in a future that is uncertain. So the thirteen agro-ecosystem indicators from Cabell and Oelofse (2012) are used to assess these properties (Choptiany et al., 2015).

Figure 7 illustrates the SHARP's integration of farming system and resilience approaches based on the farming system conceptualisations of Dixon et al. (2001) and the indicators from Cabell and Oelofse (2012) (Choptiany et al., 2015).

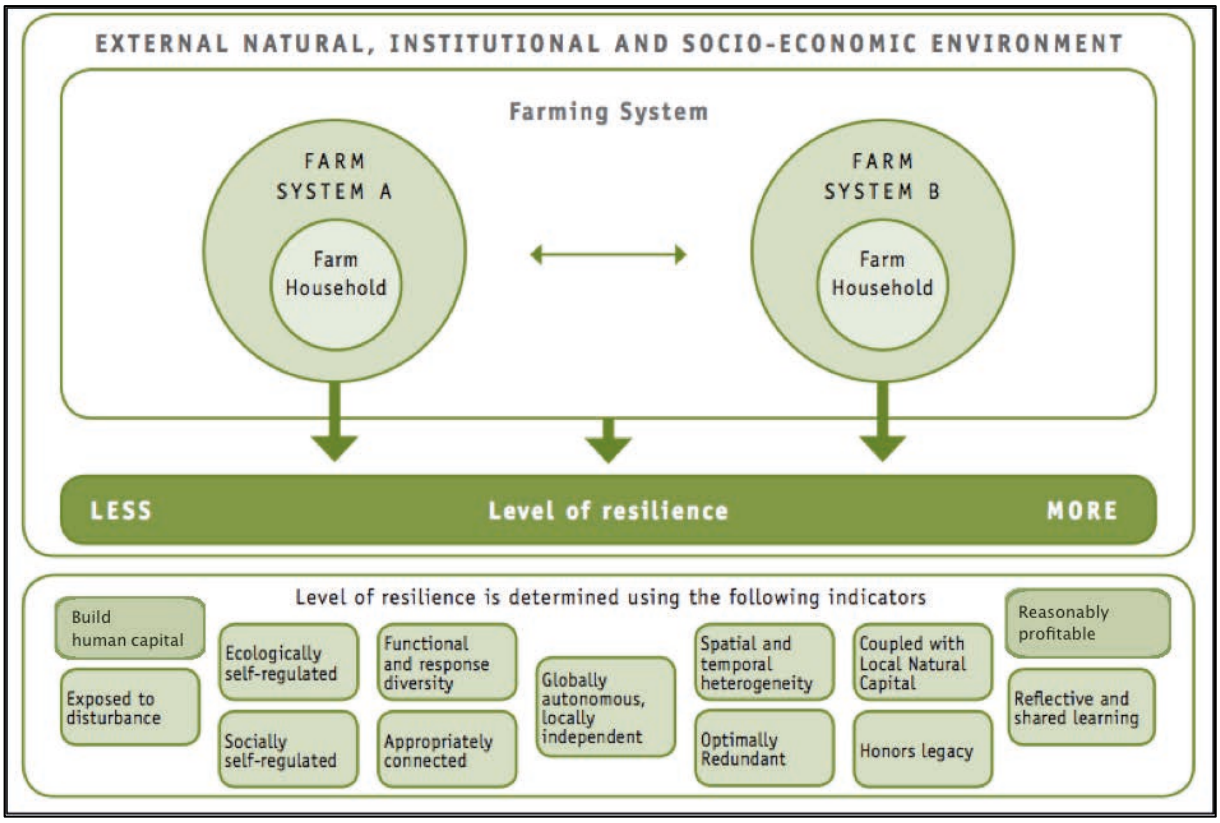

Figure 7: Conceptualisation of farming systems and resilience adapted from Dixon et al. (2001) and the agroecosystem resilience indicators proposed by Cabell and Oelofse (2012); Choptiany et al. (2015)).

The SHARP tool has been designed on the basis of the following definition of *resilience* ensuing from Adger (2000); Carpenter et al. (2001); Gunderson and Holling (2002); Walker et al. (2004): " Resilience is the ability of a system to recover, reorganise and evolve following external stresses and disturbances". In this definition, the notions of change or transformation are included as essential (Choptiany et al., 2015).

2.2.2 The indicators and corresponding questions

As mentioned earlier, SHARP uses the adapted indicators from Cabell and Oelofse (2012) since it is difficult to measure resilience directly (Bennett et al., 2005; Carpenter et al., 2001; Cumming et al., 2005; Darnhofer, 2010; Fletcher et al., 2006). These different components/attributes of resilience which are assessed by these 13 indicators, give a representation of resilience when they are combined (Choptiany et al., 2015).

Through field-tests, interviews and discussions with experts, a list of questions was set up and categorised into the 13 indicator groups (see Appendix 4). Thus, each of the 13 indicators was splitted in subcategories and each subcategory has been phrased into questions for farmers. For instance, as reported in Appendix 4, the first indicator *Socially self-organized* has been splitted into five subacategories (Group membership; Functions of groups; Access to local farmers markets; Previous collective action and Access to communal resources) and each subcategory has been phrased into one or two questions. Hence, each question contributes to a specific indicator.

All questions have a similar structure (see Figure 8): Close-ended questions (often with an initial “Yes/No” followed by more thorough questions if the answer is “yes”), open-ended response to expand if desired, one (or more) mandatory self-assessment of adequacy question(s) and one (or more) mandatory self-assessment of importance to livelihood question(s). To have an accurate survey, the formulation of the questions uses a phrasing as neutral as possible (Choptiany et al., 2015).

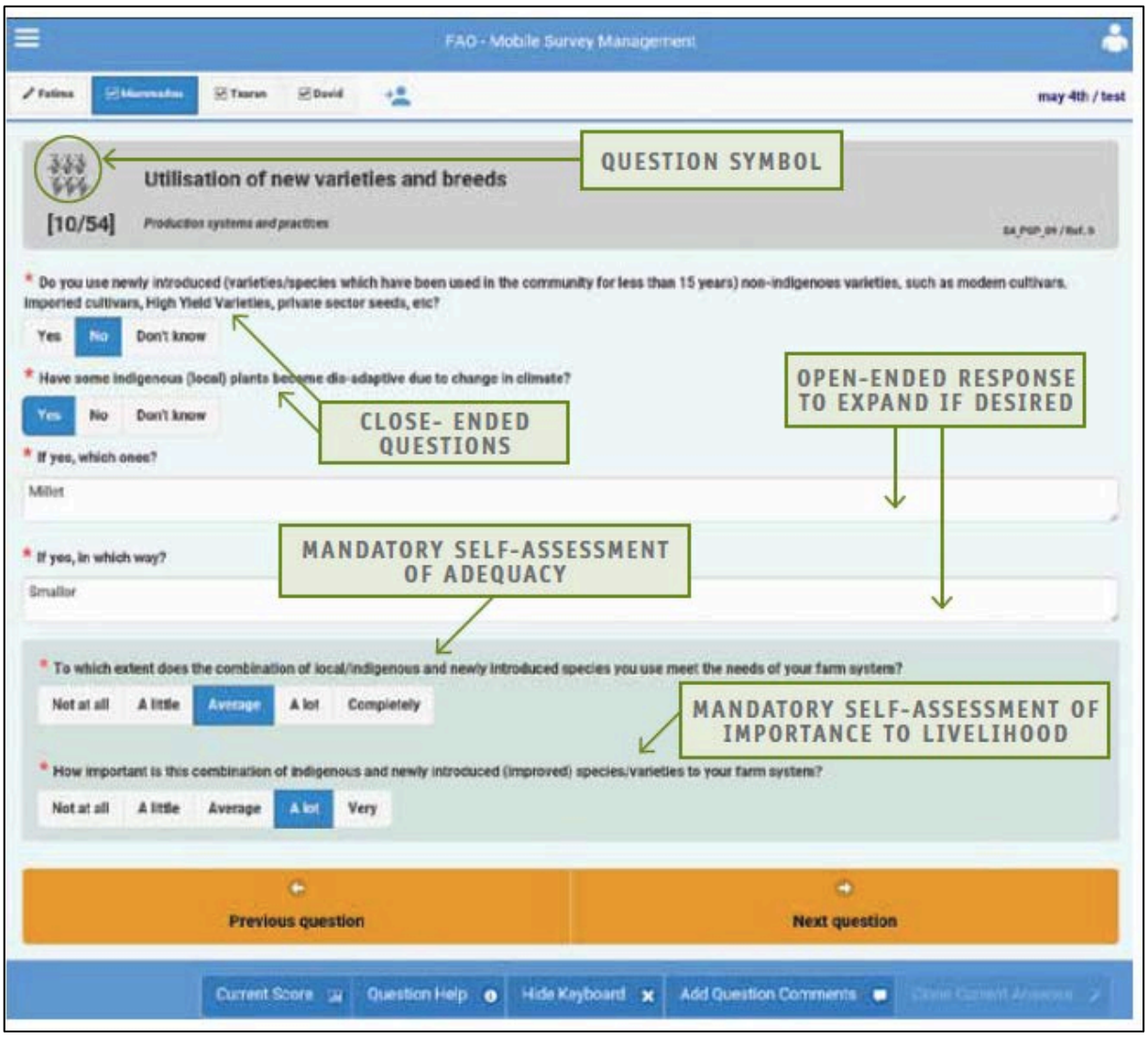

Figure 8: Sample of a question to present the SHARP question framework (source : Choptiany et al. (2015))

In the initial version of SHARP, there are 54 sets of questions but since not all questions correspond to all farmers/pastoralists, the participants will only answer a subset of questions. However, there are mandatory ones that have to be answered by everybody. Quantitative questions provide absolute values and qualitative ones give space for explanations. Also, the questions cover four assessment areas: environmental, social, economic and governance as well as a fifth called “Production systems and practices” that gives general information about the farm/farming system (Choptiany et al., 2015).

2.2.3 The scoring

The responses from the SHARP survey are recorded through an application on a computerised tablet (e.g. generic android tablet) which produces a rapid report right after the survey has been completed. By using a computerised application, calculations such as multiplication and addition of responses can be performed much more quickly, which allows an individualised priority ranking to be produced in real time (see Figure 9) (Choptiany et al., 2015).

This process incorporates the farmers/ pastoralists' self-assessment of importance, adequacy of the component and the "academic" score as developed during an expert e-discussion and feedback from experts. A lower overall score indicates a higher priority. The scoring of self-assessed importance is on an inverse scale to "academic" score and self-assessment as more importance indicates a higher priority, whereas higher "academic" and self-assessed resilience is "better" and thus less important to address. Relative score = "academic score" + self-assessment of adequacy" + "self assessed importance"

QUESTION	RESPONSE	"ACADEMIC" SCORE (/10)	SELF-ASSESSMENT OF ADEQUACY RESPONSE	SELF-ASSESSMENT OF ADEQUACY (/10)	SELF-ASSESSED IMPORTANCE RESPONSE	SELF-ASSESSED IMPORTANCE (/10)	RELATIVE SCORE	PRIORITY RANKING
e.g.	A	B	C	D	E	F	G	H
Sources of water	3	7	Average	5	A little	7.5	19.5	3
Access to credit	N	0	A little	2.5	Very	0	2.5	1
Locally adapted seeds	Y	10	Completely	10	A lot	2.5	22.5	5
Energy sources	3	6	Not at all	0	Average	5	11	2
Group membership	2	6	A lot	7.5	A little	7.5	21	4

Figure 9: Example of the calculations used to assess the resilience of a farm system component and its relative ranking of importance to address (source : Choptiany et al. (2015))

As mentioned earlier, each section has four aspects: 1) a question with a *Yes/No*, selected from a list or number as an answer; 2) a self-assessment of the adequacy of the aspect, selected from the following five answer options: *Not at all (0 pt), A little (2.5 pts), Average (5 pts), A lot (7.5 pts) or Completely (10 pts)*; 3) a relative importance of that aspect for their farm system with again five answer options: *Not at all (10 pts), A little (7.5 pts), Average (5 pts), A lot (2.5 pts), Very (0 pt)* ; 4) subsequent qualitative questions may be asked to provide further explanations that will help in the understanding of a low/high resilience but will not be scored. To quantify the responses, there is a pre-defined scale coded into a score out of ten. Thus, each closed question can have a maximum of 10 points (highest resilience) and a minimum of 0 (lowest resilience) (see Appendix 4) (Choptiany et al., 2015).

Those questions are put together into three parts (see Figure 10). If in one part there is more than one question, the points of all questions of that part are added together and an average of them is calculated. At the end, in the report of the results, if the points of the self-assessment are added to the points of the academic assessment, a relative resilience score out of 30– not an absolute score of resilience- is calculated which gives a resilience priority ranking. If the self-assessment is not taken into account, a resilience score out of 10 is given.

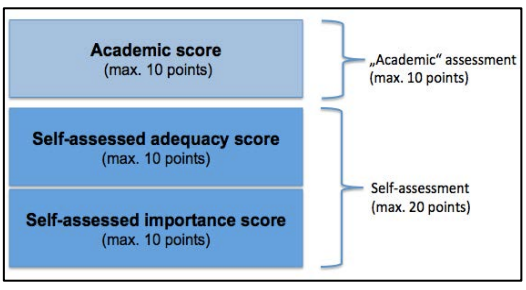

Figure 10: The scoring structure of SHARP (source : author's own elaboration)

2.2.4 The implementation

The implementation cycle of SHARP is composed of three phases (see Figure 11). The first phase includes the self-assessment of the current farmer/pastoralist situation. Then, based on the output from Phase 1, the second phase is made of a gap analysis of climate change resilience weaknesses. And after that, a third phase complements the cycle with a study of possible specific strategies that could help to close the identified gaps of Phase 2. The information gathered in Phase 1 reinforces the second and third phases for the weaknesses/strengths assessments in climate change resilience to later help guiding policies/curricula for addressing the issues (Choptiany et al., 2015).

The intended approach suggests that the process should be repeated in a cyclic pattern. Phase 1 is recommended to be conducted periodically (e.g. every year at the beginning of each AP/FFS) whereas phase 2 and 3 could be conducted as needed, depending on each project (Choptiany et al.,2015). However, many projects using SHARP are instead using it directly as a Monitoring & Evaluation tool (personal communication, Choptiany (2017)).

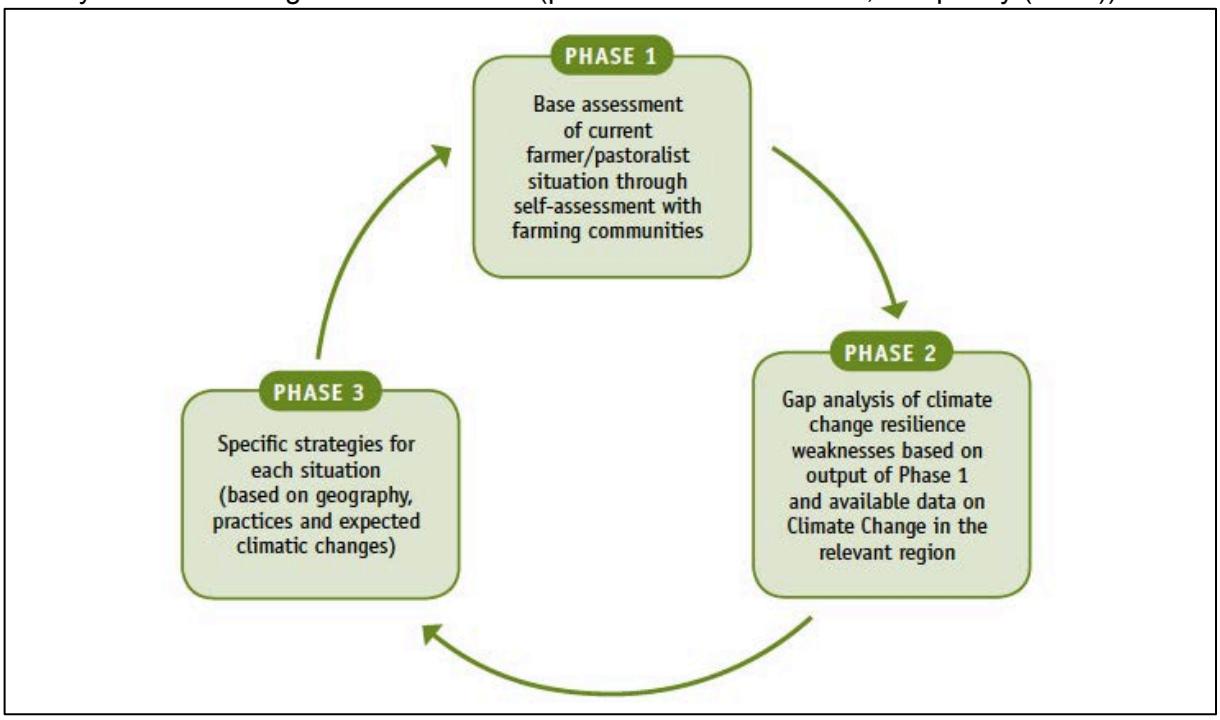

Figure 11: Phases of SHARP process (source : Choptiany et al. (2015))

3. SHARP's adaptation

As mentioned previously, the FAO SHARP tool had to be adapted from the context of developing countries to that of developed countries and then those adaptations had to be translated from English into French to be used in Switzerland. However, in order to be consistent with the initial version, the thirteen behaviour - based indicators from Cabell and Oelofse (2012) (see Appendix 3), which are at the core of the SHARP tool, had to remain unchanged. Additionally, the ten-point scale to score the questions had to be kept as well.

3.1 Questions' adaptation

As mentioned previously, to construct the SHARP tool in a way to be useful for farmers, in the initial version of SHARP each of the thirteen behaviour-based indicators was split into subcategories and each subcategory was formulated into questions for farmers (see Appendix 4).

However, in order to reflect the reality of farming systems from Western countries, several questions had to be rephrased. The direct interaction with experts and farmers during the adaptation as well as during the pre-test enabled to adjust the wording to better suit the Western context (see Appendix 4,5,6).

Furthermore, the questions that were not relevant had to be deleted and others had to be added to integrate the elements that are specific to Western countries (see Appendix 4). The removal or addition of questions were based on discussions with the FAO SHARP team and other experts as well as the literature review. The addition of questions followed the same approach as it was used to elaborate the initial SHARP, meaning that each question contributes to a specific indicator. Each change had to be traceable and justified so all changes can be found in Appendix 4, 5 and 6.

3.2 Scores' adaptation

In order to generate results with the initial SHARP tool, a score was given to the questions. However, since the conditions in developing countries are, for some aspects, considerably different from those in Western countries, the scoring also had to be adjusted (see Appendix 4). For instance, for some questions, the adapted score had to be stricter since the infrastructures in Western farming systems are, in most cases, more developed. An example of it is the question about the access/use of information sources on cropping/livestock practices corresponding to the 3rd indicator (Appropriately connected) and the subcategory 3.3 (Access/Use of information sources) (see Appendix 4). In the initial SHARP scoring system, having access to one source gives a score of 4 out of 10 whereas in the adapted SHARP scoring system, using one source of information gives a score of 2 out of 10 (10 being the highest resilience score).

The scoring is very subjective since for the answer to each question a value between 0 and 10 had to be given to remain in accordance with the initial version of SHARP. Therefore, the score changes have mainly been achieved through discussions with fifteen experts from different fields. In addition, some of them have been completed in reference to the literature.

4. Sampling

As mentioned previously, the sampling for the test of the adapted SHARP tool consisted of twenty-five farmers from the Canton of Vaud in Switzerland. To test the adapted tool, I organised three morning sessions of 7-9 farmers over three days in an office of the *Service de l'Agriculture et de la Viticulture du Canton de Vaud* (SAVI). Each session lasted three hours and consisted of two hours to test the adapted tool and about thirty minutes at the beginning to introduce the tool and thirty minutes at the end to discuss the results and get a feedback. The majority of the farmers were familiar with computerised tablets so after showing them the functioning of the SHARP application, each farmer could answer the questionnaire of the application independently and I was there in case they had questions.

This sampling is not statistically representative because, on the one hand, given the timeframe of the study, it was not possible to test the tool with a statistically significant number of farmers. On the other hand, the sampling was not random because, for logistical reasons, the chosen participants were all living in the region and had already participated in previous projects in the past.

However, this sample provides at least some data to be able to verify if the adapted tool worked well and whether coherent results come out and it also allowed to check, for the first time, the acceptance of the tool by Western farmers and to provide precious feedback for the finalisation of the new/adapted version of the tool.

IV. Results

1. Context for Swiss farmers

As mentioned above, the adapted SHARP tool has been tested in the Vaud Canton of Switzerland. Thus, in order to contextualise the sampling which tested the tool, the main relevant aspects for Swiss and Vaud farmers are presented below.

1.1 Geographical context

Switzerland's total surface area is 41'285 square kilometers and is composed of three main geographic regions: The Alps, which cover about 60% of the country's surface area, the Swiss Plateau covering 30% and the Jura covering 10%. In 2013, Switzerland's surface area was covered by 36.9% of utilised agricultural areas, 30.8% of forests and woodland, 6.8% of settlement and urban area, and about 25.5 % of unproductive area (watercourses, non-productive vegetation and areas without vegetation). The altitude varies between 193 m and 4'634 meters above sea level (EDA, 2016; FSO, 2013).

The Vaud Canton has a total surface area of 3'212 square kilometers with its major part (almost half of it, 1400 km2) situated on the Plateau. Farming area covers 42% of the total surface, followed by 32% of wooded area, 10% of inhabited/infrastructure area and 16% of non-productive area (lakes, rivers, glaciers, snow, non-productive vegetation or no vegetation etc.)(DFIRE, 2016; VDSTAT, 2016a, 2016b). The altitude of the Canton varies between 372 and 3210 meters above sea level (DFIRE, 2016).

Figure 12: Map of Switzerland (source: Larousse (2016))

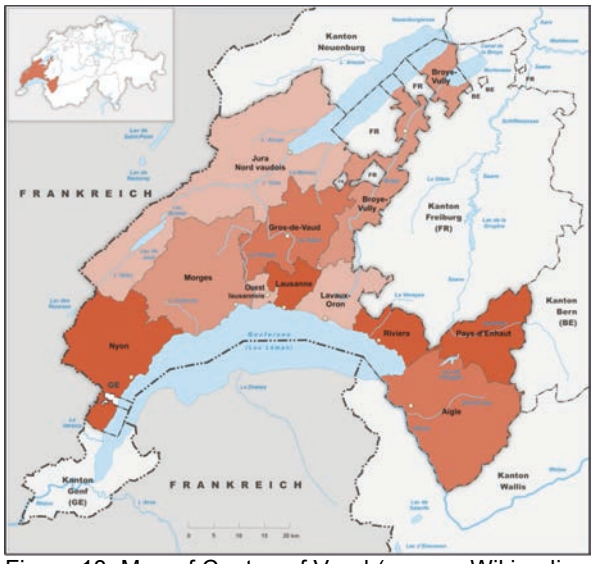

Figure 13: Map of Canton of Vaud (source: Wikipedia (2017a))

- The Swiss Plateau

Two-thirds of the total population lives in the Swiss Plateau region and almost half of the Plateau (49.5%) is given over to agricultural use. Most of Switzerland's main towns, cities and industrial centres are also concentrated on the Plateau. Even though it is called a "Plateau", this region is not flat and uniform but is made up of many hilly areas, large lakes (Genève, Neuchâtel, Zurich, Konstanz) and major rivers (Aare, Saane, Rhine) (EDA, 2016).

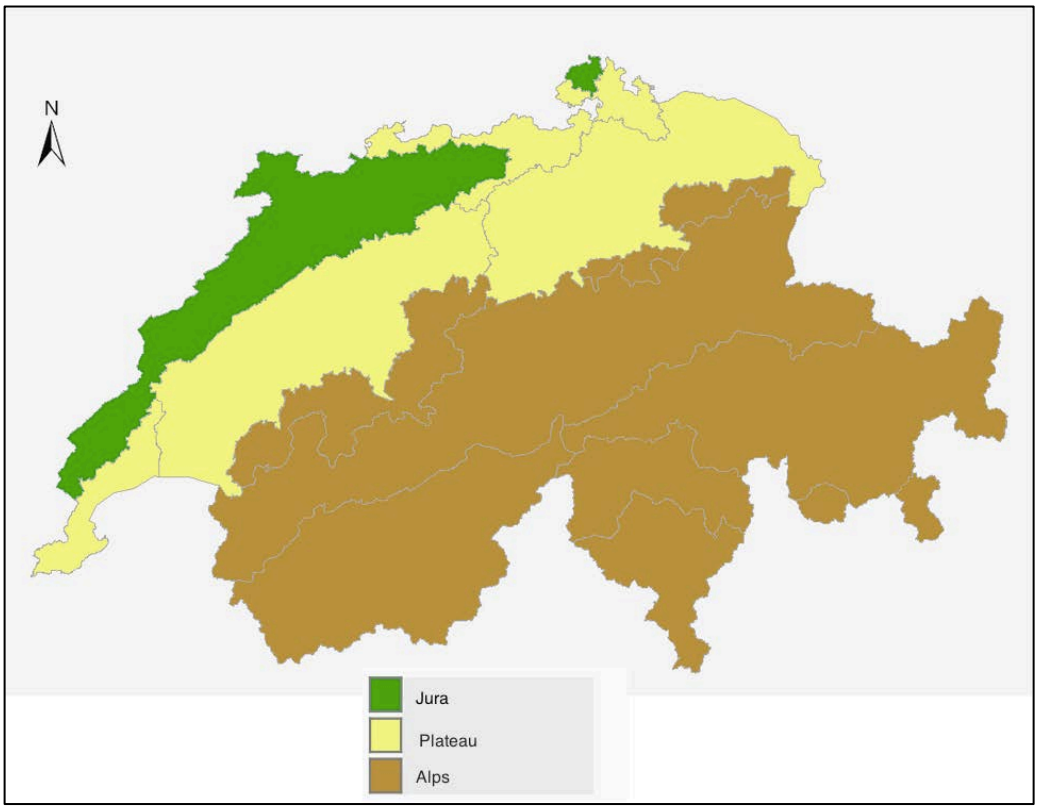

Figure 14: The three main geographical regions of Switzerland (adapted from: Wikipedia (2017b))

- The Jura

The Jura region is situated in Northern Switzerland and has an average altitude of 700 meters above sea level. Forest covers about half of the surface (47.4%) and the other half is mostly covered by agricultural land (43.4%) with only 8.2% covered by housing and industry (EDA, 2016).

A part of the Vaud Canton is also situated in the Jura region (EDA, 2016).

- The Alps

The Alp region covers most of Switzerland's surface area but in this region there is little agricultural land and only 11% of the population lives there. This can be explained by its average altitude being 2500 meters above sea level (Anylatitude, 2016; EDA, 2016).

About 20 % (700 km2) of the Vaud Canton is situated in the Alp region (Fallot, 2016).

1.2 Climatic context

Since Switzerland is in the centre of Europe, the country is at the intersection of major climate zones. The relatively nearby Atlantic conditions strongly influence the Swiss climate through Atlantic winds transporting moisture and mild maritime air towards the Alps. Through these westerly winds, winter and summer are mild and rain falls throughout the year. Even though there are four distinct seasons throughout the country, it is a country of microclimates with the Alps acting as a climatic divider between the North and the South of Switzerland (EDA, 2016).

The topography and different altitudes of Switzerland is the principle reason why the climate varies considerably from one region to the next. The altitude conditions the temperatures. Thus on the Swiss Plateau the average temperature is ~1°C in January and ~17°C in July whereas in the regions above 1'500 meters above sea level it is about -5°C in January with frequent snow fall and ~11°C in July (EDA, 2016).

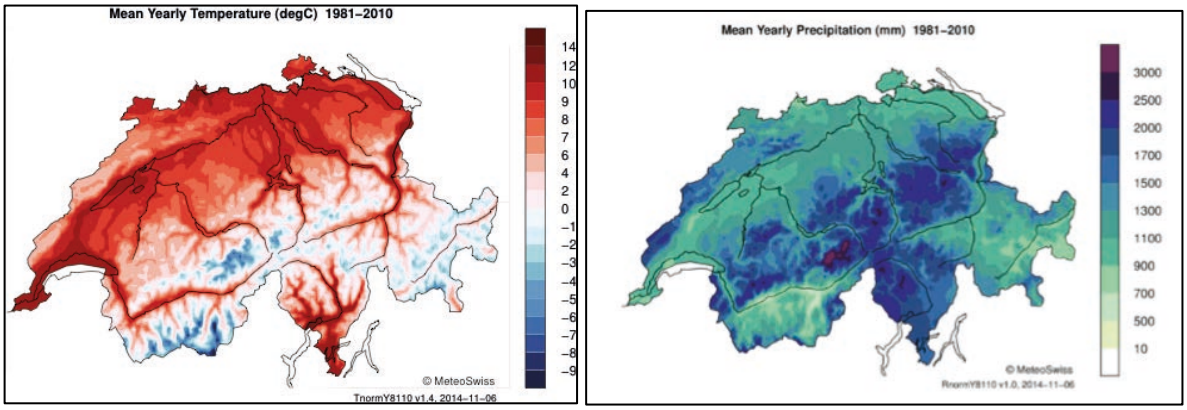

Figure 15: Mean yearly temperature and precipitation in Switzerland between 1981-2010 (source : MeteoSwiss (2016))

1.3 Context of Swiss agricultural structures

1.3.1 Global overview of the food supply chain

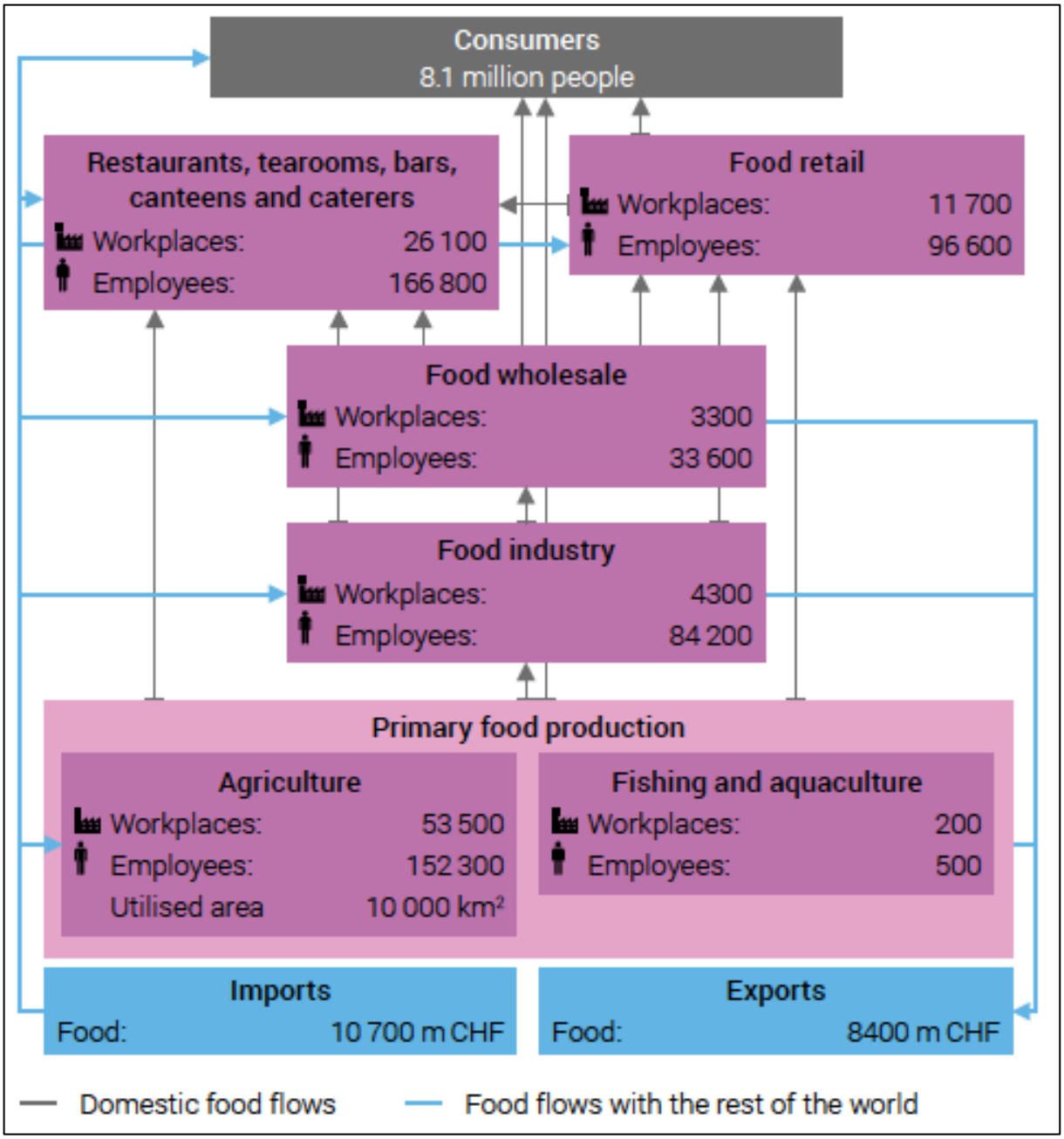

Figure 16: Food supply chain in Switzerland in 2013 (source : FSO (2016b))

In 2013, from Switzerland's total workforce of 5 million, about 530'000 people (~11%) worked within the food supply chain (FSO, 2016b) (see Figure 15).

1.3.2 Number of farm workers

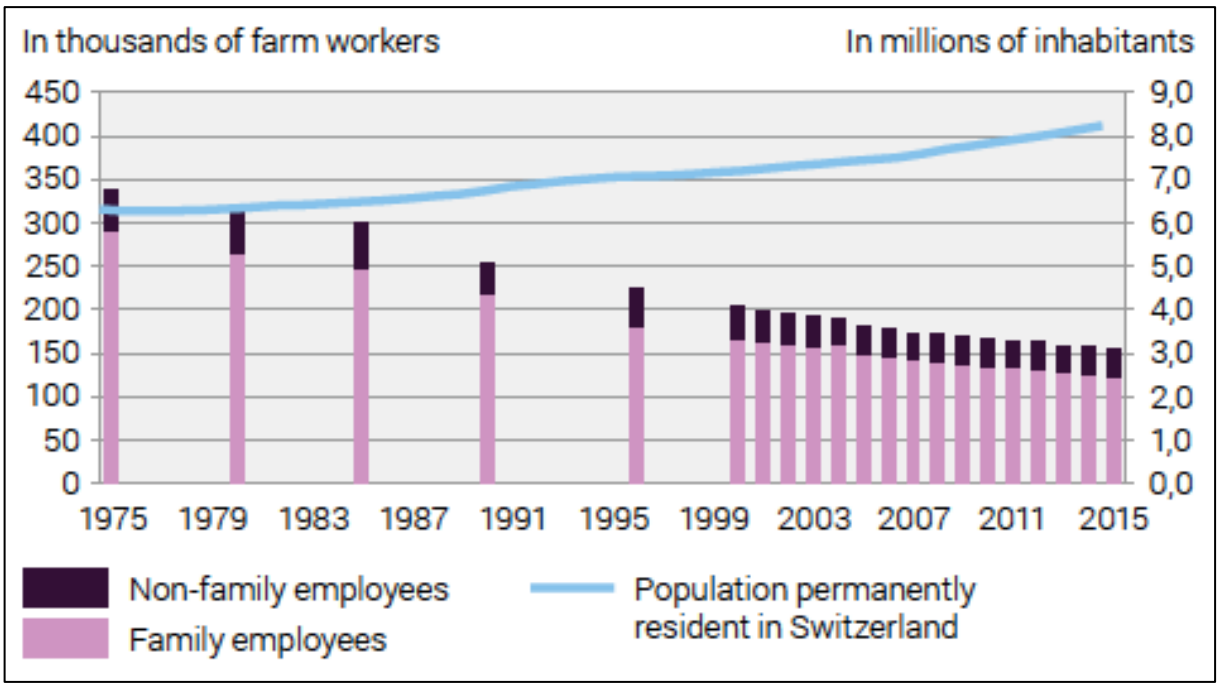

Figure 17: Swiss farm workers and resident population (source : FSO (2016b))

As can be seen in Figure 16, the number of farm workers is continuing to decrease whereas the population is increasing. Thus, agriculture has to supply food to an increasing number of people with fewer and fewer employees (FSO, 2016b). In 2013, 57.7% of the gross Swiss food consumption (including food produced from imported animal feed) and 50.2% of the net food consumption (excluding food produced from imported animal feed) was produced in Switzerland (FSO, 2016a).

In 2013, about 3% (152'300) of all Swiss workers worked in the agricultural sector (FSO, 2016b) with about 45% of them working full time and 55% working part-time (FOAG, 2016a).

In the Vaud Canton in 2013, there were 12'899 people working in the agricultural sector which represents about 8% of all Swiss farm workers (DFIRE, 2015).

1.3.3 Farms by type of farming

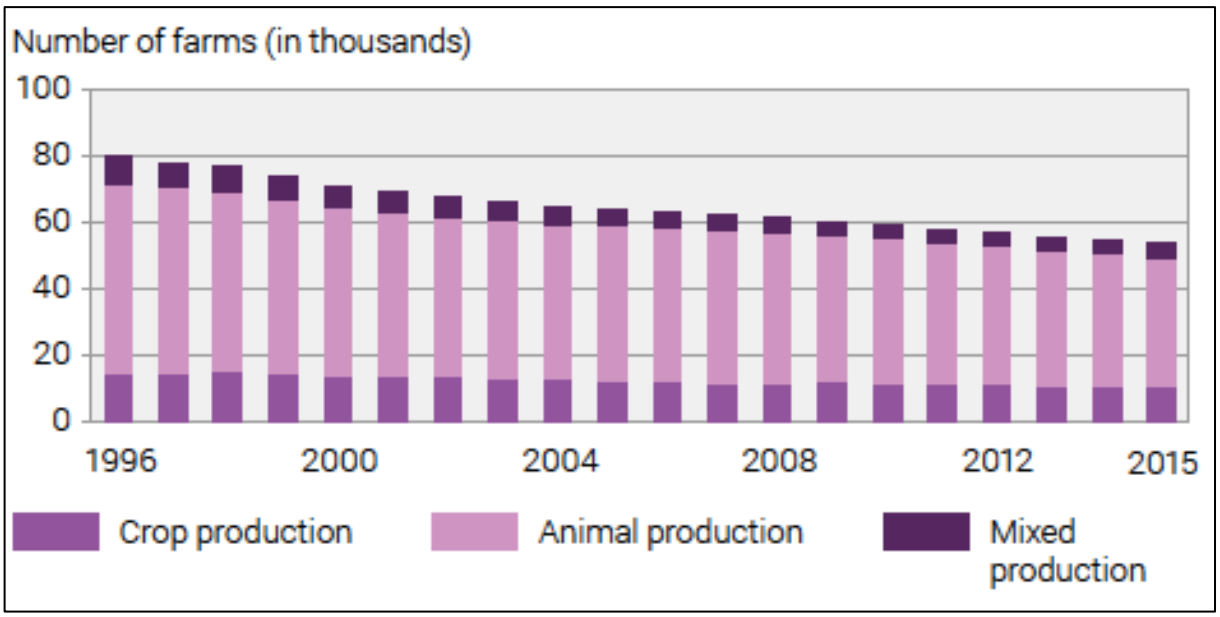

Figure 18: Swiss farms by type of farming (source : FSO (2016b))

The number of farms decreased from 79'500 to 53'000 between 1996 and 2015 (see Figure 17). Thus, compared to 1996, the remaining farms cultivate today an area that is about 45% larger per farm (FSO, 2016b). Animal production remains dominant in Switzerland followed by crop production and then mixed production (FSO, 2016b).

In 2013 in the Vaud Canton, there were 3'841 farms which represented about 7% of all farms in Switzerland. Since 1980, the level of employment in agriculture has decreased by half (-52%) (DFIRE, 2015).

1.3.4 Use of utilised agricultural area

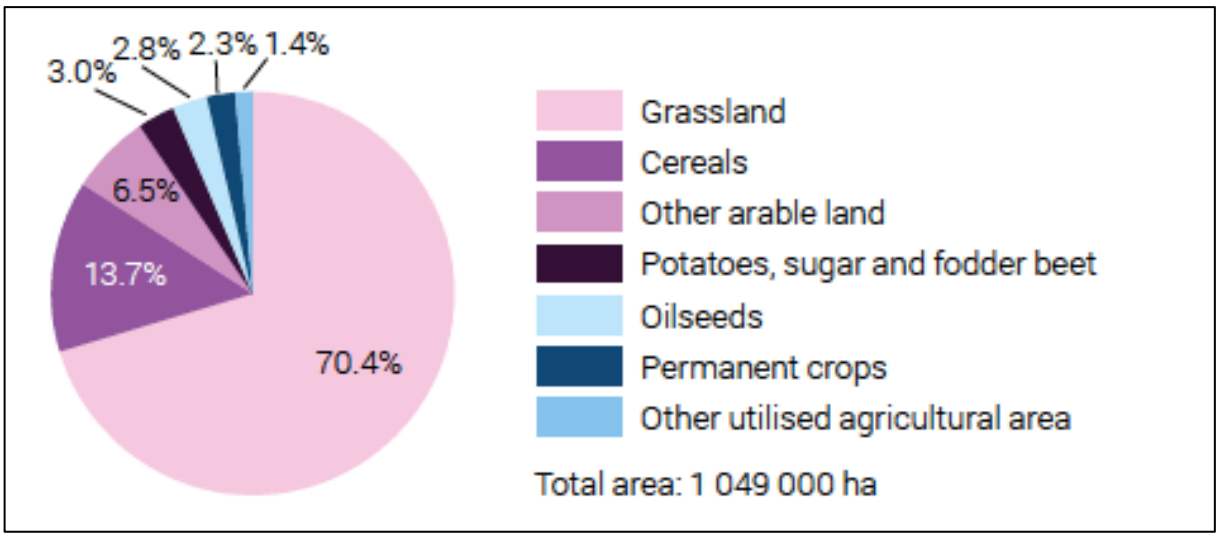

Figure 19: Swiss use of utilised agricultural area in 2015 (source : FSO (2016b))

The total utilised agricultural area (UAA) in Switzerland varies slightly each year but in the past 5 years it has always been around 1'050'000 ha which represents about 25 % of the total country surface (see Figure 18). The average UAA per farm is around 20 ha (FOAG, 2016a; MySwitzerland, 2016). Most (70%) of the utilised agricultural area (UAA) of Switzerland is used for grassland. The rest of the surface area is used mainly for the most important arable crop which is cereals (~14%). In 2015, 13% of the area was managed organically which represented 12% of all farms (FSO, 2016b).

In the Vaud Canton in 2013, the UAA was 109'129 ha which is about 10 % of the total utilised agricultural area of Switzerland. It is the second largest Canton concerning the UAA (SCRIS, 2016). Most of this land is used for grassland (~45%) and cereals (~30%). Over the past 30 years, the average farm size has almost doubled, increasing from 14.7 ha in 1980 to 28.4 ha in 2013 (DFIRE, 2015). Regarding organic agriculture in the Vaud Canton, in 2014 only 5.1% were organic (Agridea, 2016).

1.3.5 Total income per farm

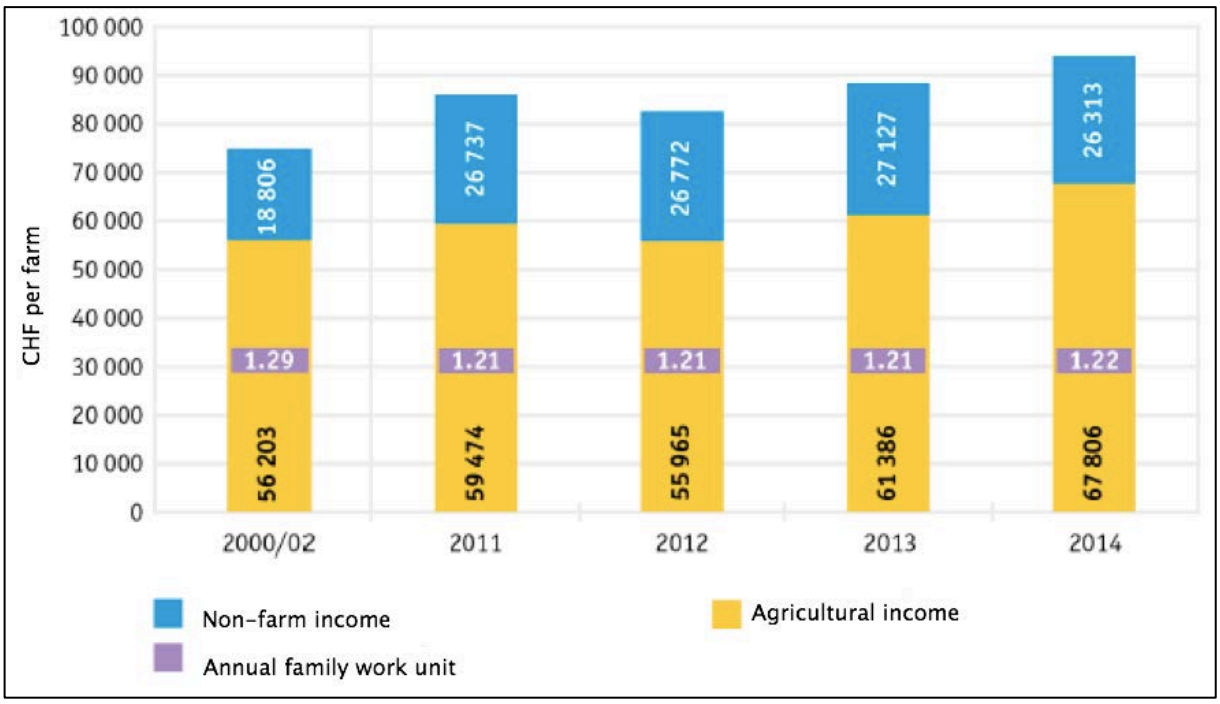

Figure 20: Swiss income per farm. Evolution of farms' income: average of all regions (adapted from FOAG (2016a))

The Swiss average yearly agricultural income per farm is about 67'800 CHF and in addition to that, a farming household usually earns around one quarter of its total income from outside agriculture (FSO, 2016b). The details about the agricultural income are represented in Figure 19. Between 2011 and 2014, the average annual family work unit was around 1.2 UTAF where 1 UTAF is equivalent to the maximum working amount for 1 person which is 280 working days (Lambelet et al., 2003).

In 2015, the Swiss confederation spent 5.2 % of its total spending (~69 billions) on agriculture and food which represented 3.59 billion CHF (EFV, 2017). This amount is mainly represented by the dark green area (Direct Payments) on Figure 20.

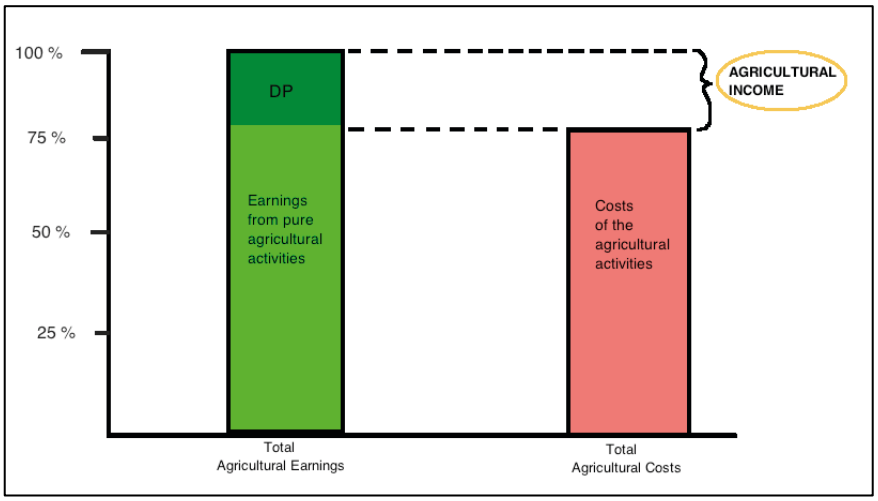

Figure 21 : Average share of earnings and costs of practicing Farming in Switzerland; DP = Direct Payments (source : author's own elaboration ; data from FSO (2016c))

1.4 Governance context for Swiss farmers from 1950 until today

From the end of the Second World War until 1990, Swiss agriculture was governed by the agricultural law that followed the following major principle: "The price must cover the production costs". Under this law, agriculture was protected at the borders as directed by the State and farmers received "parity wages" which resulted in strongly intensive production systems (Chappuis et al., 2008).

However, at the end of 1960s, society started noticing progressively the negative externalities from agriculture and began to contest about it and ecology began to gain in importance. Therefore, by the end of the 1970s some additional regulations were introduced to limit surplus such as the "milk quotas" and the limitation of the size of buildings for the production of meat and eggs (Chappuis et al., 2008).

Later, in the 1980s-1990s, the principle of "parity wages" was criticized because the price of the products needed to increase constantly to such an extent that the price was out of kilter with neighbouring countries. So, markets were saturated and more and more money was requested from the State which increased its costs. The situation clearly needed to change. In this way, a new idea was born: to remunerate the farmers directly for their services of public interest. Thus, the pricing policy would be separated from the income policy by means of direct payments. In other words, a certain sum of money would be paid by the state to the farmers independently of what they produced (see Figure 21) (Chappuis et al., 2008).

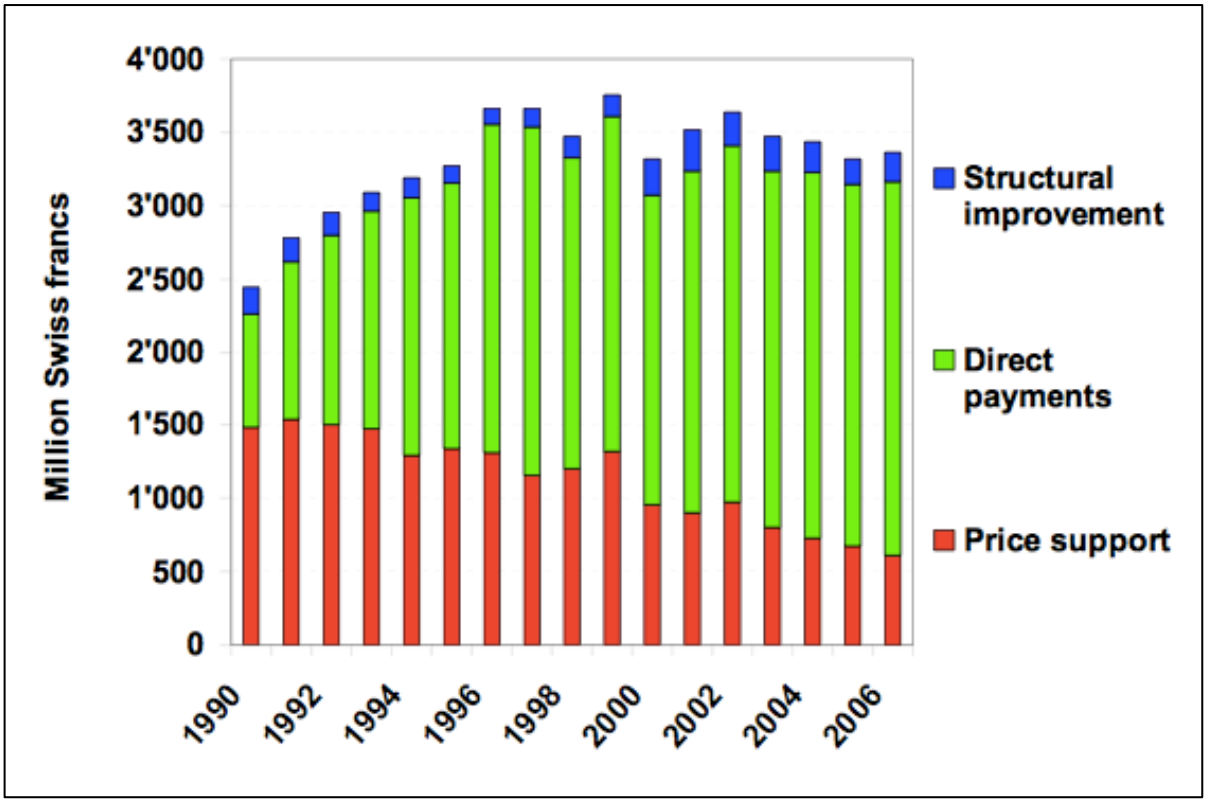

Figure 22: Swiss agricultural reform 1992 and public expenditures : from price support to direct payments (source :Joerin (2007))

This idea was put into effect by two main elements from the 1990s: trade liberalisation with the GATT (General Agreement on Tariffs and Trade) and the increasing alarming environmental consequences arising from agriculture. This led to the agricultural reform/reorientation that began in 1992 which included, the prohibition of some environmentally harmful practices, a strategy incorporating the aspects of research, training and outreach by extension services and voting on Article 104 of the Federal Constitution. The latter is a crucial step because this Article 104, voted and approved in 1996, constitutes henceforth the basis for Swiss agricultural policy (see Appendix 1). As it is written in Appendix 1, Switzerland has anchored in its Constitution the requirement for agriculture to respect natural resources. Thus, this Constitutional basis led to coupling direct payments to environmental performances (Chappuis et al., 2008).

To implement the content of Article 104, from 1999 until today, every four years a new agricultural policy has been adopted with further measures (PA 2002, PA 2007, PA 2011, PA 2014-2017) (see Figure 22) (Chappuis et al., 2008).

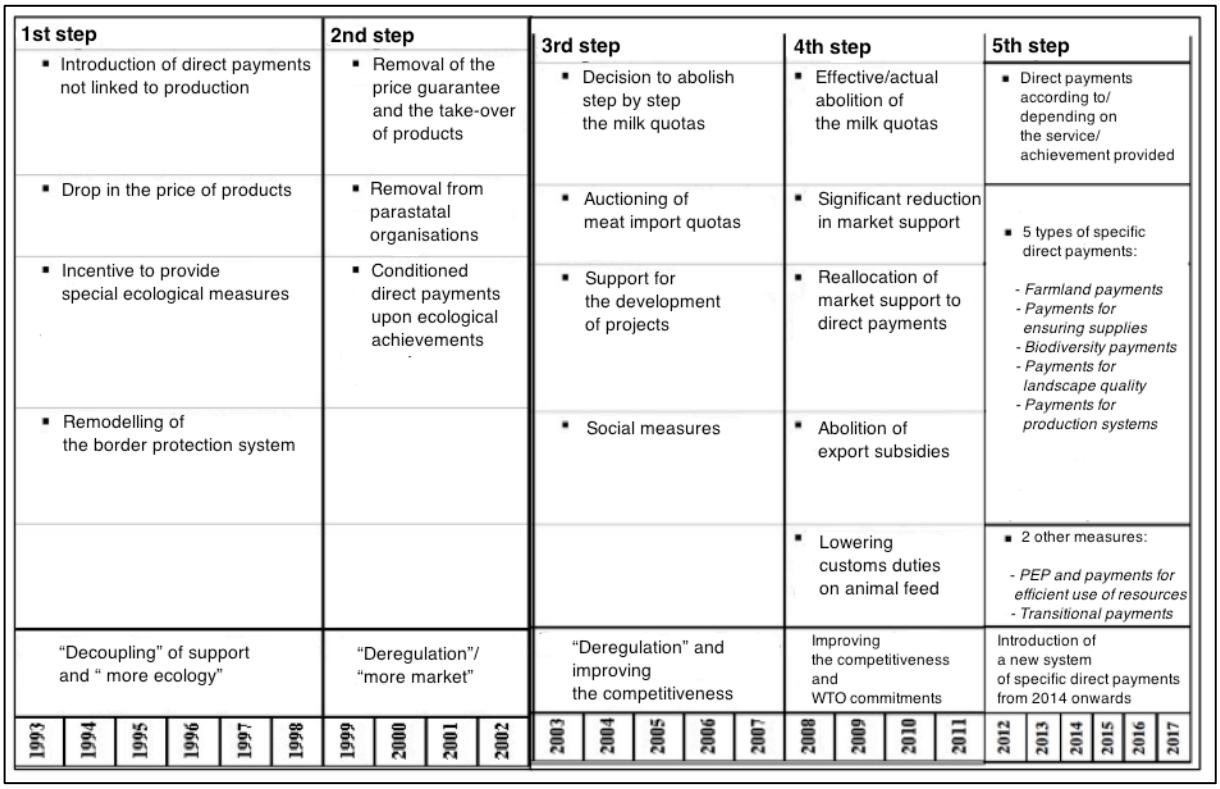

Figure 23: Steps from the reform of the Swiss agricultural policy (source : Agrihebdo (2016); Chappuis et al. (2008))

Currently, farmers have to implement the Agricultural Policy 2014-2017. This time frame faces major challenges, namely: (1) the improvement of Swiss agriculture's competitiveness to access additional markets, (2) the increase of farmers' services to the community and the efficient use of resources, as well as (3) the minimisation of the negative effects of farming on the environment. In this context, the agricultural policy and direct payments system must be as effective and efficient as possible. Thus, for that to happen, concrete aims have been set (see Table 2) and measures with unspecified aims have been replaced by specific tools through an improvement of the direct payments system (Lanz, 2012) (see Figure 23).

Table 2: Aims of the agricultural policy for 2014-2017 (source : Lanz (2012))

Field	Aspect	Situation in 2007/09	Aims for 2017
Economy	Productivity	+2.1% p.a.	+2.1 % p.a.
	Renewal of capital	30 years	30 years
Social	Incomes in the sector	-0.7 % p.a.	Reduction in the drop in incomes to below 0.5 % p.a.
Ensuring food supplies	Gross production	24,200 TJ	24,500 TJ
	Net production	21,500 TJ	22,100 TJ
	Farmed land in permanently settled areas	-1,900 ha p.a.	Reduction in loss of farmland to below 1,000 ha p.a.
Natural heritage, environment	N-efficiency	29 %	33 %
	P-efficiency	59 %	68 %
	NH_3 emissions	48,600 t N	41,000 t N
	Quantity of ESA*	60,000 ha in lowland areas	65,000 ha in lowland areas
	Quality of ESA	36 % interconnected 27 % high-quality	50% interconnected 40% high quality
Farmland	Farmed land in mountain areas	-1,400 ha p.a.	Reduction in advance of woodland by 20%
Animal welfare	Participation in ROEL programmes	72%	80%

*ESA = ecological set-aside areas

In the new direct payment system, the farmers must adhere to certain ecological requirements called “Proof of Ecological Performance” (PEP) to receive agricultural direct payments. Under the PEP, the following measures are included: a balanced use of fertilisers, an adequate share of biodiversity acreages, a planned and strict crop rotation, adequate soil protection, a particular choice and application of pesticides and adequate livestock farming. Thus, if the farmers do not meet these requirements, they will receive reduced direct payments or, in the worst case, no direct payments which means that the direct payments are conditional upon PEP (FOAG, 2015, 2016d). At present, there are the following seven types of contributions/payments (FOAG, 2016a):

1) **Farmland Contributions** including the maintenance of an open landscape through agriculture on the whole farmland, adaptive compensation for particular difficulties and promoting pasture on the highlands
2) **Contributions for ensuring minimum food supplies** including the maintenance of the capacity of production, compensation for natural handicaps (altitude, slope) and promotion of the cultivation of crops and specific strategic food (sugar and potatoes, for example)
3) **Contributions to biodiversity** including the maintenance and promotion of the biodiversity of species and habitats
4) **Contributions to the quality of the landscape** including the preservation, promotion and development of the diversity of cultivated landscapes
5) **Contributions to the production systems** including the promotion of production systems that are providing ecosystem services, protective of natural resources and animals
6) **Contributions for efficient use of resources** including the sustainable use of natural resources
7) **Transition Subsidies** so that the evolution of the farms’ structures are not a shock for the farmers’ families

This concept is summarized in the below Figure:

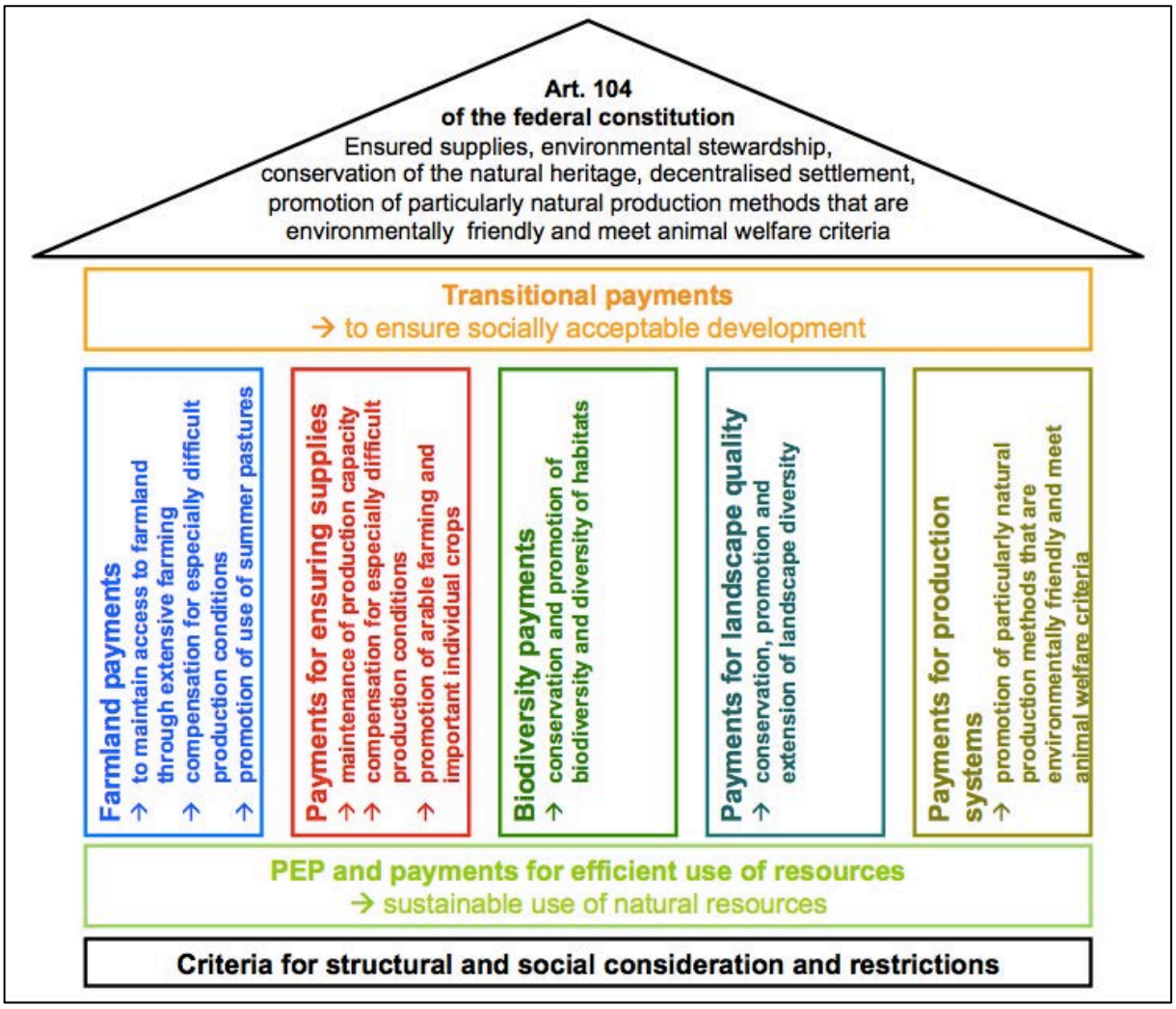

Figure 24: The concept of direct payments in Switzerland (translated from: FOAG (2016a))

In addition, “The Direct Payment Ordinance” sets further detailed requirements and limitations for farmers to receive the payments. For instance, the minimal labour input is 0.2 standard labour units/year (UMOS), the minimal part of family-based labour is 50%, the age limit is 65 years old and the farmers must follow the principle of minimal curriculum (FOAG, 2016c).

2. Obtained results

This part presents the results of the test of the adapted SHARP tool/application. To enable an analysis of the whole sampling (twenty-five farmers), the code of the application containing the data collected had to be exported from the tablets to a computer and then translated by means of a computerised macro. Once the code was translated, graphs could be drawn through the Excel program.

2.1 Identification of the least and most resilient sections

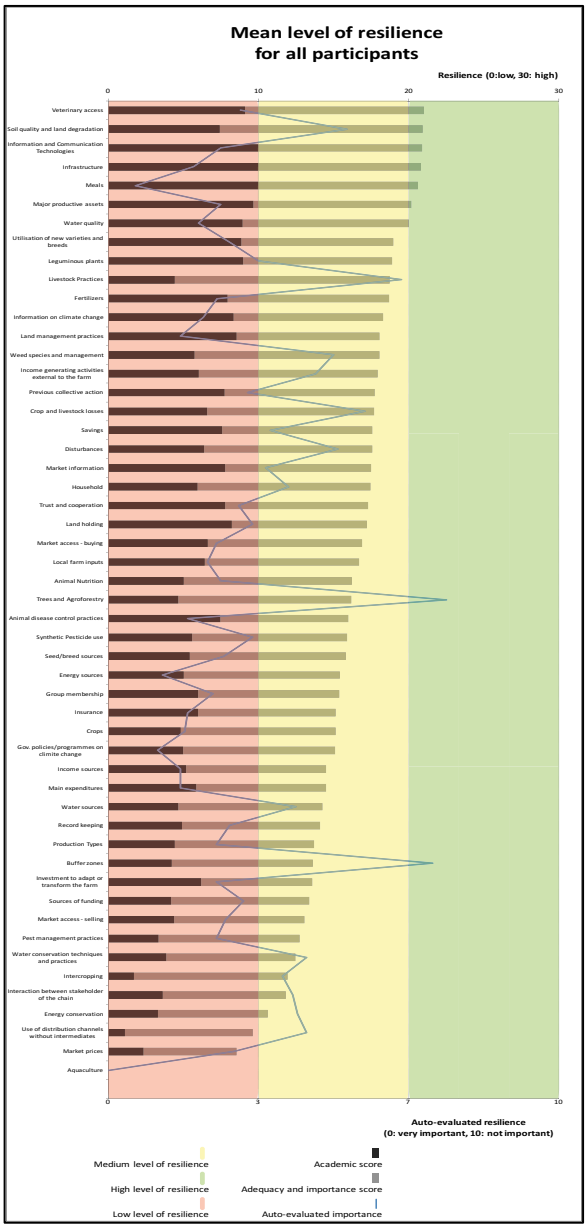

Figure 25: Mean level of resilience for all participants (with self-evaluation) (Data source: surveys from author)

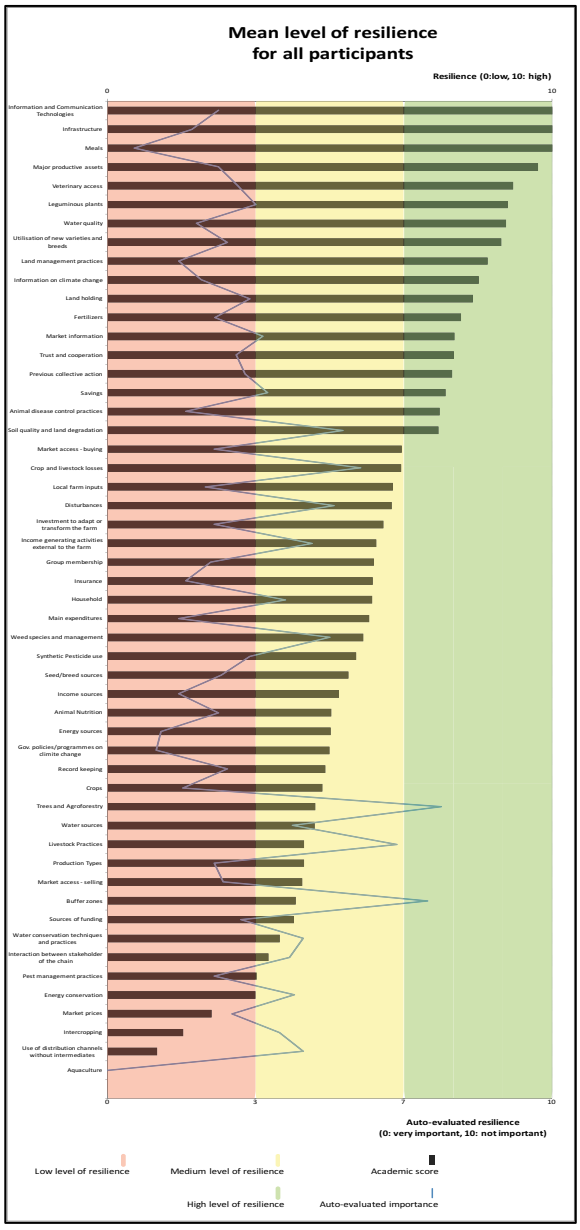

Figure 26: Mean level of resilience for all participants (without self-evaluation) (Data source: surveys from author)

The generated graphs derived from the data from all participants indicated that the most resilient sections of the investigated farming systems are the following: *Veterinary access, Information & Communication Technologies*, *Infrastructures* and *Meals*. Those four sections are in the top 5 of the graph that includes the self-evaluation as well as the graph that excludes the self-evaluation which increases the reliability.

Top 5 (with self-ev.)	Top 5 (without self-ev.)	Lowest 5 (with self-ev.)	Lowest 5 (without self-ev)
***Veterinary access**	****Information and Communication Technologies**	***Market prices**	*****Use of distribution channels without inter-mediaries**
Soil quality and land degradation	*****Infrastructure**	****Use of distribution channels without inter-mediaries**	******Inter-cropping**
****Information and Communication Technologies**	******Meals**	Energy conservation	***Market prices**
*****Infrastructure**	Major productive assets	Interaction between stakeholders	Energy conservation
******Meals**	***Veterinary access**	*****Inter-cropping**	Pest management practices
Overall resilience average: 15.9 / 30 -> medium resilience level			

According to these graphs, the least resilient sections of the investigated farming systems are the following: *Market prices*, *Use of distribution channels without intermediaries and Intercropping*. Again, these three sections are in the lowest 5 of both graphs which increases the reliability. The section *Energy conservation* is also present in the lowest 5 of both graphs but for that section there was a scoring mistake in the computerised application so it will not be taken into account in the analysis. Likewise, the section *Aquaculture* has the lowest score on both graphs but it will not be discussed further because it just comes from the fact that all farmers who participated do not practice aquaculture.

The majority of all sections lie in the yellow zone which corresponds to an average resilience priority ranking score of 15.9 out of a maximum of 30 points (see Figure 25). The blue line of self-assessed importance indicates on both graphs that for the investigated farmers the three most important sections of their farming system are *Meals, Governmental policies / programs on climate change* as well as *Energy Sources*. None of those three belong to the ten least resilient sections. The blue line shows also that *Buffer zone*, *Trees and Agroforestry* as well as *Diversity in Livestock Practices* seems not so important to them.

2.2 Identification of the gaps

To identify the main gaps, the analysis will focus on the above mentioned least resilient sections.

2.2.1 Intercropping

- Presence of intercropping

Out of the twenty-five farmers who participated in the test, fourteen of them (56%) did not practice intercropping. Only eleven of them (44%) did integrate intercropping in their farming system.

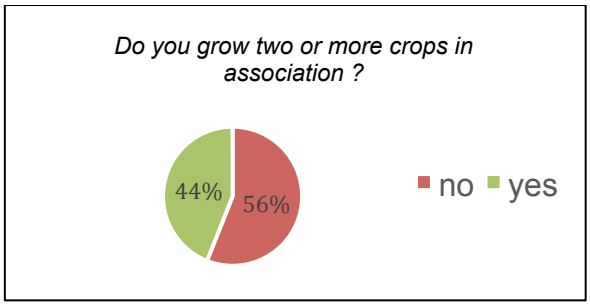

Figure 27: Whether intercropping is present or not (Data source: surveys from author)

From those eleven farmers, four of them practice intercropping on fifteen percent of their cultivated crops, two of them practice intercropping on one third of their cultivated crops, two of them on ten percent, another two of them on five percent and one of them on twenty-five percent of their cultivated crops. So, for those who do integrate intercropping in their farming system, the percentage of their cultivated crops which is intercropped varies between five and thirty-three percent meaning that for those farmers, not more than one third of their cultivated crops is intercropped.

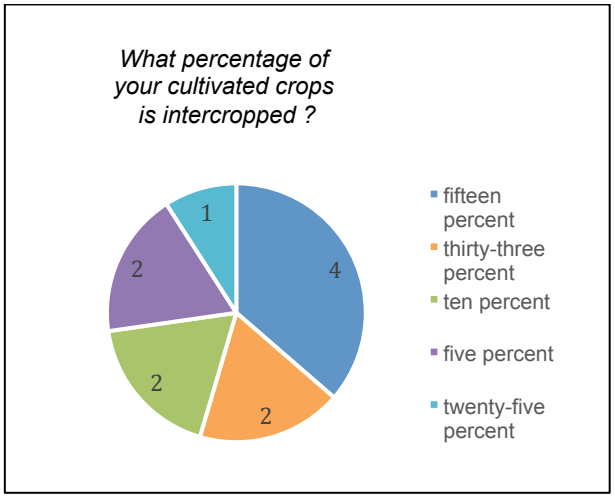

Figure 28: Intercropping as a percentage of total cultivated crops (Data source: surveys from author)

- Self-assessed adequacy of intercropping

According to the eleven farmers who practice intercropping, six of them (55%) are very satisfied with their intercropping practice and five of them (45%) are averagely satisfied.

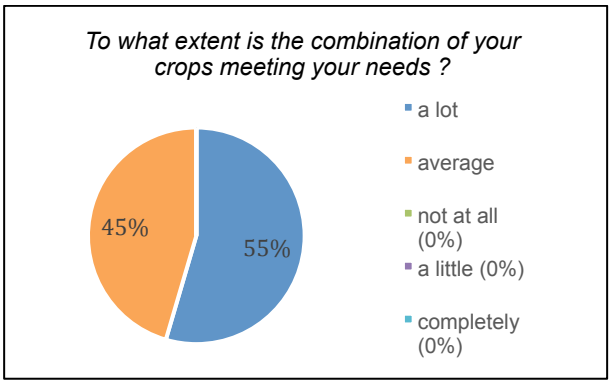

Figure 29: Self-assessed adequacy of intercropping (Data source: surveys from author)

- Self-assessed importance of intercropping

The majority of the farmers (55%) who practice intercropping acknowledge averagely the role that intercropping has in their farming systems.

Five farmers of all who practice intercropping (45%) seem to recognise that intercropping is very important but when looking at figure 28, not more than one third of their cultivated crops was effectively under intercropping.

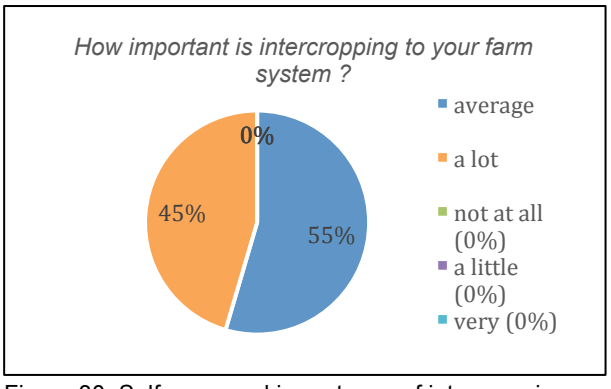

Figure 30: Self-assessed importance of intercropping (Data source: surveys from author)

2.2.2 Market prices

- Price evolution from most profitable products

The price evolution of the most profitable products is decreasing for 39% of the products, for 19% too low and for 12% unpredictable. Only for 24% is the price evolution perceived as stable and for 6% as increasing.

Thus, for about two-thirds of the farmers, the price of most of their products sold evolves negatively.

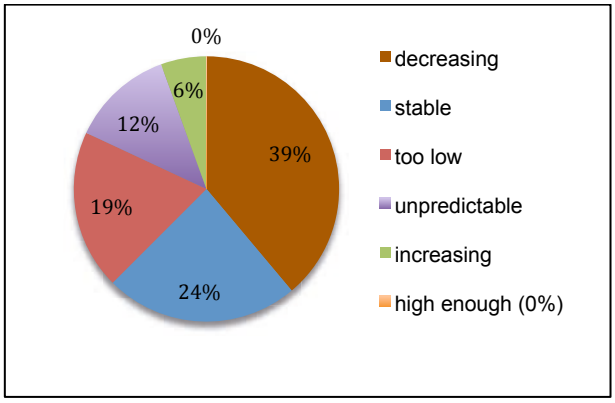

Figure 31: Price evolution of most profitable products sold (across the last 3 years) (Data source: surveys from author)

- Self-assessed adequacy of market prices

The self-assessed adequacy complements the previous question by showing that for about one third of them (32%), the selling price is not adequate at all for the farmers' livelihood. In addition, for 16% of them it is only "a little" adequate and for 40% of them it is moderately adequate.

Thus, for almost half of them (48%) the selling price is not high enough for them to have an acceptable livelihood.

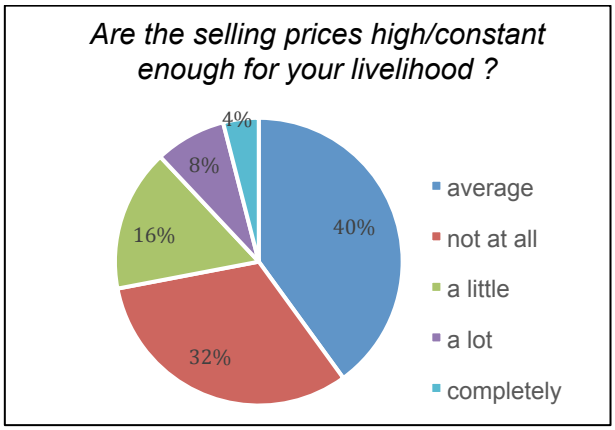

Figure 32: Self-assessed adequacy of market prices (Data source: surveys from author)

- Self-assessed importance of market prices

In addition to the previous graph that shows that selling prices are not adequate, the graph on the right shows that for the majority (67%) of the farmers, price fluctuations are an important aspect of their livelihood since those fluctuations affect them a lot / very much.

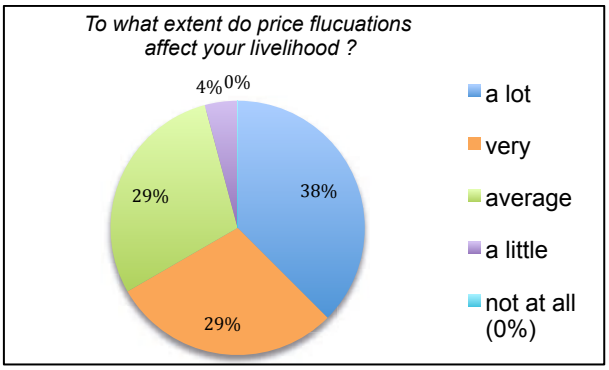

Figure 33: Self-assessed importance of market prices (Data source: surveys from author)

2.2.3 Use of distribution channels without intermediaries

Almost three-quarters (71%) of the investigated sold products are not sold directly to consumers. Only about one quarter of them benefit from the advantages of direct selling.

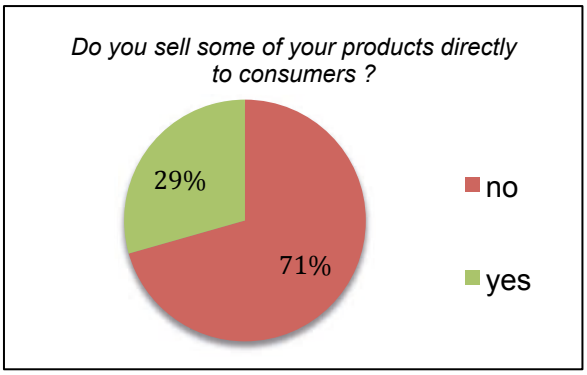

Figure 34: Whether some of the participants' products are sold directly to consumers (Data source: surveys from author)

From all investigated products, 78% are not sold on local farmers' market. When comparing this graph with the previous one, it indicates that most of the products that are sold directly to the consumers are sold through local farmers' markets.

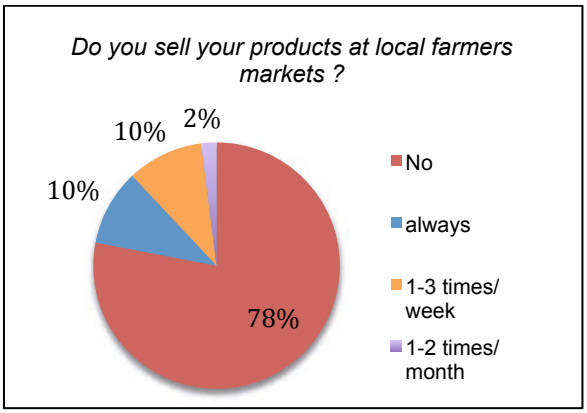

Figure 35: Whether some of the participants' products are sold at local farmers' markets (Data source: surveys from author)

- Self-assessed adequacy of distribution channels without intermediaries

This graph contributes to explaining the low score of adequacy for this section but cannot be taken into account in the analysis since, in the tested adapted version of SHARP, the farmers who do not sell directly to consumers had to answer this question even though they were not concerned.

This point will need to be adjusted in the final computerised adapted version of the application so that this case does not happen again.

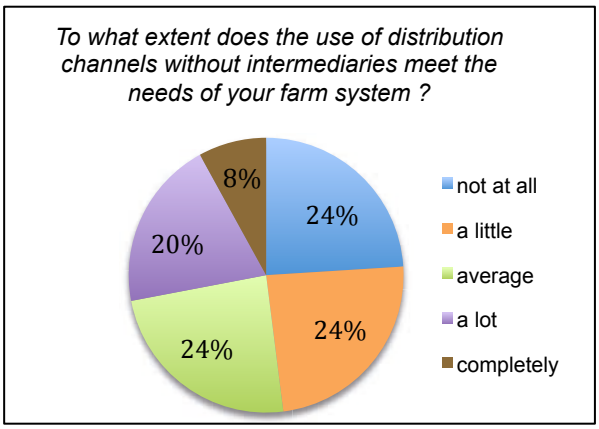

Figure 36: Self-assessed adequacy of distribution channels without intermediaries (Data source: surveys from author)

- Self-assessed importance of distribution channels without intermediaries

Out of all the farmers, 44 % (28% *very important* and 16% *a lot*) of them seem to acknowledge the importance of the use of distribution channels without intermediaries. However, more than half of them do not consider this distribution channel as considerably important.

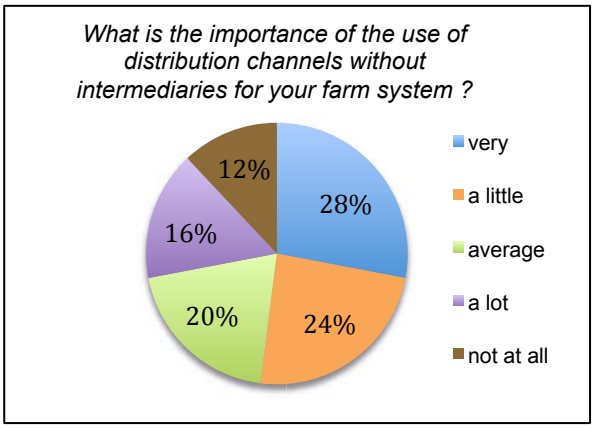

Figure 37: Self-assessed importance of distribution channels without intermediaries (Data source: surveys from author)

2.3 Identification of the main stakeholders

In order to later enable a discussion on who to work with to support the building of resilience of those farming systems, the section "Interactions between stakeholders of the value chain" is analysed. This section was not in the initial version of SHARP and was added in the adapted version to complete the agroecosystem resilience indicator "Appropriately connected" (see Appendix 4).

The majority (70%) of the investigated products are sold either to agricultural cooperatives (43%) or to agroindustry (27%). Thus, almost three-quarters of the products are negotiated with those two main stakeholders.

Only 30% of the investigated products are commercialised through local cooperative societies, direct selling and selling to retailers.

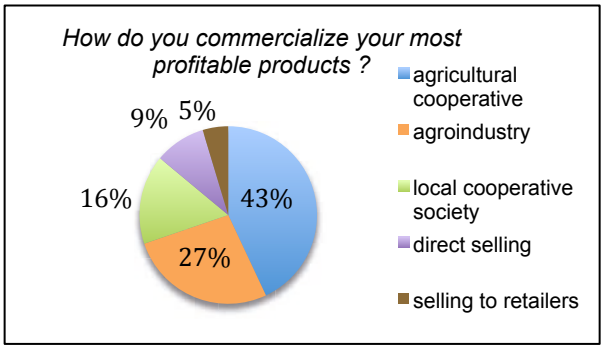

Figure 38: Commercialisation of the participants' most profitable products (Data source: surveys from author)

The majority (59%) of the investigated products could be chosen by farmers themselves.

However, there are 41% of the products which are chosen by stakeholders who are not farmers.

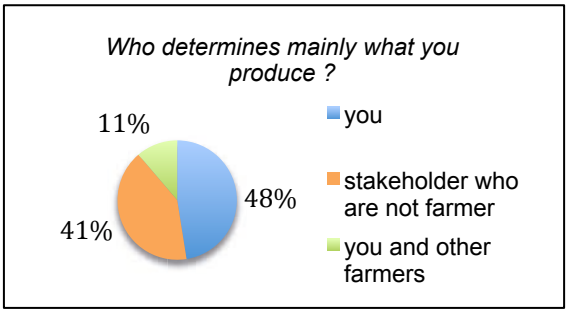

Figure 39: Stakeholders who determine what is produced (Data source: surveys from author)

According to 96% of the farmers, the citizen-consumers are not aware enough of the farmers' challenges. Only 4% of the farmers think that citizen-consumers are aware enough.

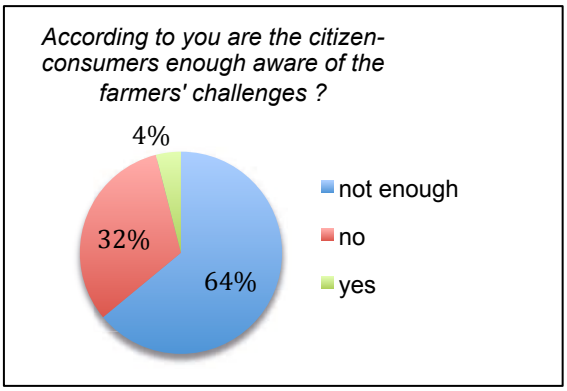

Figure 40: Awareness of the citizen-consumers (Data source: surveys from author)

Either at local, regional or federal level, the majority (66%, 69% or 85%) of the farmers are not involved in the determination of operational specifications (Code of practices/ Book of requirements). At local level, slightly more than a quarter (28%) of the farmers participate a little and a small percentage (6%) participate a lot. At regional level, less than a quarter (22%) of the farmers participate a little and 9% participate a lot. At federal level, only 12% participate a little and 3% participate a lot.

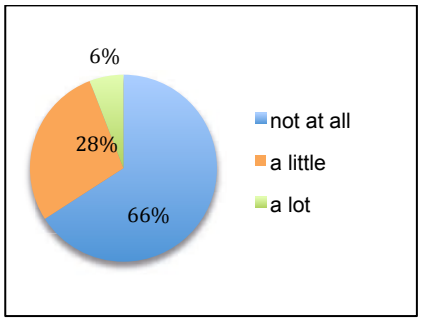

Figure 41: Participation in determination of local operational specifications (Data source: surveys from author)

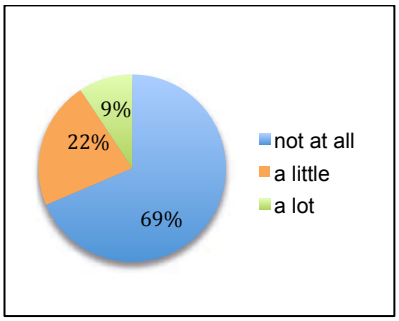

Figure 42: Participation in determination of regional operational specifications (Data source: surveys from author)

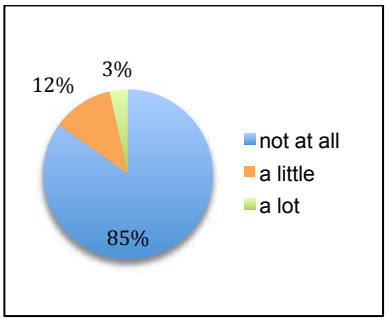

Figure 43: Participation in determination of federal operational specifications (Data source: surveys from author)

- Self-assessed adequacy of interacting with the other stakeholders of the value chain

More than a third (36%) of the farmers are either not satisfied at all (16%) or only a little satisfied (20%) with their interactions with the others stakeholders of the value chain. About half of the farmers (52%) are moderately satisfied and 12% are well satisfied with their interactions with other stakeholders of the value chain.

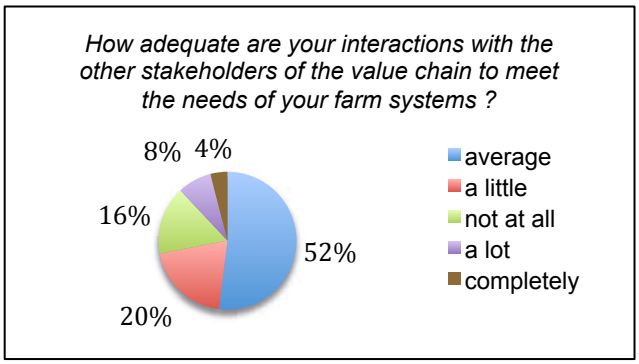

Figure 44: Self-assessed adequacy of interacting with the other stakeholders (Data source: surveys from author)

- Self-assessed importance of interacting with the other stakeholders of the value chain

When compared with the previous graph, the percentage distribution is the same for the self-assessed adequacy and self-assessed importance.

The interaction with the other stakeholders is important for more than a third of the farmers (20% *a lot* and 16% *very important*). About half of the farmers (52%) consider these interactions moderately important and 12% do not consider these interactions as important.

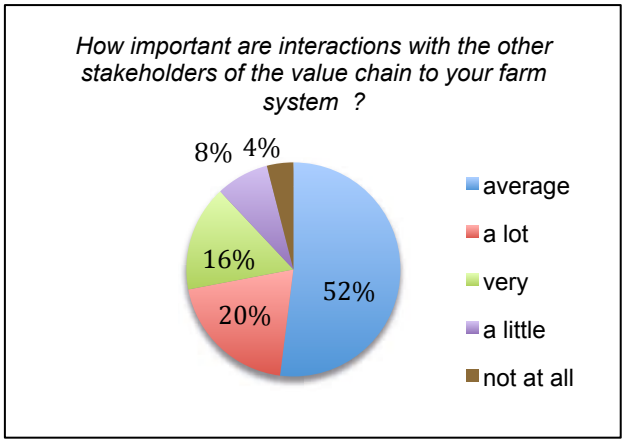

Figure 45: Self-assessed importance of interacting with the other stakeholders (Data source: surveys from author)

V. Discussion

1. SHARP's resilience assessment approach

1.1. Self-evaluation approach

The farming systems' resilience assessment from SHARP follows an approach which doesn't request any measured information. The *academic part* from the survey does not require specific measured numbers so the farmers can answer them with approximate numbers / percentages.

Furthermore, as presented in the methodological part, each question category is made up of an *academic part* with a maximum of ten points and a *self-evaluation part* with a maximum of twenty points. This *self-evaluation part* is completely subjective but counts for two-thirds of the resilience priority ranking score (twenty out of thirty points) so it can influence considerably the end results. This means that if in the report of the results the *self-evaluation part* is taken into account, the ranking (highest resilience priority to lowest resilience priority) is mostly determined by the *self-evaluation part*, which relies entirely on the perception of the farmer. Thus the ranking of some farming system sections can be misinterpreted. For instance, the section *Soil quality and land degradation* is ranked 2nd on the resilience priority ranking but falls to the eighteenth rank when taking into account only the academic score (see Figures 25 and 26).

For those reasons, the interpretation of the results must be done very carefully. On the one hand, the ranking chart with the self-evaluation score and the academic score should always be compared to the ranking chart with only the academic score. On the other hand, the results /ranking should be discussed and validated by the farmers. The results should be used as a "springboard" for discussion rather than being the final outcome of the discussion (Choptiany et al., 2016). Thus, the SHARP tool is not prescriptive but is a "guide" that provides information and aims to generate discussion to identify areas that need to be addressed (Choptiany et al., 2016). Therefore, it is crucial that the SHARP results are used very carefully if they are aggregated and used at a national/international level as presented in the theoretical background chapter.

1.2 Perception of the farmers

Positive feedback came out of the test of the adapted SHARP tool. The majority of the farmers who participated in the test appreciated having a computerised tool that generates immediate results at the end of the survey. Furthermore, they appreciated being in groups of 7-9 farmers to discuss those results. The immediate results enabled the farmers to kick-start discussions with each other. They could compare themselves with the others, identify what makes one more or less resilient than another and see where the common issues/priorities lay.

Rather than simply using the tablet's overall ranking, discussions lead to better understanding of the farmers' priorities which in turn enables priorities to be set for projects that aim to build farming systems' resilience. Thus, discussion is part of the process of increasing resilience (Choptiany et al., 2016). As it is written in the *SHARP User Manual*, the rationale for SHARP is mainly to find the most vulnerable farmers, learn from them, and empower them (Choptiany et al., 2016). So, the practitioners who facilitate the survey must take responsibility for what they do. They must take enough time to listen to the participants

(farmers) and learn from them. Otherwise, rushing and a lack of commitment will skew the analysis (Choptiany et al., 2016).

Furthermore, the farmers appreciated the holistic approach of SHARP. Since environmental aspects as well as economic, political and social aspects are integrated, the assessment of their farming system seemed more realistic. Additionally, even though it was the first time for some participants to hear about the concept of resilience, the majority of them found interesting to have an assessment about it since it relates directly to them and their reality.

2. Ways to build farming systems' resilience

The results presented in chapter IV are a means of knowing where to start and with who to work with for projects that aim to support the building of farming systems' resilience.

However, as mentioned previously, this ranking should always first be discussed and validated with the farmers to make sure that this computerised ranking corresponds to the farmers' reality.

2.1 Gaps lowering resilience

According to the test from the adapted tool, *intercropping*, *market prices* and *use of distribution channels without intermediaries* are the sections of the investigated farming systems which are the least resilient. By analysing the survey more deeply, in section 2.2 of chapter IV, the gaps or elements lowering farming systems' resilience could be identified. This indicates where to start with projects aiming to support the building of farming systems' resilience.

However, as mentioned in the methodological part, it is important to note that the sampling of this study is not statistically representative. Additionally, given the fact that the computing part of the adapted tool is not yet completely finalised, the following discussion on the results is solely an example of what kind of analysis might be derived from the results of the adapted SHARP tool once the computerised code of the adapted application is finalised. Therefore, the identified gaps of this study can be used as a starting point for discussion but should not be used for broad generalisations about farmers from Vaud, nor to guide projects.

2.1.1 "Intercropping" section

Intercropping was one of the three sections which had the lowest resilience score (see Figures 25 and 26). When looking at the scored answers from the participants, three elements can be identified which lowered the resilience score.

First, more than half (56%) of the participants do not practice intercropping (see Figure 27). Given the multiple benefits that intercropping brings to farming systems such as producing various crops simultaneously, minimising risk, greater yield stability and less productivity decline during drought (Altieri et al., 2015), not practicing intercropping lowers the resilience of the system (see Appendix 2).

Second, for the participants who do practice intercropping, not more than one third of their cultivated crops are intercropped. However, for the reasons mentioned above, the higher the percentage of intercropped cultivated crops, the more resilient are those crops. Thus, a low percentage of intercropped crops lowered their resilience score.

Third, 45% of those who do practice intercropping are moderately satisfied with intercropping but consider it very important. Since the less adequate and the more important a section is, the more it will increase its resilience priority, this third element contributed to give to this section a higher resilience priority ranking score.

Therefore, according to those twenty-five participants, giving them support to practice intercropping would contribute to building their farming systems' resilience. This argument is supported by literature such as Altieri et al. (2015) which highlight the link between plant diversity and resilience. *Diversified farming systems* such as agroforestry and polycultural

systems/intercropping systems provide various examples on how complex agroecosystems are able to adapt to the effects of climate changes (Altieri et al., 2015).

2.1.2 "Market prices" section

Market prices is another section which had one of the lowest resilience scores (see Figures 25 and 26). When looking at the scored answers from the participants, the following three elements lowered the resilience score of that section.

First, the price evolution (across the last 3 years) of the most profitable products sold by the participants was for 39% of the products decreasing, for 19% too low and for 12% unpredictable (see Figure 31). This negative or uncertain price trend of most products contributed to lowering the resilience of those farming systems.

Second, the question about the adequacy of those prices has also got a low score of resilience since for about one third of the farmers (32%) the selling price is not adequate at all for their livelihood, for 16% of them the selling price is only a little adequate and for 40% of them the selling price is moderately adequate (see Figure 32). This means that for 88% of the participants, the resilience score for that question never reached more than five points out of ten.

Third, the majority of the farmers (67%) consider that price fluctuations affect their livelihood a lot /very much (see Figure 33). This point means that for the farmers who participated in the test, the section *market prices* is one of their priorities and thus gives to this section a higher resilience priority ranking score.

The low selling prices mentioned above might originate from the emergence of industrial agriculture and the development of mass food retailing. The mass retailers have relied more and more on the cheap and flexible supply of uniform commodities that industrial agriculture is exclusively in a position to provide. In parallel to that, consumers have got used to cheap abundant food. Those facts generated a vicious circle that is now strongly in place: as long as consumers continue to expect the same food at the same price and as long as industrial agriculture continues to provide this flow of cheap food, retail practices are unlikely to change. Under this mechanism, a decent livelihood remains unreachable for many of those employed in food systems, while food and agriculture generate increasing value for grain traders and global retail giants (Frison, 2016).

Therefore, in order to support the building of resilience of farming systems and break the vicious circle that reinforces industrial agriculture, one key measure is a transition from industrial agriculture to *diversified agroecological systems* (Frison, 2016).

2.1.3 "Use of distribution channels without intermediaries" section

The low resilience score of this section can be explained by the following elements. First, almost three-quarters (71%) of the investigated sold products are not sold directly to consumers (see Figure 34) meaning that only about one third of them benefit from the advantages of direct selling. Second, of all investigated products, 78% are not sold at local farmers' markets (see Figure 35).

However, selling directly to consumers at a local farmers' market allows the farmers to get a better price per kilogram produced as well as meeting other farmers and the consumers face-to-face. This face-to-face interaction at local farmers' markets is a social event which enables them to get direct feedback from consumers and encourages learning. Learning

enhances the adaptive capacity of the producers which in turn is a prerequisite for building resilience. Thus, the interactions between farmers and consumers at local farmers' markets allow them to better understand the complexity of the food system which in turn can influence consumer choices and farm management in a sustainable direction (Milestad et al., 2010).

Nonetheless, of all the farmers who participated in the test, 44 % of them seem to acknowledge the importance of the use of distribution channels without intermediaries but more than half of them do not consider this distribution channel as considerably important (see Figure 37). Therefore, a way to support the building of resilience would be to promote farmer-consumer interactions and support shorter distribution channels (Milestad et al., 2010).

2.2 Relevant stakeholders to build resilience

In order to know with who to work with to support the building of resilience of farming system, the relevant stakeholders must be identified.

The first gap identified in the intercropping section could possibly be filled with the support of extension services. The latter could strongly highlight the advantages of intercropping and the role of such practices to enhance resilience. Furthermore, the builders of agricultural machines could promote machines that would ease such practices.

To help to fill in the second gap (low/decreasing selling prices) as well as the third gap (low use of distribution channels without intermediaries), a closer look at the interaction between stakeholders of the value chain is needed.

According to the results presented in section 2.3 from chapter IV, the majority (70%) of the investigated products are sold either to agricultural cooperatives (43%) or to agroindustry (27%) (see Figure 38). This high percentage goes hand in hand with the literature from Frison (2016) who wrote that for many farmers, the increasingly dominant and consolidated mass retail circuits continue to be the only viable outlet for selling their products. However, this distribution channel forces farmers to specialise and industrialise their production in order to supply large volumes of specific commodities at low costs (Frison, 2016). Moreover, in a context of climate change and globalisation, specialised industrial agricultural systems, which are based on uniformity, are vulnerable. In contrast, there is now a lot of evidence that diversified agroecological systems are able to deliver resilience in the face of environmental stresses (Frison, 2016). Therefore, in order to build farming systems' resilience, collaboration with the stakeholders promoting and enabling the development of *diversified agroecological systems* is needed.

In addition, since at local, regional or federal level, the majority (66%, 69% or 85%) of the farmers are not involved in the determination of the operational specifications concerning them (see Figure 41, 42 and 43), better collaboration should take place between farmers and the stakeholders who do determine those operational specifications.

Last but not least, according to 96% of the farmers, the citizen-consumers are not aware or not aware enough of the farmers' challenges (see Figure 40). Thus, more interaction with the citizen-consumers is needed in order to make them understand the true value of food and guide them towards more sustainable consumption choices. This is significant since today the citizen-consumers are the ones who determine the direction that the agro-food system takes. Each purchasing decision can be seen as a new form of political participation where each consumer is "voting with his dollar" (Johnston, 2008; Schweizer, 2015).

2.3 Link to recommendations from literature

Even though the results are not statistically representative, from the above-mentioned gaps, one way identified for supporting the building of those farming systems' resilience goes hand in hand with what has already been written in literature, namely: the need to shift towards *Diversified agroecological systems* (Frison, 2016).

Diversified agroecological systems are systems which combine diversification and agroecology. Diversification is a combination of maintaining multiple sources of production as well as varying what is produced across farming landscapes and over time (Frison, 2016). Agroecology is defined as " the science of applying ecological concepts and principles to the design and management of sustainable food systems" (Gliessman, 2007). This includes approaches to maximize biodiversity and to stimulate interactions between different plants and species, as part of holistic strategies aiming at building long-term fertility, healthy agro-ecosystems and secure livelihoods (Frison, 2016).

In order to remain consistent with the farming systems' resilience assessment approach used by the SHARP tool and throughout this study, the outcomes of *Diversified agroecological systems* needed to be reviewed to check whether or not the 13 behaviour-based indicators of Cabell and Oelofse are present. As presented in previous chapters, according to Cabell and Oelofse (2012) the more present are those thirteen behaviour-based indicators, the more resilient is the farming system.

Thus, in the following section, the content of the table describing each of the 13 indicators of Cabell and Oelofse (see Appendix 3) is compared to the outcomes of *Diversified agroecological systems*:

- **Behaviour-based indicator n°1: socially self-organised**

Indicator (sources)	Definition	Implications	What to look for
Socially self-organized (Levin 1999, Holling 2001, Milestad and Darnhofer 2003, Atwell et al. 2010, McKey et al. 2010)	The social components of the agroecosystem are able to form their own configuration based on their needs and desires	Systems that exhibit greater level of self-organization need fewer feedbacks introduced by managers and have greater intrinsic adaptive capacity	Farmers and consumers are able to organize into grassroots networks and institutions such as co-ops, farmer's markets, community sustainability associations, community gardens, and advisory networks

Outcome from diversified agroecological systems:

Agroecology is used more and more by organisations and social movements as a platform for defending rural spaces in the face of threats from agribusiness and other private actors (Rosset and Martínez-Torres, 2012).

- **Behaviour-based indicator n°2: ecologically self-regulated**

Indicator (sources)	Definition	Implications	What to look for
Ecologically self-regulated (Sundkvist et al. 2005, Ewell 1999, Jackson 2002, Swift et al. 2004, Jacke and Toensmeier 2005, Glover et al. 2010, McKey et al. 2010)	Ecological components self-regulate via stabilizing feedback mechanisms that send information back to the controlling elements	A greater degree of ecological self-regulation can reduce the amount of external inputs required to maintain a system, such as nutrients, water, and energy	Farms maintain plant cover and incorporate more perennials, provide habitat for predators and parasitoids, use ecosystem engineers, and align production with local ecological parameters

Outcome from diversified agroecological systems:

One of the key characteristics of such systems is the emphasis of natural synergies, e.g. pest management through agrobiodiversity (Frison, 2016). Diverse agricultural landscapes nurture wild biodiversity in the surrounding ecosystems (Altieri and Nicholls, 2004; Scherr and McNeely, 2008), maintain tree cover and provide complementary habitats (Harvey et al., 2008). In addition, the rich biodiversity present in such systems contributes delivering crucial ecosystem services (Frison, 2016) such as the creation of diverse microclimates which enables the establishment of a range of beneficial organisms (predators, parasites, pollinators as well as soil fauna) which in turn support entire agroecosystems (Altieri and Nicholls, 2004). Furthermore, diversified agroecological systems aim to secure and stabilise agro-ecosystems to allow them to remain productive over time, rather than maximizing short-term yields of a specific crop (Frison, 2016).

- **Behaviour-based indicator n°3: appropriately connected**

Indicator (sources)	Definition	Implications	What to look for
Appropriately connected (Axelrod and Cohen 1999, Holling 2001, Gunderson and Holling 2002, Picasso et al. 2011)	Connectedness describes the quantity and quality of relationships between system elements	High and weak connectedness imparts diversity and flexibility to the system; low and strong impart dependency and rigidity	Collaborating with multiple suppliers, outlets, and fellow farmers; crops planted in polycultures that encourage symbiosis and mutualism

Outcome from diversified agroecological systems:

Through the process of acting independently and retaining control over how resources are used, agroecology is seen to build social capital and the capacity to adapt (Chambers, 2014; Pretty and Smith, 2004). In addition, since agroecological systems are more labour-intensive, it increases employment opportunities (Frison, 2016). Concerning the environmental aspects, the advantages stemming from the ecosystem services benefit not only farmers. For instance, improved water quality also benefits the communities downstream. Those advantages can be upscaled when farmers work together with other actors to combine agroecological farming with integrated landscape management (Estrada-Carmona et al., 2014; Scherr and McNeely, 2008). Additionally, on-field connectedness is promoted through intercropping which is a spatial diversification practice used in diversified agroecological systems (Frison, 2016).

- **Behaviour-based indicator n°4: functional and response diversity**

Indicator (sources)	Definition	Implications	What to look for
Functional and response diversity (Altieri 1999, Ewell 1999, Berkes et al. 2003, Luck et al. 2003, Swift et al. 2004, Folke 2006, Jackson et al. 2007, Di Falco and Chavas 2008, Moonen and Barbieri 2008, Chapin et al. 2009, Darnhofer et al. 2010*b*, McIntyre 2009)	Functional diversity is the variety of ecosystem services that components provide to the system; response diversity is the range of responses of these components to environmental change	Diversity buffers against perturbations (insurance) and provides seeds of renewal following disturbance	Heterogeneity of features within the landscape and on the farm; diversity of inputs, outputs, income sources, markets, pest controls, etc.

Outcome from diversified agroecological systems:

Diversified agroecological systems are *per se* nurturing diversity (see the definition above). The characteristics of such systems include (amongst other things) temporal diversification as well as spatial diversification, the use of a wide range of species, the use of less uniform and locally adapted varieties/breeds, the maximization of multiple outputs and the production of a wide range of less homogeneous products (Frison, 2016).

- **Behaviour-based indicator n°5: optimally redundant**

Indicator (sources)	Definition	Implications	What to look for
Optimally redundant (Low et al. 2003, Sundkvist et al. 2005, Darnhofer et al. 2010*b*, Walker et al. 2010)	Critical components and relationships within the system are duplicated in case of failure	Also called response diversity; redundancy may decrease a system's efficiency, but it gives the system multiple back-ups, increases buffering capacity, and provides seeds of renewal following disturbance	Planting multiple varieties of crops rather than one, keeping equipment for various crops, getting nutrients from multiple sources, capturing water from multiple sources

Outcome from diversified agroecological systems:

The biodiversity that is present in diversified agroecological systems often plays an essential role in delivering resilience since it is a buffer against environmental as well as economic risks (Mijatović et al., 2013). Furthermore, the efficiency of water use can be increased in diversified agroecological systems since such systems combine local water catchment systems with improved soil capacity for water absorption retention as well as lower run-off and reduced evaporation through soil cover (Gómez et al., 2009; ZUAZO et al., 2009).

- **Behaviour-based indicator n°6: spatial and temporal heterogeneity**

Indicator (sources)	Definition	Implications	What to look for
Spatial and temporal heterogeneity (Alcorn and Toledo 1998, Devictor and Jiguet 2007, Di Falco and Chavas 2008)	Patchiness across the landscape and changes through time	Like diversity, spatial heterogeneity provides seeds of renewal following disturbance; through time, it allows patches to recover and restore nutrients	Patchiness on the farm and across the landscape, mosaic pattern of managed and unmanaged land, diverse cultivation practices, crop rotations

Outcome from diversified agroecological systems:

One of the key characteristics of diversified agroecological systems is temporal diversification through practices such as crop rotation. Another key characteristic of such systems is spatial diversification through practices such as mixed farming as well as intercropping (Frison, 2016).

- **Behaviour-based indicator n°7: exposed to disturbance**

Indicator (sources)	Definition	Implications	What to look for
Exposed to disturbance (Gunderson and Holling 2002, Berkes et al. 2003, Folke 2006)	The system is exposed to discrete, low-level events that cause disruptions without pushing the system beyond a critical threshold	Such frequent, small-scale disturbances can increase system resilience and adaptability in the long term by promoting natural selection and novel configurations during the phase of renewal; described as "creative destruction"	Pest management that allows a certain controlled amount of invasion followed by selection of plants that fared well and exhibit signs of resistance

Outcome from diversified agroecological systems:

In mixed farming systems, the rich synergies between different species allow pest management improvements (Frison, 2016).

- **Behaviour-based indicator n°8: coupled with local natural capital**

Indicator (sources)	Definition	Implications	What to look for
Coupled with local natural capital (Ewell 1999, Milestad and Darnhofer 2003, Robertson and Swinton 2005, Naylor 2009, Darnhofer et al. 2010*a*,*b*, van Apeldoorn et al. 2011)	The system functions as much as possible within the means of the bioregionally available natural resource base and ecosystem services	Responsible use of local resources encourages a system to live within its means; this creates an agroecosystem that recycles waste, relies on healthy soil, and conserves water	Builds (does not deplete) soil organic matter, recharges water, little need to import nutrients or export waste

Outcome from diversified agroecological systems:

Two of the key characteristics of diversified agroecological systems are low external inputs as well as recycling of waste within full nutrient cycling (Frison, 2016). In terms of water, light and nutrients, resource efficiency is maximized and waste reduced in systems with a variety of species and production types (Altieri et al., 2012; Gliessman, 2007). Concerning water, as mentioned, the efficiency of water use can be increased in such systems since it combines local water catchment systems with improved soil capacity for water absorption retention as well as lower run-off and reduced evaporation through soil cover (Gómez et al., 2009; ZUAZO et al., 2009). Furthermore, such systems can also help to restore degraded land and rebuild fertility (FAO, 2015).

- **Behaviour-based indicator n°9: reflective and shared learning**

Indicator (sources)	Definition	Implications	What to look for
Reflective and shared learning (Berkes et al. 2003, Darnhofer et al. 2010*b*, Milestad et al. 2010, Shava et al. 2010)	Individuals and institutions learn from past experiences and present experimentation to anticipate change and create desirable futures	The more people and institutions can learn from the past and from each other, and share that knowledge, the more capable the system is of adaptation and transformation, in other words, more resilient	Extension and advisory services for farmers; collaboration between universities, research centers, and farmers; cooperation and knowledge sharing between farmers; record keeping; baseline knowledge about the state of the agroecosystem

Outcome from diversified agroecological systems:

As mentioned above, through the process of acting independently and retaining control over how resources are used, agroecology is seen to build social capital and the capacity to adapt (Chambers, 2014; Pretty and Smith, 2004). Furthermore, agroecology is used more and more by organisations and social movements as a platform for defending rural spaces in the face of threats from agribusiness and other private actors (Rosset and Martínez-Torres, 2012). In addition, local food that comes with the practice of agricultural diversity, is linked to locally-adapted knowledge that would be lost otherwise. In recent years, traditional agroecological knowledge and practices have been revived, *inter alia*, by the reintroduction of traditional crop varieties (Swiderska et al., 2011).

- **Behaviour-based indicator n°10: globally autonomous and locally interdependent**

Indicator (sources)	Definition	Implications	What to look for
Globally autonomous and locally interdependent (Milestad and Darnhofer 2003, Walker et al. 2010, van Apeldoorn et al. 2011)	The system has relative autonomy from exogenous (global) control and influences and exhibits a high level of cooperation between individuals and institutions at the more local level	A system cannot be entirely autonomous but it can strive to be less vulnerable to forces that are outside its control; local interdependence can facilitate this by encouraging collaboration and cooperation rather than competition.	Less reliance on commodity markets and reduced external inputs; more sales to local markets, reliance on local resources; existence of farmer co-ops, close relationships between producer and consumer, and shared resources such as equipment

Outcome from diversified agroecological systems:

As mentioned previously, two of the key characteristics of diversified agroecological systems are low external inputs as well as recycling of waste within full nutrient cycling (Frison, 2016). In such systems, through the production of organic fertilizers on-farm, the farmers' reliance on costly external inputs is reduced which in turn makes the farmers less dependent on local retailers and moneylenders (De Schutter, 2011). In addition to reduced reliance on external inputs, the capital requirement is also reduced (Frison, 2016). Furthermore, in terms of water, light and nutrients, resource efficiency is maximized (Altieri et al., 2012; Gliessman, 2007). Concerning the local interdependence, as mentioned above, agroecology is used more and more by organisations and social movements as a platform for defending rural spaces in the face of threats from agribusiness and other private actors (Rosset and Martínez-Torres, 2012).

- **Behaviour-based indicator n°11: honors legacy**

Indicator (sources)	Definition	Implications	What to look for
Honors legacy (Gunderson and Holling 2002, Cumming et al. 2005, Shava et al. 2010, van Apeldoorn et al. 2011)	The current configuration and future trajectories of systems are influenced and informed by past conditions and experiences	Also known as path dependency, this relates to the biological and cultural memory embodied in a system and its components	Maintenance of heirloom seeds and engagement of elders, incorporation of traditional cultivation techniques with modern knowledge

Outcome from diversified agroecological systems:

The practice of agricultural diversity appears to go hand in hand with the capacity to retain traditions and traditional knowledge. Globally, the crop varieties and animal breeds underpinning local specialities are better preserved by the communities, cultures and countries which are able to maintain their own traditional food systems (Johns et al., 2013).

- **Behaviour-based indicator n°12: build human capital**

Indicator (sources)	Definition	Implications	What to look for
Builds human capital (Buchmann 2009, Shava et al. 2010, McManus et al. 2012)	The system takes advantage of and builds "resources that can be mobilized through social relationships and membership in social networks" (Nahapiet and Ghoshal 1998:243)	Human capital includes: constructed (economic activity, technology, infrastructure), cultural (individual skills and abilities), social (social organizations, norms, formal and informal networks)	Investment in infrastructure and institutions for the education of children and adults, support for social events in farming communities, programs for preservation of local knowledge

Outcome from diversified agroecological systems:

The local food mentioned above that comes with the practice of agricultural diversity, is linked to locally-adapted knowledge that would be lost otherwise (Swiderska et al., 2011). Concerning economic activities, since agroecological systems are more labour-intensive, such systems increase employment opportunities (Frison, 2016).

- **Behaviour-based indicator n°13: reasonably profitable**

Indicator (sources)	Definition	Implications	What to look for
Reasonably profitable	The segments of society involved in agriculture are able to make a livelihood from the work they do without relying too heavily on subsidies or secondary employment	Being reasonably profitable allows participants in the system to invest in the future; this adds buffering capacity, flexibility, and builds wealth that can be tapped into following release	Farmers and farm workers earn a livable wage; agriculture sector does not rely on distortionary subsidies

Outcome from diversified agroecological systems:

Crop and livestock diversification is a kind of self-insurance against risk since it is a way to stabilise income in the face of crop failure, livestock loss or other risks (Gliessman, 2007; Johnston et al., 1995). The risks that come with variable yields and seasonal shortages can be reduced by diversified systems given that, e.g., crop diversification provides more opportunities for continued production year-round (Powell et al., 2015).

The above section has demonstrated the potential of *Diversified agroecological systems* to support the building of farming systems/agroecological systems' resilience since all thirteen behaviour-based indicators for assessing agroecosystem resilience are present in such systems.

3. Future perspectives

Now that the SHARP tool has been adapted to the Western countries context and that the adapted tool got positive feedback from the test with farmers, the following steps are still needed before it can be used for projects.

3.1 Finalisation of the macro

The SHARP application has been adapted but the macro used to process a larger number of data must still be finalised. The macro is necessary to translate the code of the collected data from the android tablet to an Excel file and to build graphs for the analysis.

3.2 Test on larger scale & integration of further adjustments

Once the macro is finalised, the adapted SHARP tool should be tested again but on a larger scale to make sure that the adapted application works well with numerous data and that accurate statistics can be derived from the macro. Depending on the results, this step might generate further adjustments.

3.3 Support the building of resilience through projects

By the time the adapted SHARP application and its macro are finalised, the tool will be able to be used for projects that aim to support the building of farming systems' resilience.

VI. Conclusion

In the present context of climate change and globalisation, our world food production system needs resilient farming systems to face the unpredictable and uncontrollable disturbances that come along with those two societal trends. In order to enable farming systems to become more resilient, a close look at their current situation is needed to know where to start with projects that aim to support the building of their resilience. For that, the farming systems' resilience assessment tool, SHARP, is useful since it allows (1) to have a good overview of the actual situation, (2) to have valuable discussions with the farmers thanks to the immediate results that this computerised tool generates, (3) to set priorities for projects. Thus, given that this tool has a considerable potential, it is of importance to widen its scope beyond developing countries. This takes on even more significance in view of the fact that most of the world's arable land is under Western farming systems.

However, to provide a reliable assessment with this adapted SHARP tool for future projects, further adjustments of the tool's computerised system are required. Subsequently, it will be of equal relevance to test the improved tool with a larger sample before using it for concrete projects.

The limited timeframe of this study and the complexity of adapting the SHARP tool to the context of Western farming systems prevented us from already carrying out those finalisation steps. Nevertheless, the pilot test that was undertaken with twenty-five farmers allowed to check, for the first time, the acceptance of the tool by Western farmers, to provide precious feedback for the finalisation of the new version of the tool and to verify whether coherent results come out. Even if the sample is not statistically representative, the analysis of those few results already points out a way to support the building of farming systems' resilience which is supported by literature and recent studies, namely: a shift towards Diversified agroecological systems.

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VIII. Appendices

Appendix 1: Art 104 of the Federal Constitution (source: FOAG (2016b))

Art. 104 Agriculture

[1] The Confederation shall ensure that agricultural sector, by means of a sustainable and market oriented production policy, makes an essential contribution towards:

a. the reliable provision of the population with foodstuffs;

b. the conservation of natural resources and the upkeep of the countryside;

c. decentralised population settlement of the country.

[2] In addition to the self-help measures that can reasonably be expected in the agriculture sector and if necessary in derogation from the principle of economic freedom, the Confederation shall support farms that cultivate the land.

[3] The Confederation shall organise measures in such a manner that the agricultural sector fulfils its multi-functional duties. It has in particular the following powers and duties:

a. supplementing revenues from agriculture by means of direct subsidies in order to achieve of fair and adequate remuneration for the services provided, subject to proof of compliance with ecological requirements;

b. encouraging by means of economically advantageous incentives methods of production that are specifically near-natural and respectful of both the environment and livestock;

c. legislating on declarations of origin, quality, production methods and processing procedures for foodstuffs;

d. protecting the environment against the detrimental effects of the excessive use of fertilisers, chemicals and other auxiliary agents;

e. at its discretion, encouraging agricultural research, counselling and education and subsidise investments;

f. at its discretion, legislating on the consolidation of agricultural property holdings.

[4] For these purposes, the Confederation shall provide both funds earmarked for the agricultural sector and general federal funds.

Appendix 2: Agroecological practices and their potential to enhance resiliency to climatic stresses through various effects on soil quality and water conservation (source: Altieri et al. (2015))

	Soil organic build up	Nutrient cycling	>Soil cover	Reduced ET	Runnoff reduction	>Water-holding capacity	>Infiltration	Microclimatic amelioration	Reduction of soil compactation	Reduction of soil erosion	>Hydrological regulation	>Water use efficiency	>Mycorrhizal network
Diversification													
• Mixed or intercropping			□	□	□			□	□	□		□	
• Agroforestry	□	□	□	□	□	□	□	□	□	□		□	
• Intensive silvopastoral system	□	□	□	□	□	□	□	□	□	□	□	□	□
• Crop rotation	□	□	□		□		□		□	□		□	
• Local variety mixtures			□									□	
Soil management													
• Cover cropping	□	□	□	□	□	□	□		□	□	□		
• Green manures	□	□	□	□	□	□	□		□	□		□	□
• Mulching													
• Compost applications	□					□							□
• Conservation agriculture (organic-no-till)			□	□	□		□		□	□		□	
Soil conservation													
• Contour farming					□		□		□	□	□		
• Grass strips/ living barriers			□		□		□			□	□		
• Terracing					□		□			□	□		
• Check dams along gullies					□		□			□	□		

Appendix 3: Indicators for assessing agroecosystem resilience (source : Cabell and Oelofse (2012))

Indicator (sources)	Definition	Implications	What to look for
Socially self-organized (Levin 1999, Holling 2001, Milestad and Darnhofer 2003, Atwell et al. 2010, McKey et al. 2010)	The social components of the agroecosystem are able to form their own configuration based on their needs and desires	Systems that exhibit greater level of self-organization need fewer feedbacks introduced by managers and have greater intrinsic adaptive capacity	Farmers and consumers are able to organize into grassroots networks and institutions such as co-ops, farmer's markets, community sustainability associations, community gardens, and advisory networks
Ecologically self-regulated (Sundkvist et al. 2005, Ewell 1999, Jackson 2002, Swift et al. 2004, Jacke and Toensmeier 2005, Glover et al. 2010, McKey et al. 2010)	Ecological components self-regulate via stabilizing feedback mechanisms that send information back to the controlling elements	A greater degree of ecological self-regulation can reduce the amount of external inputs required to maintain a system, such as nutrients, water, and energy	Farms maintain plant cover and incorporate more perennials, provide habitat for predators and parasitoids, use ecosystem engineers, and align production with local ecological parameters
Appropriately connected (Axelrod and Cohen 1999, Holling 2001, Gunderson and Holling 2002, Picasso et al. 2011)	Connectedness describes the quantity and quality of relationships between system elements	High and weak connectedness imparts diversity and flexibility to the system; low and strong impart dependency and rigidity	Collaborating with multiple suppliers, outlets, and fellow farmers; crops planted in polycultures that encourage symbiosis and mutualism
Functional and response diversity (Altieri 1999, Ewell 1999, Berkes et al. 2003, Luck et al. 2003, Swift et al. 2004, Folke 2006, Jackson et al. 2007, Di Falco and Chavas 2008, Moonen and Barbieri 2008, Chapin et al. 2009, Darnhofer et al. 2010*b*, McIntyre 2009)	Functional diversity is the variety of ecosystem services that components provide to the system; response diversity is the range of responses of these components to environmental change	Diversity buffers against perturbations (insurance) and provides seeds of renewal following disturbance	Heterogeneity of features within the landscape and on the farm; diversity of inputs, outputs, income sources, markets, pest controls, etc.
Optimally redundant (Low et al. 2003, Sundkvist et al. 2005, Darnhofer et al. 2010*b*, Walker et al. 2010)	Critical components and relationships within the system are duplicated in case of failure	Also called response diversity; redundancy may decrease a system's efficiency, but it gives the system multiple back-ups, increases buffering capacity, and provides seeds of renewal following disturbance	Planting multiple varieties of crops rather than one, keeping equipment for various crops, getting nutrients from multiple sources, capturing water from multiple sources
Spatial and temporal heterogeneity (Alcorn and Toledo 1998, Devictor and Jiguet 2007, Di Falco and Chavas 2008)	Patchiness across the landscape and changes through time	Like diversity, spatial heterogeneity provides seeds of renewal following disturbance; through time, it allows patches to recover and restore nutrients	Patchiness on the farm and across the landscape, mosaic pattern of managed and unmanaged land, diverse cultivation practices, crop rotations
Exposed to disturbance (Gunderson and Holling 2002, Berkes et al. 2003, Folke 2006)	The system is exposed to discrete, low-level events that cause disruptions without pushing the system beyond a critical threshold	Such frequent, small-scale disturbances can increase system resilience and adaptability in the long term by promoting natural selection and novel configurations during the phase of renewal; described as "creative destruction"	Pest management that allows a certain controlled amount of invasion followed by selection of plants that fared well and exhibit signs of resistance
Coupled with local natural capital (Ewell 1999, Milestad and Darnhofer 2003, Robertson and Swinton 2005, Naylor 2009, Darnhofer et al. 2010*a*,*b*, van Apeldoorn et al. 2011)	The system functions as much as possible within the means of the bioregionally available natural resource base and ecosystem services	Responsible use of local resources encourages a system to live within its means; this creates an agroecosystem that recycles waste, relies on healthy soil, and conserves water	Builds (does not deplete) soil organic matter, recharges water, little need to import nutrients or export waste

Reflective and shared learning (Berkes et al. 2003, Darnhofer et al. 2010*b*, Milestad et al. 2010, Shava et al. 2010)	Individuals and institutions learn from past experiences and present experimentation to anticipate change and create desirable futures	The more people and institutions can learn from the past and from each other, and share that knowledge, the more capable the system is of adaptation and transformation, in other words, more resilient	Extension and advisory services for farmers; collaboration between universities, research centers, and farmers; cooperation and knowledge sharing between farmers; record keeping; baseline knowledge about the state of the agroecosystem
Globally autonomous and locally interdependent (Milestad and Darnhofer 2003, Walker et al. 2010, van Apeldoorn et al. 2011)	The system has relative autonomy from exogenous (global) control and influences and exhibits a high level of cooperation between individuals and institutions at the more local level	A system cannot be entirely autonomous but it can strive to be less vulnerable to forces that are outside its control; local interdependence can facilitate this by encouraging collaboration and cooperation rather than competition.	Less reliance on commodity markets and reduced external inputs; more sales to local markets, reliance on local resources; existence of farmer co-ops, close relationships between producer and consumer, and shared resources such as equipment
Honors legacy (Gunderson and Holling 2002, Cumming et al. 2005, Shava et al. 2010, van Apeldoorn et al. 2011)	The current configuration and future trajectories of systems are influenced and informed by past conditions and experiences	Also known as path dependency, this relates to the biological and cultural memory embodied in a system and its components	Maintenance of heirloom seeds and engagement of elders, incorporation of traditional cultivation techniques with modern knowledge
Builds human capital (Buchmann 2009, Shava et al. 2010, McManus et al. 2012)	The system takes advantage of and builds "resources that can be mobilized through social relationships and membership in social networks" (Nahapiet and Ghoshal 1998:243)	Human capital includes: constructed (economic activity, technology, infrastructure), cultural (individual skills and abilities), social (social organizations, norms, formal and informal networks)	Investment in infrastructure and institutions for the education of children and adults, support for social events in farming communities, programs for preservation of local knowledge
Reasonably profitable	The segments of society involved in agriculture are able to make a livelihood from the work they do without relying too heavily on subsidies or secondary employment	Being reasonably profitable allows participants in the system to invest in the future; this adds buffering capacity, flexibility, and builds wealth that can be tapped into following release	Farmers and farm workers earn a livable wage; agriculture sector does not rely on distortionary subsidies

Appendix 4: Table linking the 13 resilience indicators to SHARP indicators, questions, answers/units and preliminary scales (adapted from: Cabell and Oelofse (2012) and Choptiany et al. (2015))

In Black = what is original/initial ; In Red= what has been added/changed; In Blue= what existed in the app but was not scored

Resilience component	SHARP indicators	SHARP questions (number and text)	Measurement	Answers/units	Developing country scale (higher is more resilient/ better)	Developed country scale (higher is more resilient/ better)	Explanation for changes of questions/scoring	Reference (with literature & experts)
1. Socially self-organized Farmers and consumers are able to organize into grassroots networks and institutions such as co-ops, farmer's markets, community sustainability associations, community gardens, and	1.1 Group membership	32. Are you a member of any groups, organizations or associations? + for each give ~~provide the name and~~ degree of participation (Leader, Very Active, quite Active, Not active)	# of groups which have at least 'quite active' participation level	# ticked from all options given in table	~~0= 0,~~ ~~1= 7,~~ ~~2+= 10~~	0= 0 1=2 2-3= 5 4+= 10	In a developed countries context, it is the average to be "quite active" in 2-3 groups so the scale needed to be adjusted; Deleted "name" to keep only relevant information with reference to a developed countries context	Mr. Charles (score) Ms Barjolle (by question: "name" delete)
		32. For each group give the frequency to which you meet with the group/organization/association	Frequency of the group meetings	On average from all groups: once a week/once every two weeks/once a month/two times a year or less/ Never	-	Once a week=10 Once every two weeks=7 Once a month=5 Two times a year or less=2 Never=0	Group membership or degree of participation is not enough, what also matter is the frequency to which you meet face-to-face with the others to be socially well integrated	Question and score approved by Mr. Kohli
		34. In case of a shock/disturbance, is your entourage (relatives, friends, acquaintance) giving you enough	Whether the entourage is giving enough support	Entourage giving enough support/ Left to your own devices	-	Entourage giving enough support=10 Left to your own devices=0	In modern agricultural system, work-force has been replaced by machines which led to loneliness issue for farmers; isolated	Question and score approved by Mr. Kohli

				food production, food utilisation				
		~~34. Were any of those groups initiated/started by your community?~~	~~Whether any group was initiated by the individual~~	~~Yes/ No~~	~~Yes= 10, No= 0~~		Deleted to keep only relevant information with reference to a developed countries context	*Deleted*
	1.3 ~~Access to local farmers markets~~ Use of local farmers markets (= direct selling)	51. ~~Do you have access to local farmers' market?~~ Do you sell your products at a local farmer's markets?	~~Degree of market access for selling~~ Frequency of selling at local farmer's market	No/1 -3 times a week/1-2 times a month/Always (4+ times a week)	~~No access= 0 Intermittent= 4 Sustained access= 10~~	No = 0 1-2 times a month = 4 1-3 times a week = 7 Always= 10	Wording change since access is, in most cases, not an issue in a developed countries context; Face-to-face interactions with the consumers build networks and are an opportunity for learning which improves their adaptive capacity	Ms Worbs (question) Ms Barjolle, Milestad et al., 2010 (score)
	1.4 Previous collective action	11. Crop and livestock losses: over the past 10 years have you lost a significantly large portion of your crops/ livestock? If yes how did you cope with this loss?(exist already)	Whether internal coping strategies are used	Yes/ No (N/A if did not experience loss)	Yes=10, No=0		Added just the piece of the already existing question that was missing in table 8 but present in the app	Question and score existed already
		37. If there were common issues in your village or neighbourhood that needed attention during the last year, how often did you join together with others to address them?	Frequency (and presence) of collective action	Never , Rarely, Sometimes, Frequently, or Not applicable	Never= 0 Rarely= 4 Sometimes= 7 Frequently= 10		*Unchanged*	Score the same as before, approved by Mr.Charles
		37. Do you share machinery with other farmers?	Whether machinery are shared with other farmers	Yes/No	-	Yes = 10 No = 0	The share of machinery show coordination capacity/socially self-organization which will prevent to hold inefficiently high stocks of machinery, what will reduce costs	Ms Worbs ; Petrick and Kloss, 2012 (question and score)
		37. Do you exchange plots of land with other farmers?	Whether plots of land are exchanged with other farmers	Yes/No	-	Yes = 10 No = 0	Reflects the capacity to organise/interact with others; spreads risks through the collective management of land	Mr. Droz and Ms Barjolle (question) Mr. Droz approved score
	1.5 ~~Access to~~ Use of communal resources	20. Water access: ~~number and type of water source~~ How many sources of water can be used to irrigate your fields?	# of water points that ~~are accessible~~ can be used to irrigate fields	# of ~~types~~ irrigation sources; e.g. well, dam, river, lake	0= 0 1= 2 2= 6 3+= 10		Wording change since access is, in most cases, not an issue in a developed countries context	Score the same as before, approved by Mr. Mayor Ms Worbs

								(question)
		~~25. Land holding access: Total accessible communal land (agricultural + pasture land) accessible agricultural land if applicable (hectares)~~	~~Area of communal community land accessible~~	~~Total # (hectares) inserted in: 'Communal land' column (agricultural and pasture land together)~~	~~0 ha =0~~ ~~0 ha =5~~ ~~>0ha = 10~~		~~Wording change; Score change since communal land in a developed countries context is less relevant~~	
	1.6 Household support	36. Do you have support to fulfil your household duties (cooking, laundry, cleaning, children care)?	Level of household support	No support, but need none /Need support but get none/ Need support and get some, but need more (not enough) / Need support, and get all support I need	-	No support, but need none = 10 Need support but get none = 0 Need support and get some, but need more (not enough) = 5 Need support, and get all support I need = 10	Work overload weakens the individuals which reduces the room to manage future disturbances; it reduces their flexibility	Ms. Darnhofer (approved my question and adapted my score)

2. Ecologically self-regulated Farms maintain plant cover and incorporate more perennials, provide habitat for predators and parasitoids, use ecosystem engineers, and align production with local ecological parameters	2.1 Perennial crops	4. Do you grow perennial crops (plants that can live several years)?	Whether perennial crops are grown	Yes/ No	Yes= 10, No= 0		*Unchanged*	*Unchanged*
	2.2 Origin of species used	9. Approximately what percentage of your crops is a newly-introduced variety (varieties~~/species~~ which have been used in the community for less than 15 years)?	% of non-local ~~species/~~varieties used	Average % given across both crops and animals	~~0-25%= 10~~ ~~25-50%= 6~~ ~~50-75%= 3~~ ~~75-100%= 1~~	0-25%= 10 26-50%= 6 51-75%= 3 76-90%= 1 91-100%=0	Score adjusted to be more consistent; "Species" has been deleted in the question since this word is not equivalent to "variety" and is not appropriate in this context	Score approved by Ms Barjolle; Question changed by Mr Charles
		9. Approximately what percentage of your animal breeds is newly-introduced(varieties~~/species~~ which have been used in the community for less than 30 years)?	% of non-local ~~species/~~varieties used					
	2.3 Synthetic pesticide use/ disposal	17. Have you used synthetic pesticides over the last cropping season? + If you use synthetic pesticide, did you look for pests/diseases on your crops before spraying?	Whether different types of pesticides are used, and whether the farmer looks for pests/diseases before spraying	Yes/ No and Yes/ No for different types of pesticide (insecticide, herbicide, fungicide)	Use pesticide: yes + do you look for pest: No= 0; Use of pesticide: Yes+ do you look for pest: Yes= 5; Use of pesticide: No= 10		*Unchanged*	Score approved by Mr. Charles
		17. What do you do with the containers after you have used the products?	Pesticide disposal	Options from list	~~Taken empty to a hazardous waste collection centre = 10~~ ~~Thrown in trash = 6~~ ~~Reused, thrown near a water stream,~~	Taken empty to a hazardous waste collection centre = 10 Thrown in trash = 4 Reused, burned, Thrown near a water stream, thrown away on ground = 0	The score from "Thrown in trash" changed from 6 to 4 because in developed countries there are special trash/recycling structures that have been put in place so the pesticide containers should not end up with standard trash; "burned" has been added since some people could have	Mr. Charles (score)

					~~thrown away on ground = 0~~		done it	
	2.4 Use of nitrogen fixing legumes/ plants and natural fertilizer s	26. ~~Do you have any leguminous plant growing on your farmland? + If yes, did you plant it?~~ Do you grow every year any leguminous crop / grass-leguminous mixture in your crop rotation?	Presence ~~and use~~ of leguminous plants	~~Yes/ No answers to the two questions~~ Yes every year/ Yes but not every year/Never/Not applicable	~~Yes to first question+ Yes to second question= 10 Yes to first question + No to second question = 5 No to first question + No to second question =0~~	Yes every year = 10 Yes but not every year=5 Never=0	Wording change because farmers in developed countries plant usually all of their crops on purpose; "in your crop rotation" replaced " on your farmland" to make sure that the marginal leguminous mixture are not taken into account	Mr.Charles (question and score)
		25. Do you have practices promoting the development of the mycorrhizes? (e.g. direct seeding)	Whether mycorrhiza are considered	Yes/ No / Not applicable	-	Yes =10 No =0	The use of agro-ecological principles represents a robust path to increase the resilience of agricultural production. One example of it is the consideration of Mycorrhiza fungi which influence soil productivity by improving plant-water interactions/nutrient uptake.	Mr. Charles approved question and score ; Nicholls and Altieri, 2012 (score)
	2.5 Buffer zones	27. Is your land bordered by wild/ protected borders/unmanaged land? If so, have you observed many plants and insects on that land?	Existence of buffer zones and observance of wild plant/ insect species	None of it Less than 7%, 7% or more but less than 15%, 15% or more, Not applicable	~~None of it = 0~~ ~~Some + No = 2~~ ~~Some + Yes = 5~~ ~~Most + No =4~~ ~~Most + Yes = 6~~ ~~All + No = 7.5~~ ~~All +~~ Yes = 10	None of it = 0 Less than 7%+ No = 2 Less than 7%+ Yes = 5 7% or more but less than 15%+ No =4 7% or more but less than 15% + Yes = 6 15% or more + No = 7.5 15% or more+ Yes = 10	The score has been changed according to the Swiss regulation about protected borders/buffer zones	Ms Barjolle (question et score); Mr. Charles (score)

	2.6 Fertilizer use	30. Did you use synthetic inorganic fertilizers this season? + If you do use fertilizer, do you check the soil and plants first to see whether they need it?(exist already, just separated the question)	~~Type and~~ Use of synthetic inorganic fertilizers and Whether soil/plant have been check before using fertilizer	Yes/ No and Yes/ No	~~Yes synthetic + Yes organic= 5~~ ~~Yes synthetic + No organic= 2.5~~ ~~No synthetic + No organic= 0~~ ~~No synthetic + Yes organic= 10~~	Yes synthetic + Yes check= 6 Yes synthetic + No check=2 No fertilizer =0	Score from synthetic inorganic fertilizers and natural organic fertilizer have been separated in order to give more importance of whether soil/plant have been checked before the use of fertilizer	Mr. Charles approved score
		30. Did you use natural organic fertilizers (animal manure/ compost) this season? + If you do use natural fertilizer, do you check the soil and plants first to see whether they need it?	Natural fertilizers use and Whether soil/plant have been check before using fertilizer	Yes/ No and Yes/ No	~~Yes synthetic + Yes organic= 5~~ ~~Yes synthetic + No organic= 2.5~~ ~~No synthetic + No organic= 0~~ ~~No synthetic + Yes organic= 10~~	Yes natural organic + Yes check= 10 Yes natural organic + No check=2 No fertilizer at all=0	Score from synthetic inorganic fertilizers and natural organic fertilizer have been separated in order to give more importance of whether soil/plant have been checked before the use of fertilizer	Mr. Six and Mr. Jörin (question) Mr. Charles approved score; "animal manure/compost" comes from Ms. Barjolle
		30. Do you combine natural and synthetic Fertilizer?	Whether there is a combination of natural organic fertilizer and synthetic fertilizer	Yes/No	-	Yes to first question+ yes to second question =10 Yes to first	The combination of synthetic and organic fertilizer makes the system more resilient since there is more than	Mr. Six and Mr. Jörin (score and question)

		30.If yes do you check the soil and plants first to see whether they need it?	Whether soil/plant have been check before using fertilizer	Yes/No		question + no to second question=2 No = 0	one source of nutrients input	
	2.7 Agroforestry	10. ~~Approximately, how many trees have you planted in your farm system?~~ Do you practice agroforestry?	~~# of trees planted on farm~~ Whether agroforestry is used	Yes/No	~~0= 0~~ ~~>0= 10~~	Yes = 10, No= 0	Wording change	Mr. Charles (score and questions)
		10. ~~Have you planted more than one specie~~? Approximately how many tree species have you planted in your farm?	~~Whether more than one specie was planted~~ # of different managed species	~~Yes/No~~ # count from list	~~Yes = 10, No= 0~~	1=0 2=2 3-4=5 5=7 6+=10	Score needed to be more specific	Mr. Charles (question) Mr. Mayor (score)
		10. In general what is the overall percentage of your agricultural land is covered by trees – including natural and planted (approximately)?	% of agricultural land covered by trees	~~#~~ %: 0, 1-10, 11-20, 21-40, 41-60, 60+	0= 0 1-10%= 2 11-20%= 7 21-40%= 10 41-60%= 7 60%+= 1		*Unchanged scoring;* Only an adjective has been added in the question to add accuracy	Approved by Mr. Charles (score) Ms. Barjolle (question)
	2.8 Energy sources	28. Which energy sources are used in your farm system?	# of environmentally friendly energy sources used	Environmentally friendly options out of list are: Solar, wind, wood residues, manure, agricultural resides and domestic waste, wind, biogas, water	~~0= 0~~ ~~Solar= 4~~ ~~Domestic waste= 4~~ ~~Agricultural residues= 4~~ ~~Wood residues= 4~~ ~~Manure= 4~~ ~~Other options= 3~~ ~~2+= 10~~ ~~(maximum of 10)~~	0= 0 Solar= 4 Domestic waste= 4 Agricultural residues= 4 Wood residues= 4 Manure= 4 Wind=4 Water=4 Other options= 2 2+=10 (maximum of 10)	Some renewable energy were missing in the list	Mr. Charles (score et "water") Ms. Barjolle ("Energy" source pr 2.8)
		28. How much of your energy is provided by external suppliers?	External dependence for energy source	All or most of energy from external suppliers (0-20% on-farm); Around half of	-	All or most of energy from external suppliers=0 (0-20% on-farm) Around half of	Producing as much energy on the farm as the farm consumes is a way to rely less on external intervention/a way to	Ms. Darnhofer and Darnhofer, 2010 (for question and score)

				the energy supply (20-50% on-farm); More than half of the energy is produced on-farm (50-80%) ; All/most of the energy (80-100%) is produced on-farm		the energy supply (20-50% on-farm)=5 More than half of the energy is produced on-farm (50-80%) =8 All/most of the energy (80-100%) is produced on-farm = 10	increase their autonomy	
		29. Do you stock your liquid manure in an open container or in a closed container?	Whether liquid manure is in an open or closed container	Open/Closed/ Not applicable	-	Open = 0; Closed =10 Yes=10 No=0	Producing as much energy on the farm as the farm consumes is a way to rely less on external intervention/a way to increase their autonomy	Darnhofer, 2010 (question et score)
		29.Do you stock your manure (not liquid) in an open container or in a closed container?	Whether manure (not liquid) is in an open or closed container	Open/Closed/ Not applicable				
		29. If one of them is closed, do you use a biogas plant for on-farm energy?	Whether the biogas is used for on-farm energy	Yes/No				
		29. If yes, is the biogas plant on-farm?	Whether the biogas plant is on-farm	Yes/No				
		20.Have you seen any ~~negative~~ changes in quantity with these water sources during the past 5 years? (exist already)	Whether there has been changes of water quantity	Negative /No change/Improvement	-	Negative = 0 No change = 7 Improvement = 10	Less water implies less ability to the agricultural system to self regulate and absorb climate shocks	Existed already but changed by Mr.Choptiany (question) Mr. Choptiany (score)

	2.9 Cover crops	30. Do you use cover crops? (exist already)	Whether cover crops are used	Yes/No	-	Yes = 10 No = 0	Cover crops increase diversity on the field and enhances ecological self-	Existed already and suggested by Mr. Droz (question)

							regulation by controlling erosion/weed/soil moisture/pests and by recycling nutrient and/or fixing N	Mr. Choptiany; Lu et al., 2000 (score)
		25. What % of your total land is covered (with crop residue, cover crops, volunteers or weeds) between 2 main crops?	Percentage of covered land between 2 main crops	Percentage of covered land between 2 main crops	-	91-100=10 81-90=9; 71-80=8 61-70=7; 51-60=6; 41-50=5 31-40=4; 21-30=3 11-20=2; 1-10%=1 0%=0	The more land is bare, the more the soil is exposed to erosion/extreme temperatures/evaporation/frost which depletes the local natural resources and weakens the soil's ability of self-regulation	Mr. Charles (score and question)

3. Appropriately connected Collaborating with multiple suppliers, outlets, and fellow farmers; crops planted in polycultures that encourage symbiosis and mutualism	3.1 Seed/breed sources	8. ~~In general which sources do you have access to? (seeds)~~ In general, which sources do you use? (seeds)	# ~~and type~~ of seed sources	# ~~and type~~	~~1= 4 (if own production), 2 (if other sources) 2 (of any type)= 6 3+ (of any type)= 10~~	1= 1 2-3= 6 4+ = 10	Wording change since access is, in most cases, not an issue in a developed countries context; Score needed to be more strict because there are more seed sources available in developed countries	Mr.Oehninger and Mr. Bourguignon (score) Ms Worbs (question)
		8. ~~In general which sources do you have access to? (livestock)~~ In general, which sources do you use? (livestock)	# ~~and type~~ of livestock sources	# ~~and type~~	~~1= 4 (if own production), 2 (if other sources) 2(of any type)= 6 3+ (of any type)= 10~~	1= 1 2-3= 6 4+ = 10	Wording change since access is, in most cases, not an issue in a developed countries context; Score needed to be more strict because there are more livestock sources available in developed countries	Mr.Oehninger and Mr. Bourguignon (score) Ms Worbs (question)
	3.2 Intercropping	18. Do you grow two or more crops in association?	Whether intercropping is practiced	Yes/ No	Yes= 10, No= 0		*Unchanged*	*Unchanged*
		18. What percentage of your cultivated crops is intercropped? (exist already)	Proportion of intercropped land	# (hectares)intercropped land/total # croppe d land *100	-	%/10 = score	The more percentage of cultivated crops is intercropped, the more resilient is the system since producing various crops simultaneously reduces risk and enables greater yield stability/ less productivity declines during a drought compared to monoculture	Existed already (question) Mr. Six, Mr.Jörin, Mr. Charles and Altieri et al., 2015 (score)
		18. Do you grow plants in association with aquaculture ~~(e.g rice-fish farming)?~~	Whether plants are grown in association with aquaculture	Yes/ No	Yes= 10, No= 0		Only deleted rice-fish farming example since it isn't common in developed countries	Deleted approved by Ms Barjolle

	3.3 ~~Access to information~~ Use of information sources	48. How often did you ~~have access to~~ use information on market/market prices over the last season ?	~~Access to~~ Use of market information	Often, sometimes, very rarely/ never	Often= 10 Sometimes= 5 Very rarely/never= 0		Wording change since access is, in most cases, not an issue in a developed countries context	Question change from Ms Worbs and Mr.Droz
		14. ~~Do you have access to weather forecast services?~~ Do you use weather forecast services (e.g Agrometeo)?	~~Access to~~ Use of weather forecast services	Yes/ No	Yes= 10, No= 0		Wording change since access is, in most cases, not an issue in a developed countries context	Ms Worbs and Ms. Barjolle (question)
		14. ~~Do you have access to information on cropping/livestock practices?~~ Do you use information and extension services on cropping/livestock practices?	~~Access to~~ Whether information on cropping/livestock practices are used	Yes/ No	-	Yes=10, No= 0	Wording change since access is, in most cases, not an issue in a developed countries context; The use of information is essential to access to knowledge about managing/adapting the farm to keep/make him strong/stronger and to keep updated about the dynamic system	Ms Worbs (question) Ms. Barjolle (score)
		14. ~~If yes, how do you get this information?~~ How do you get most frequently in touch with the relevant information (Newspaper,internet,radio,etc.) ?	Sources of information on cropping/livestock practices	# of sources	~~0= 0,~~ ~~1= 4,~~ ~~2= 8~~ ~~3+= 10~~	0= 0, 1=2 2= 5, 3=6 4= 7 5+= 10	Score needed to be more strict because there are more information sources available in developed countries	Ms. Barjolle (question) Mr. Mayor (score)
		47. ~~Do you have access to~~ Do you use Information and Communication Technologies? (ICTs)	~~Access to ICTs~~ Use of ICTs used	# of 'Yes' across ICTs options	~~0= 0~~ ~~1+= 10~~	0= 0 1=1 2=4	Wording change since access is, in most cases, not an issue in a developed countries context; Score needed to be more strict because	Ms Worbs (wording change) Mr.Mayor (score)

						3= 5 4=8 5 and more =10	there are more ICTs available in developed countries	
	3.4 Veterinary access	35. Do you have access to veterinary services?	Level of access to veterinary services	Yes and it is good quality; Yes but it is problematic; No	No= 0, Yes, but it is problematic (unqualified personnel, expensive, distant, etc.)= 5; Yes, and it is of good quality, affordable and nearby= 10		*Unchanged*	*Unchanged*
	3.5 Trust and cooperation	36. In your village/ neighbourhood do you generally trust others in matters of lending and borrowing?	Level of trust in the community	Yes/ No	Yes= 10, No= 0		*Unchanged*	*Unchanged*
		36. Generally speaking, would you say that most people in your village/ neighbourhood can be trusted or that you can't be too careful in dealing with people?	Level of trust in the community	Options: People can be trusted You can't be too careful	People can be trusted= 10 You can't be too careful= 0		Only an element has been added in the question to add accuracy	Mr. Charles (approved score)
		36. If a community project does not directly benefit you but has benefits for many others in the village/neighbourhood, would you contribute time or money to the project?	Level of involvement in communal activities	Options to count from are: Time, Money, None, Other. Number of responses (not	~~0= 0~~ ~~1= 8~~ ~~2= 10~~	1= 8 2+= 10 None=0	Score adjusted because "None" can not be scored like the other answers	Mr. Charles (approved score)

				including "None")				
		37. Do you share machinery with other farmers?	Whether machinery are shared with other farmers	Yes/No	-	Yes = 10 No = 0	The share of machinery show coordination capacity/socially self-organization which will prevent to hold inefficiently high stocks of machinery, what will reduce costs	Ms Worbs ; Petrick and Kloss, 2012 (question and score)

	3.6 Interactions between stakeholders of the value chain	52. Do you consider yourself as a stakeholder of a value chain or an individual productive entity?	Self-perception of the farmer about his role in the food system	Individual productive identity / Stakeholder of a value chain	-	Individual productive entity =0 Stakeholder of a value chain= 10 (Average from all)	A farmer that considers itself as part of the value chain will be more interacting with the other stakeholders and will therefore be able to influence the system and get more information what will allow him to respond better in case of disturbances	Mr. Kohli (question) Ms. Barjolle (score)
		52.Do you participate in the determination of the local operational specifications (Code of Practices or Book of requirements)?	Level of the farmers' participation in the determination of the local specifications of his products	Not at all/ A little/ A lot	-	Not at all=0 A little=4 A lot = 10	The more a farmer interacts with the stakeholders that influence the Code of Practices, the more the Code of Practices will be suited to the field reality/challenges of the farmer	Question and score approved by Mr.Kohli
		52.Do you participate in the determination of the regional operational specifications (Code of Practices or Book of requirements)?	Level of the farmers' participation in the determination of the regional specifications of his produce	Not at all/ A little/ A lot	-	Not at all=0 A little=6 A lot = 10	The more a farmer interacts with the stakeholders that influence the Code of Practices, the more the Code of Practices will be suited to the field reality/challenges of the farmer	Question and score approved by Mr.Kohli
		52.Do you participate in the determination of the federal	Level of the farmers' participation in the	Not at all/ A	-	Not at all=0 A little=8	The more a farmer interacts with the	Question and score approved by Mr.Kohli

		operational specifications (Code of Practices or Book of requirements)?	determination of the federal specifications of his produce	little/ A lot		A lot = 10	stakeholders that influence the Code of Practices, the more the Code of Practices will be suited to the field reality/challenges of the farmer	
		49. ~~Do you have any agreement or binding documents with the seller/provider?~~ If you have binding contracts with the seller/provider, are you satisfied with their terms or do you feel that they limit your flexibility?	Binding agreements with seller	Satisfied, do not feel limited by the agreement ;There are two sides to every coin (i.e. mixed feelings) ; I feel that the agreements limit me in what I can do, what I can change; Not applicable	-	Satisfied, do not feel limited by the agreement = 10 There are two sides to every coin (i.e. mixed feelings) = 5 I feel that the agreements limit me in what I can do, what I can change = 0	Question change because : This is a double-edged sword: a 'binding agreement' gives you planning security (which is good, frees energy for other projects), but 'binding' also means you cannot change (no flexibility, which can be 'bad'). So it should not be asked for 'binding' but how it is perceived by the farmers	Ms. Darnhofer (question and score)
		50. ~~Do you have any agreement or binding documents with the buyer?~~ If you have binding contracts with the buyer, are you satisfied with their terms or do you feel that they limit your flexibility?	Binding agreements with buyer					
		52. How do you commercialize your most profitable products?	Level of commercialization of the main products	Through: Agroindustry ; Agricultural cooperative	-	Agroindustry=2 Agricultural cooperative=6 Selling to retailer(s) without intermediary= 8 Local	The level of commercialization of the farmer's products will determine the type of relationship that the farmer can have with his purchasers: The most distant	Mr.Kohli (question) Ms. Barjolle (score)

				(e.g Fenaco); Selling to retailer (s) without intermediary; Local cooperative society (e.g local dairy-cheese factory); Direct selling		cooperative society =8 (e.g local dairy-cheese factory) Direct selling=10 (Average from all)	relationship is through agroindustry and the closest relationship is through direct selling	
		52. If you do contract farming, do you (or your professional organization or representatives) have a say in the negotiation of the content of the contract?	Level of negotiation power	Yes/No /Not applicable	-	Yes=10, No=0 (Average from all)	Having a say in the contract negotiations will allow the contract to better suit the farmer's situation	Question and score approved by Mr.Kohli
		52. Who determines mainly what you produce?	Main Stakeholder determining the production	You or You with other farmers /Stakeholders who are not farmers	-	You or you with other farmers= 10 Stakeholders who are not farmers= 0 (Average from all)	Being able to determine what to produce gives the farmer the possibility to adjust his production with his situation	Mr. Kohli (question) Ms. Barjolle (score)
		52.According to you, are the citizen-consumers enough aware of the farmers' challenges ?	Awareness of citizen-consumers	Yes/Not enough /No	-	Yes=10, Not enough=2 No=0	Citizen-consumers are farmer's purchasers so if they are aware of the challenges, they will	Question and score approved by Ms. Barjolle

							support them instead of supporting the ones from other countries by buying local/seasonal and they might promote direct selling	
	3.7 Cover crops	30. Do you use cover crops? (exist already)	Whether cover crops are used	Yes/No	-	Yes = 10 No = 0	Cover crops increase diversity on the field and enhances ecological self-regulation by controlling erosion/weed/soil moisture/pests and by recycling nutrient and/or fixing N	Existed already and suggested by Mr. Droz (question) Mr. Choptiany and Lu et al., 2000 (score)

4. Functional and response diversity Heterogeneity of features within the landscape and on the farm; diversity of inputs, outputs, income sources, markets, pest controls, etc.	4.1. Species/genetic diversity	5. Approximately, how many animals do you own? [per category]	# of animals owned per category	Average of scores for #species, #breeds	Species: 1= 0, 2= 4, 3= 7, 4+= 10 Breeds: 1-5= 3, 6-10= 8, 11+= 10		*Unchanged*	*Unchanged*
		7. Do you practice aquaculture? If yes, what species do you manage?	Whether they practice aquaculture and # of different managed species	# count from first row of table	1= 0, 2= 4, 3= 7, 4+= 10		*Unchanged*	Score approved by Mr.Charles
		4. Do you have more than one variety of this crop?	Whether more than one crop variety is cultivated	Yes/No list	Yes = 10, No= 0		*Unchanged*	*Unchanged*
		4. Which crops do you cultivate? (exist already)	# of different crops	# count from list	-	1=0 2-3=4 4-5=6 6+=10	Diversity is needed to have a resilient system	Question existed already Ms Barjolle (score)
		10. ~~Have you planted more than one specie~~? Approximately how many tree species have you planted in your farm?	~~Whether more than one specie was planted~~ # of different managed species	~~Yes/No~~ # count from list	~~Yes = 10, No= 0~~	1=0 2=2 3-4=5 5=7 6+=10	Score needed to be more specific	Mr. Charles (question) Mr. Mayor (score)
		27. Is your land bordered by wild/ protected borders/unmanaged land? If so, have you observed many plants and insects on that land?	Existence of buffer zones and observance of wild plant/ insect species	None of it Less than 7%, 7% or more but less than 15%, 15% or more, Not applicable	~~None of it = 0~~ ~~Some + No = 2~~ ~~Some + Yes = 5~~ ~~Most + No =4~~ ~~Most + Yes = 6~~ ~~All + No = 7.5~~ ~~All +~~ Yes = 10	None of it = 0 Less than 7%+ No = 2 Less than 7%+ Yes = 5 7% or more but less than 15%+ No =4 7% or more but less than 15% + Yes = 6 15% or more + No = 7.5 15% or more+ Yes = 10	The score has been changed according to the Swiss regulation about protected borders/buffer zones	Ms Barjolle (question et score); Mr. Charles (score)
		~~33. How many types of invasive~~	~~# of types of persistent and~~	~~#~~	~~**0= 10, 1= 8, 2= 6, 3= 4, 4= 2, 5+= 0**~~		Deleted by 4.1 because	Delete approved by Ms

		~~(local or external) weed species have you observed in your field in the past 10 years~~	~~damaging weeds species~~				the question doesn't fit to the indicator " Functional and response diversity"; by weeds, it is not the more different weed species there is that the more the system will be resilient because there is a maximum threshold (see score by. 7.1)	Barjolle
	4.2 Agriculture categories	2. Does anyone in your household carry out any of these activities on your farm?	# of different activities carried out	Livestock, crops, trees, bee keeping, fish pond-aquaculture	1= 0, 2= 5, 3= 7, 4+= 10		*Unchanged*	Score approved by Mr.Charles
	4.3 Household income sources	40. ~~How many different income sources did you have over the past year?~~ How many different income sources does your household have ?	# of different income sources	0,1,2,3, 4,5,6+ - Agriculture production, labour/ daily wages, livestock, petite trade/shop keeper	1= 0, 2= 5, 3+= 10		Question changed because a farmer is more resilient if his household has more income sources than if he has different income sources by himself since the latter could lead to work overload what would compromise his resilience; It is better to look at the current status so "over the past year" has been deleted	Ms Barjolle (question) Score approved by Mr. Mayor and Ms Barjolle
	4.4 Types of weed/pest/animal disease control	15. ~~What types of animal disease control methods do you use?~~ How many different methods of animal disease control do you use for your animals/livestocks? (e.g. antibiotics, vaccines, natural remedies, treatments against	Different methods of control used	# from list	~~0= 0, 1= 5, 2= 7, 3+= 10~~	0-1= 0, 2=2, 3= 6, 4+= 10	Score needed to be more strict because there are more animal disease control methods available in developed countries; Also, the score needed to be more strict because hygiene is and	Mr. Forestier (question and score)

		internal and external parasites, integrated animal health management (e.g. hygiene, spacing, feed and culling practices))					must be the first disease control method and antibiotic is a current practice	
		16. What pest control practices did you use over the last cropping season?	Different types of pest control practices used	# from list	~~0= 0, 1= 5, 2= 7, 3+= 10~~	0=0 1=1 2=2 3=3 4=4 5=5 6+=10	Score needed to be more strict because there are more pest control practices available in developed countries	Mr. Charles (score)
		31. In your field, what weed management practices do you use? (exist already)	Different types of weed management practices	# from list	-	1=0 2=3 3=5 4+=10	Diversity is needed to have a resilient system	Question exists already Mr. Mayor (score)
		30. Do you use cover crops? (exist already)	Whether cover crops are used	Yes/No	-	Yes = 10 No = 0	Cover crops increase diversity on the field and enhances ecological self-regulation by controlling erosion/weed/soil moisture/pests and by recycling nutrient and/or fixing N	Existed already and suggested by Mr. Droz (question) Mr. Choptiany and Lu et al., 2000 (score)
	4.5 Diversity of markets	50. Do you sell any product with only one available buyer? (exist already)	Whether there is any product with only one available buyer	Yes/No	-	Yes = 0 No = 10	Diversity is needed to have a resilient system	Question exist already Mr. Choptiany (score)
		49. ~~Do you have any vegetal product, that you can only access from one available seller?~~ (exist already) Do you have any inputs for the crop production that you can only access from one available seller?	Whether there is any vegetal product with only one available seller	Yes/No	-	Yes = 0 No = 10	Diversity is needed to have a resilient system; Wording change to be more precise	Question exist already Mr. Choptiany (score)
		49. ~~Do you have any animal products, that you can only access from one available seller?~~ (exist already) Do you have any inputs for the	Whether there is any animal product with only one available seller	Yes/No	-	Yes = 0 No = 10	Diversity is needed to have a resilient system ; Wording change to be more precise	Question exist already Mr. Choptiany (score)

		animal production~~-that you can only access from one available seller~~?						

5. Optimally redundant Planting multiple varieties of crops rather than one, keeping equipment for various crops, getting nutrients from multiple sources, capturing water from multiple sources	5.1 Varietal diversity	5. Livestock breeds/varieties - Do you have more than one breed of this species?	Whether more than one breed per species is owned	Yes/No	Yes= 10, No= 0		*Unchanged*	*Unchanged*
		7. Do you practice aquaculture? If yes, do you manage more than one species?	Whether more than one species is managed	Yes/No	Yes= 10, No= 0		*Unchanged*	*Unchanged*
		4. Crop varieties/landraces- How many varieties do you cultivate?	# of crop varieties across crop species	Total number of crop varieties/total number of crop species	~~1= 0 2= 8 3+= 10~~	1= 0 2= 4 3= 8 4+=10	Score needed to be more strict	Mr.Charles (score)
		10. Have you planted different varieties of the same tree species?	# of different managed varieties	Yes/ No	Yes= 10, No= 0		*Unchanged*	*Unchanged*
	5.2 Market access - selling	50. Most profitable products sold ~~Last year, have you sold part of your crops/livestock/seeds?~~	Most profitable products sold ~~Whether products were sold and which types~~	# ~~e.g. sorghum, millet, chickens~~	~~0= 0, 1=2, 2= 4, 3= 6, 4+= 10 N/A (if answered 'No' to initial question)~~	0= 0, 1=2, 2= 4, 3= 5, 4= 6, 5=7, 6+=10 ~~N/A (if answered 'No' to initial question)~~	Score needed to be more strict because selling products on the market is not as much hindered as in developing countries	Ms Barjolle (score)
		50. Do you sell any product with only one available buyer? (exist already)	Whether there is any product with only one available buyer	Yes/No	-	Yes = 0 No = 10	Diversity is needed to have a resilient system	Question exist already Mr. Choptiany (score)
	5.3 Water sources	20. Water access: ~~number and type of water source~~ How many sources of water can be used to irrigate your fields?	# of water points that ~~are accessible~~ can be used to irrigate fields	# of ~~types~~ irrigation sources ; e.g. well, dam, river, lake	0= 0 1= 2 2= 6 3+= 10		Wording change since access is, in most cases, not an issue in a developed countries context	Score the same as before, approved by Mr. Mayor Ms Worbs (question)
	5.4 Energy sources	28. Which energy sources are used in your farm system?	# of energy sources	# count out of	~~0= 0, 1= 3,~~	0=0 1=1	Score needed to be more strict because	Mr. Mayor (score)

				all options given in the list	~~2= 6,~~ ~~3+= 10~~	2=4 3=7 3+=10	more energy sources are available in developed countries	
	5.5 Land improving practices	25. Which land improving practices do you use?	# of land improving practices used	# of practices selected from list	~~0= 0 1= 3 2= 6~~ ~~3+= 10~~	0= 0 1= 1, 2= 3, 3= 5 4= 7 5= 9 6+=10	Question changed because for a system to be resilient, it has to use land improving practices and not whatever practice; Score needed to be more strict because more land improving practices are available in developed countries	Ms Barjolle (question) Mr.Charles (score)
	5.6 Sources of fertilizers	30. In general, where do you source your fertilizers from?	# of different sources	# selected options count from table: Farm; Shop; Aid; Friends. Neighbours; Extension worker; Directly from seller.	1= 0, 2= 5, 3+= 10		*Unchanged*	Score approved by Mr.Charles
	5.7 Major productive assets owned/ accessible	38. Rank by importance the major productive assets that you own (1= most important, 6=less important)	# of productive assets owned	# of productive assets owned Land Livesto	~~1= 4~~ ~~2= 7~~ ~~3+ =10~~	1= 2 2=5 3=7 4+=10	Score needed to be more strict because it is easier to own productive assets in developed countries	Mr.Charles (score)

				ck Seeds, Buildings Equipment ,Others				
		~~25. Total area of accessible agricultural land: private plots and Total area of owned Land: private plots~~	~~Area of private land accessible~~	~~# ha inserted in 'Private plots' column ,'Total accessible agricultural land, if applicable (hectares)'row~~	~~0= 0 0.1-1= 2 1.1-5= 5 >5= 10~~		Deleted by 5.7 because the question doesn't fit to the indicator " Optimally redundant"	Deleted approved by Ms Barjolle
	5.8 Seed/Livestock ~~access~~ sources	8. ~~In general which sources do you have access to? (seeds)~~ In general, which sources do you use? (seeds)	# ~~and type~~ of seed sources	# ~~and type~~	~~1= 4 (if own production), 2 (if other sources) 2 (of any type)= 6 3+ (of any type)= 10~~	1= 1 2-3= 6 4+ = 10	Wording change since access is, in most cases, not an issue in a developed countries context; Score needed to be more strict because there are more seed sources available in developed countries	Mr.Oehninger and Mr. Bourguignon (score) Ms Worbs (question)
		8. ~~In general which sources do you have access to? (livestock)~~ In general, which sources do you use? (livestock)	# ~~and type~~ of livestock sources	# ~~and type~~	~~1= 4 (if own production), 2 (if other sources) 2(of any type)= 6 3+ (of any type)= 10~~	1= 1 2-3= 6 4+ = 10	Wording change since access is, in most cases, not an issue in a developed countries context; Score needed to be more strict because there are more livestock sources available in developed countries	Mr.Oehninger and Mr. Bourguignon (score) Ms Worbs (question)

	5.9 Human nutrition	~~Did anyone in the household eat the food in question over the last day and night?~~ 33. Is everybody in the household having access to a diverse diet?	~~Household Dietary Diversity Score (HDDS) going from 0 to 12~~ Whether the diet is diverse	~~Yes/ No for each food category in list. There are 12 categories of foods, so HDDS goes from 0 to 12~~ Yes/No	~~If HHDS= 1,score= 0; if HHDS= 2,score= 1; HHDS= 3, score= 2 [...] if HHDS= 11+, score= 10~~	Yes=10,No=0	Wording change since diet diversity is not a issue in most cases of developed countries	Ms Barjolle (question and score)
		~~35. Number of vegetables, pulses and fruit eaten (inferred from above)~~	~~# of vegetables, pulses, fruit~~	~~# of times fruits/ vegetables/pulses were eaten during week~~	~~1= 0, 2= 3, 3= 6, 4= 8, 5+= 10~~		Deleted to keep only relevant information with reference to a developed countries context	*Deleted*
		~~35. At the moment, which are your food stocks? (specify quantity in kg)~~	~~Level of food stocks~~	~~Quantity in kg~~	~~0= 0 >0= 10~~		Deleted to keep only relevant information with reference to a developed countries context	*Deleted*
	5.10 Animal nutrition	6. ~~Do you give food supplements to your animals (such as pods)? If so, which foods?~~ How many other nutritive sources than pasture/grass do you give to your cattle? (e.g. corn (whole plant or cob), concentrated feed, potatoes, by-product from bakery, whey, straw, etc.)	# of different foods with same function~~(including grazing) for top three animals **categories**~~	# of foods mentioned	~~0= 0 1= 5 2= 7 3+= 10~~	0=0, 1=2, 2=4, 3=7, 4+=10	Giving only one type of food supplement is not contributing so much to "optimally redundant" which is a resilience indicator	Mr. Forestier (question and score)

		6. How many other nutritive sources than concentrated feed and/or cereals produced on-farm do you give to your pigs? (e.g. whey, by-product from bakery, cheese, etc.)	# of different foods with same function	# of foods mentioned	-	0=0, 1=3, 2=7, 3+= 10	Giving only one type of food supplement is not contributing so much to "optimally redundant" which is a resilience indicator	
		6. Do you give to your poultry other nutritive sources than concentrated feed and/or cereals produced on-farm?	Whether other nutritive sources are given to poultry	Yes/No	-	Yes=10 No=0	For poultry, only one type of food supplement is considered as quiet good	
		7. For each aquatic species mentioned do you provide food supplements? If so, which ones?	# of different food supplements across species mentioned	Total # of foods mentioned in the 'If so, which foods' row for all animals (if /total number of animal categories possessed	0= 0, 1= 5, 2= 7, 3+= 10		*Unchanged*	*Unchanged*
		6. Do you keep the animals grazing on pasture or agricultural lands during part or throughout the year? (Tick if yes)	Access to vegetation for feed	Yes/ No for each animal category possessed Averag	Yes= 10 No= 0 for each category. Overall score / # of animal categories		*Unchanged*	Score approved by Mr.Charles

				e points across animals: points for each animal category/ # of animal categories				
		6. Do you store some stocks of feed in case of shortage?	Whether stocks of feed exist	Yes/No	-	Yes = 10 No = 0	Having some superfluous units that have some degree of functional overlap within the system can serve to buffer against risk and shocks/ assures that there is a backup	Cabell and Oelofse, 2012
	~~5.11 Cereal bank~~	~~14. What kind of infrastructure do you have in your community?~~	~~Access to a cereal bank~~	~~Yes/ No (cereal bank access)~~	~~Yes= 10, No= 0~~		Deleted by 5.11 because the question doesn't fit to the indicator " Optimally redundant"	*Deleted*
	5.12 Market access-buying	49. ~~Do you have any vegetal product, that you can only access from one available seller?~~ (exist already) Do you have any inputs for the crop production that you can only access from one available seller?	Whether there is any vegetal product with only one available seller	Yes/No	-	Yes = 0 No = 10	Diversity is needed to have a resilient system; Wording change to be more precise	Question exist already Mr. Choptiany (score)
		49. ~~Do you have any animal products, that you can only access from one available seller?~~ (exist already) Do you have any inputs for the animal production that you can only access from one available	Whether there is any animal product with only one available seller	Yes/No	-	Yes = 0 No = 10	Diversity is needed to have a resilient system ; Wording change to be more precise	Question exist already Mr. Choptiany (score)

		seller?						

6. Spatial and temporal heterogeneity Patchiness on the farm and across the landscape, mosaic pattern of managed and unmanaged land, diverse cultivation practices, crop rotations	6.1 Temporal heterogeneity of farm system	25. Which land improving practices do you use?	# of land improving practices used	# of practices used from list	~~0= 0, 1= 3 2= 6, 3+= 10~~	0= 0 1= 1, 2= 3, 3= 5 4= 7 5= 9 6+=10		Ms Barjolle (question and score) Mr.Mayor (score)
	6.2 Trees on farm	10. In general what is the overall percentage of your agricultural land is covered by trees – including natural and planted (approximately)?	% of agricultural land covered by trees	~~#~~ %: 0, 1-10, 11-20, 21-40, 41-60, 60+	0= 0 1-10%= 2 11-20%= 7 21-40%= 10 41-60%= 7 60%+= 1		*Unchanged scoring;* Only an adjective has been added in the question to add accuracy	Approved by Mr. Charles (score) Ms Barjolle (question)
	6.3 Types of soil	24. How many different types of soil can you observe on your field (approximately)?	# of different types of soil observed	# of types observed: types include sandy, loamy, clay, stony.	1= 0, 2= 5, 3+= 10		*Unchanged*	Approved by Mr. Charles (score)
	6.4 Land management practices	25. Which land improving practices do you use?	# of land improving practices used	# of practices selected from list	~~0= 0 1= 3 2= 6 3+= 10~~	0= 0 1= 1, 2= 3, 3= 5 4= 7 5= 9 6+=10	Question changed because for a system to be resilient, it has to use land improving practices and not whatever practice; Score needed to be more strict because more land improving practices are available in developed countries	Ms Barjolle (question) Mr.Charles (score)
	6.5 Heterogeneity of farm and landscape	23. ~~Total number of fields you have access to:~~ How many different clusters of plots (plots with same management type) do you have?	# of separate fields accessible (across private, community and government)	# of separate fields for each category	1 cluster ~~field~~= 0, 2= 7, 3+= 10			Ms Barjolle (question); Approved by Mr. Charles and Ms Barjolle (score)

	6.6 Intercropping	18. What percentage of your cultivated crops is intercropped? (exist already)	Proportion of intercropped land	# (hectares)intercropped land/total # cropped land *100	-	%/10 = score	The more percentage of cultivated crops is intercropped, the more resilient is the system since producing various crops simultaneously reduces risk and enables greater yield stability/ less productivity declines during a drought compared to monoculture	Existed already (question) Mr. Six, Mr.Jörin, Mr. Charles and Altieri et al., 2015 (score)
	6.7 Invasive species	31. Approximately, what percentage of your fields ~~land~~ is covered by weeds?	Level of invasive weeds	% of cultivated land cover by weeds	100-75%= 0 75-50%= 2 50-25%= 4 25-11%= 6 10-0%= 10		*Unchanged*	Approved by Mr. Charles (score)
	6.8 Perennials	4. Do you grow perennial crops (plants that can live several years)?	Whether perennial crops are grown	Yes/ No	Yes= 10, No=0		*Unchanged*	*Unchanged*
	6.9 Cover crops	30. Do you use cover crops? (exist already)	Whether cover crops are used	Yes/No	-	Yes = 10 No = 0	Cover crops increase diversity on the field and enhances ecological self-regulation by controlling erosion/weed/soil moisture/pests and by recycling nutrient and/or fixing N	Existed already and suggested by Mr. Droz (question) Mr. Choptiany and Lu et al., 2000 (score)

7. Exposed to disturbance Pest management that allows a certain controlled amount of invasion followed by selection of plants that fared well and exhibit signs of resistance	7.1 Invasive species	31. How many types of invasive weed species have you observed in your field in the past 10 years?	# of types of persistent and damaging weeds species	#	~~0=0~~ ~~1= 2,~~ ~~2= 4,~~ ~~3= 6,~~ ~~4= 8,~~ ~~5+= 10~~	0= 0, 1= 2, 2= 4, 3= 10, 4= 5, 5+= 2	Score needed to be changed because too many weed species can become incontrollable and harm the system	Ms Barjolle and Mr.Mayor (score)
	7.2 Disturbances	14. Over the last ten years, have you observed any changes relating to the weather? If yes, what changes have you noticed?	# of changes observed	#	0= 0, 1= 8, 2= 10, 3= 6, 4= 4, 5+= 0		*Unchanged*	Score approved by Mr.Charles
		34. What types of disturbances have you experienced in the past 10 years?	# of types of disturbances selected from options ~~+ for each disturbance experienced the number of times it was experienced~~	Number of disturbances. ~~Add together the total number of times a disturbance was experienced (across types).~~	0= 5 1= 10 2= 8 3= 6 4= 4 5+= 0		*Unchanged*	Score approved by Mr.Charles
		11. Over the past 10 years have you lost a significantly large portion of your crops (preharvest loss)?	# of severe disturbances	Yes/ No	Yes= 0, No= 10		*Unchanged*	*Unchanged*
		11. Over the past 10 years have you lost a significantly large portion of your livestock?	# of grave disturbances	Yes/ No	Yes= 0, No= 10		*Unchanged*	*Unchanged*
	~~7.3 Breeding for resistance~~	~~7. Have you tried breeding to obtain improved animals?~~	~~Knowledge on breeding animals~~	~~Yes/ No~~	~~Yes= 10, No= 0~~		Deleted because in most developed countries , researchers do the breeding	Delete approved by Mr.Schut and Ms Barjolle
	7.4 Buffer zones	27. Is your land bordered by wild/ protected	Existence of buffer zones and observance of wild	None of it	~~None of it = 0~~ ~~Some + No = 2~~	None of it = 0 Less than 7%+ No	The score has been changed according to	Ms Barjolle (question et score);

		borders/unmanaged land? If so, have you observed many plants and insects on that land?	plant/ insect species	Less than 7%, 7% or more but less than 15%, 15% or more, Not applicable	~~Some + Yes = 5~~ ~~Most + No =4~~ ~~Most + Yes = 6~~ ~~All + No = 7.5~~ ~~All +~~ Yes = 10	= 2 Less than 7%+ Yes = 5 7% or more but less than 15%+ No =4 7% or more but less than 15% + Yes = 6 15% or more + No = 7.5 15% or more+ Yes = 10	the Swiss regulation about protected borders/buffer zones	Mr. Charles (score)
	7.5 Combination local/exotic species	9. Approximately what percentage of your crops is a newly-introduced variety (varieties~~/species~~ which have been used in the community for less than 15 years)?	% of non-local ~~species/~~varieties used	Average % given across both crops and animals	~~0-25%= 10~~ ~~25-50%= 6~~ ~~50-75%= 3~~ ~~75-100%= 1~~	0-25%= 10 26-50%= 6 51-75%= 3 76-90%= 1 91-100%=0	Score adjusted to be more consistent; "Species" has been deleted in the question since this word is not equivalent to "variety" and is not appropriate in this context	Score approved by Ms Barjolle; Question changed by Mr Charles
		9. Approximately what percentage of your animal breeds is newly-introduced(varieties~~/species~~ which have been used in the community for less than 30 years)?	% of non-local ~~species/~~varieties used					

8. Coupled with local natural capital Builds (does not deplete) soil organic matter, recharges water, little need to import nutrients or export waste	8.1 Land quality	24. ~~On average, how rich in Soil Organic Matter is your soil?~~ According to you, on average, how rich is your Soil Organic Matter?	Level of soil quality	Not at all, Very little, average, Quite rich, A lot/Very, Do not know	~~Not at all= 0, Very little= 2.5, Average = 5, Quite rich= 7.5, A lot/very= 10, Do not know=5~~	Not at all= 0 Very little= 2.5 Average = 5 Quite rich= 7.5 A lot/very= 10 Do not know=0	Added " according to you" since the answer is a subjective assessment; Not knowing the soil organic matter status of his own land will not allow the farmer to manage well his land	Mr. Charles (question); Mr. Charles approved score change
		24. Do you make an organic matter balance?	Whether organic matter balance are made	Yes/No	-	Yes= 10 No =0	Way of knowing the quality status of the land which will prevent soil organic matter depletion	Mr. Droz approved question and score
	8.2 Health of soil/ water quality	24. Have you observed one or several of the following soil degradation processes these last five years ?	# of types of land degradation occurring	# of problems options selected from list	0= 10 1= 7 2= 4 3= 1 4+= 0		*Unchanged*	Score approved by Mr. Charles
		22. Have you encountered any of the following water quality problems:	# of water quality problems observed	# of problems options selected from list	~~0= 10~~ ~~1= 7~~ ~~2= 4~~ ~~3= 1,~~ ~~4+= 0~~	0=10 1=6 2=4 3+=0	Score needed to be more strict because the listed water quality problems are severe	Mr. Mayor (score)
	8.3 Land improving practices	25. Which land improving practices do you use?	# of land improving practices used	# of practices selected from list	~~0= 0 1= 3 2= 6~~ ~~3+= 10~~	0= 0 1= 1, 2= 3, 3= 5 4= 7 5= 9 6+=10	Question changed because for a system to be resilient, it has to use land improving practices and not whatever practice; Score needed to be more strict because more land improving practices are available in developed countries	Ms Barjolle (question) Mr.Charles (score)

		26. ~~Do you have any leguminous plant growing on your farmland?~~ ~~+ If yes, did you plant it?~~ Do you grow every year any leguminous crop / grass-leguminous mixture in your crop rotation?	Presence ~~and use~~ of leguminous plants	~~Yes/ No answers to the two questions~~ Yes every year/ Yes but not every year/ Never/ Not applicable	~~Yes to first question+ Yes to second question= 10~~ ~~Yes to first question + No to second question = 5~~ ~~No to first question + No to second question =0~~	Yes every year = 10 Yes but not every year=5 Never=0	Wording change because farmers in developed countries plant usually all of their crops on purpose; "in your crop rotation" replaced " on your farmland" to make sure that the marginal leguminous mixture are not taken into account	Mr.Charles (question and score)
		30. Did you use natural organic fertilizers (animal manure/ compost) this season? + If you do use natural fertilizer, do you check the soil and plants first to see whether they need it?	Natural fertilizers use and Whether soil/plant have been check before using fertilizer	Yes/ No and Yes/ No	~~Yes synthetic + Yes organic= 5~~ ~~Yes synthetic + No organic= 2.5~~ ~~No synthetic + No organic= 0~~ ~~No synthetic + Yes organic= 10~~	Yes natural organic + Yes check= 10 Yes natural organic + No check=2 No fertilizer at all=0	Score from synthetic inorganic fertilizers and natural organic fertilizer have been separated in order to give more importance of whether soil/plant have been checked before the use of fertilizer	Mr. Six and Mr. Jörin (question) Mr. Charles approved score; "animal manure/compost" comes from Ms. Barjolle
		30. Do you use cover crops? (exist already)	Whether cover crops are used	Yes/No	-	Yes = 10 No = 0	Cover crops increase diversity on the field and enhances ecological self-regulation by controlling erosion/weed/soil moisture/pests and by recycling nutrient and/or fixing N	Existed already and suggested by Mr. Droz (question) Mr. Choptiany and Lu et al., 2000 (score)
		30.Do you use the cover crops for something else (fodder, food etc.)? (exist already)	Whether cover crops are multipurpose	Yes/No	-	Yes = 10 No = 0	Multipurpose cover crops can benefit the system by being more resource efficient and allowing it more to live	Question exist already Mr. Choptiany (score)

							within its means	
		25. What % of your total land is covered (with crop residue, cover crops, volunteers or weeds) between 2 main crops?	Percentage of covered land between 2 main crops	Percentage of covered land between 2 main crops	-	91-100=10 81-90=9; 71-80=8 61-70=7; 51-60=6; 41-50=5 31-40=4; 21-30=3 11-20=2; 1-10%=1 0%=0	The more land is bare, the more the soil is exposed to erosion/extreme temperatures/evaporation/frost which depletes the local natural resources and weakens the soil's ability of self-regulation	Mr. Charles (score and question)
	8.4 Energy conservation	29. Do you use energy conservation practices to reduce energy cost in the farm ~~household~~?	Whether energy conservation practices are used	Yes/ No	No= 0, Yes= 10		Wording change since the focus of the survey is on the farm	Mr. Oehninger and Mr. Bourguignon (question)
		29. Which energy conservation methods do you use?	# of types of energy conservation methods used	#- of practices used from table options	~~1= 3~~ ~~2= 7,~~ ~~3+= 10~~	0=0 1= 3 2= 7 3+= 10	Score change since not having any energy conservation method is not resilient	Mr. Charles (score)
	8.5 Practices for resource recycling	21. In your farming system, do you use techniques and practices for water conservation?	# of water conservation practices used	#- of practices used from table options	~~0=0 1=2~~ ~~2= 7 3+= 10~~	0=0 1=2 2= 4 3- 4= 7 5+=10	Score needed to be more strict because more water conservation techniques /practices are available in developed countries	Mr. Charles (score)
		25. Do you recycle your crop residue on your own field?	Whether crop residue is recycled	Yes/No	-	Yes = 10 No = 0	Recycling is a way of reducing the need to import nutrients; gives autonomy	Mr. Droz (question and score)
	8.6 Pesticides use	17. Have you used synthetic pesticides over the last cropping season? + If you use synthetic pesticide,	Whether different types of pesticides are used, and whether the farmer looks	Yes/ No and Yes/	Use pesticide: yes + do you look for pest: No= 0; Use of pesticide: Yes+ do you look for		*Unchanged*	Score approved by Mr. Charles

		did you look for pests/diseases on your crops before spraying?	for pests/diseases before spraying	No for different types of pesticide (insecticide, herbicide, fungicide)	pest: Yes= 5; Use of pesticide: No= 10			
		17. What do you do with the containers after you have used the products?	Pesticide disposal	Options from list	~~Taken empty to a hazardous waste collection centre = 10~~ ~~Thrown in trash = 6~~ ~~Reused, thrown near a water stream, thrown away on ground = 0~~	Taken empty to a hazardous waste collection centre = 10 Thrown in trash = 4 Reused, burned, Thrown near a water stream, thrown away on ground = 0	The score from "Thrown in trash" changed from 6 to 4 because in developed countries there are special trash/recycling structures that have been put in place so the pesticide containers should not end up with standard trash; "burned" has been added since some people could have done it	Mr. Charles (score)
	8.7 Planted trees	10. Do you practice agroforestry?	Yes/ No	Yes/ No	Yes= 10, No= 0		*Unchanged*	*Unchanged*
	8.8 ~~Animal disease control practices~~ Animal health	~~15. What types of animal disease control methods do you use?~~	~~# of environmentally friendly disease control measure use~~	~~Count # use of: natural remedies, integrated animal health management~~	~~0= 0, 1= 5, 2= 7, 3+= 10~~		*Deleted since question has been phrased differently*	*Deleted*
		5. Do you follow the guidelines/regulations from Particularly Animal-friendly Stabling (PAS)?	Whether welfare housing for animals are used	Yes/ No	-	Yes = 10 No = 0	Improved well-being will enhance the health of the animals which will allow them to be	Ms Barjolle (question and score)

							more resilient	
		5. Do you follow the norms from Regular Outdoor Exercise for Livestock (ROEL)?	Whether livestock have regular outdoor exercise	Yes/ No	-	Yes = 10 No = 0	Improved well-being will enhance the health of the animals which will allow them to be more resilient	Ms Barjolle (question and score)
	8.9 Choice of varieties	24.In your varietal /species choice of crops, do you take into account the local climate and environmental conditions (soil, water availability, geography)?	Level of consideration of the climate/environmental conditions	Yes/No	-	Yes = 10 No = 0	Taking into account the local conditions allows crops/animals to be less vulnerable/adapted to the place in question	Mr. Droz approved question and score
		24.In your varietal/species choice of animals, do you take into account the local climate and environmental conditions (soil, water availability, geography)?	Level of consideration of the climate/environmental conditions	Yes/No	-	Yes = 10 No = 0	Taking into account the local conditions allows crops/animals to be less vulnerable/adapted to the place in question	Mr. Droz approved question and score

9. Reflective and shared learning Extension and advisory services for farmers; collaboration between universities, research centres, and farmers; cooperation and knowledge sharing between farmers; record keeping; baseline knowledge about the state of the agro-ecosystem	9.1 ~~Participation in AP/FFS and other groups~~ Social learning	32. Are you a member of any groups, organizations or associations? + for each give ~~provide the name and~~ degree of participation (Leader, Very Active, quite Active, Not active)	# of agricultural related groups which have at least 'quite active' participation level	Options considered: Seed bank ~~AP/FFS~~ Agricultural extension ~~Listening clubs~~ Trader's' association/ business group Farmer's'/ fisherfolk group Cooperatives/ producers' organizations Water/ waste group Credit/ finance group Women's group For those count # excluding	~~0= 0, 1= 7, 2+= 10~~	0= 0, 1= 5, 2= 7 3+=10	In a developed countries context, it is the average to be "quite active" in a couple groups so the scale needed to be more strict	Ms Barjolle ("no name") Mr. Mayor (score and list change)

				those with 'not active' was selected				
		32. For each group give the frequency to which you meet with the group/organization/association	Frequency of the group meetings	On average from all groups: once a week/once every two weeks/ once a month/ two times a year or less/ Never	-	Once a week=10 Once every two weeks=7 Once a month=5 Two times a year or less=2 Never=0	Group membership or degree of participation is not enough, what also matter is the frequency to which you meet face-to-face with the others to be socially well integrated	Question and score approved by Mr. Kohli
		32. Degree of participation (in groups)	Degree of participation	% of groups in which you participate where you are: leader, very active or quite active	~~0= 0, 100%= 10~~	%/10=score	The more a farmer participates, the more he will be socially integrated and the more he will be able to exchange knowledge with others. Also the more active he is, the more influence he will have in case he needs a change in the system to adapt his farming system	Mr. Charles (score)
		32.With who do you exchange directly knowledge? Select the following groups (researcher/agronomists,	# of different groups	# ticked from all	-	0=0 1-2= 2, 3-4=4;5 = 5, 6=6, 6+=10	The more knowledge exchange/sharing there is between people or between people and	Approved question and score by Mr. Kohli

		other farmers, family member working on the farm, direct buyer from his products, distributor, citizen consumer, government representative, other)		options given in table			institutions, the more capable the system is of adaptation and transformation (Cabell and Oelofse, 2012)	
	9.2 Trends/ changes in climate	34. Have you modified your habits in response to climatic changes?	Learning based on climatic change	Yes/ No	Yes= 10, No= 0		*Unchanged*	*Unchanged*
		34. In case of a shock/disturbance, would you feel able to deal with it? (I.e. adopt a new management strategy for the farm, adapt habits etc.)	Whether they are keen to changes/adaptations	Not at all/ A little/A verage / A lot/ Comple tely	Not at all=0 A little=2.5 Average=5 A lot=7.5 Completely=10		Resilience depends on the farmers' perception of change and his ability to interpret and make sense of difficult situations	Darnhofer, 2014; Pike et al., 2010
		14. Over the last 10 years, have you observed any changes relating to the weather?	Awareness of changes	Yes/ No	Yes= 10, No= 0		*Unchanged*	*Unchanged*
	9.3 Extension services	14. ~~Do you have access to information on cropping/livestock practices?~~ Do you use information and extension services on cropping/livestock practices?	~~Access to~~ Whether information on cropping/livestock practices are used	Yes/ No	-	Yes=10, No= 0	Wording change since access is, in most cases, not an issue in a developed countries context; The use of information is essential to access to knowledge about managing/adapting the farm to keep/make him strong/stronger and to keep updated about the dynamic system	Ms Worbs (question) Ms Barjolle (score)
		14. ~~If yes, how do you get this information?~~ How do you get most frequently in touch with the relevant information (Newspaper,internet,radio,etc.) ?	Sources of information on cropping/livestock practices	# of sources	~~0= 0,~~ ~~1= 4,~~ ~~2= 8~~ ~~3+= 10~~	0= 0, 1=2 2= 5, 3=6 4= 7 5+= 10	Score needed to be more strict because there are more information sources available in developed countries	Ms Barjolle (question) Mr. Mayor (score)

		14. Do you have enough knowledge/skills to diversify your farming system?	Whether they have enough knowledge/skills to diversify their farm	Yes/No	Yes = 10 No = 0		Knowledge development and learning facilitate the self-organizing process which has the potential to increase the resilience of resource use system	Berkes and Turner, 2006 (question and score)
	9.4 Record keeping	12. Do you keep records for any of the following:	Knowledge and use of record keeping	# of yes responses across options given for record keeping	~~0= 0~~ ~~1= 7~~ ~~2+= 10~~	0=0 1=1 2=2; 3=3, 4=4,5=5, 6=6,7=7,8=8,9=9, 10+=10	Score needed to be more strict because in developed countries record keeping is more feasible	Mr. Charles (score)
	9.5 Knowledge of environment/ agriculture	14. ~~Do you have access to information on cropping/livestock practices?~~ Do you use information and extension services on cropping/livestock practices?	~~Access to~~ Whether information on cropping/livestock practices are used	Yes/ No	-	Yes=10, No= 0	Wording change since access is, in most cases, not an issue in a developed countries context; The use of information is essential to access to knowledge about managing/adapting the farm to keep/make him strong/stronger and to keep updated about the dynamic system	Ms Worbs (question) Ms Barjolle (score)
		14. ~~If yes, how do you get this information?~~ How do you get most frequently in touch with the relevant information (Newspaper,internet,radio,etc.) ?	Sources of information on cropping/livestock practices	# of sources	~~0= 0,~~ ~~1= 4,~~ ~~2= 8~~ ~~3+= 10~~	0= 0, 1=2 2= 5, 3=6 4= 7 5+= 10	Score needed to be more strict because there are more information sources available in developed countries	Ms. Barjolle (question) Mr. Mayor (score)
		14. Are you aware of climate change?	Whether they are aware of climate change	Yes/No	-	Yes= 10, No=0	The ability to respond to changes and to adapt to them in an active way	Milestad and Darnhofer, 2003 (question and score)

							depends (amongst others) on understanding cycles of natural and unpredictable events	
		14. Do you know what Conservation Agriculture is about?	Whether there is knowledge about conservation agriculture	Yes/No	-	Yes = 10 No = 0	Having knowledge about conservation agriculture widens the range of land management which expands the capacity to adapt/transform	Mr. Droz approved question and score
		14. From how many different sources do you get information about pesticide use? (e.g. seller of pesticide, agronomist, internet, extension services, other farmers, etc.)	Whether there is the required knowledge to use pesticide	One source / Two sources / Three sources or more	-	1=0; 2=5; 3 and more = 10	Having knowledge about pesticide use allows a better management which increases the capacity to respond to disturbances. However, more than one source of information is needed to be able to make comparisons and find the best management way.	Mr. Droz (question and score)
		14. Are you aware of the phosphor crisis?	Whether there is knowledge about the phosphor crisis	Yes/No	-	Yes = 10 No = 0	Having knowledge about the phosphor crisis allows to prepare/adapt the system to future potential shocks on the fertiliser market	Mr. Droz approved question and score
	9.6 Staff education	3. If you employ people, did they participate in extension services / agricultural education in the last 3 years?	If employees are supported	Yes/No	-	Yes=10 No=0	Farm management based on the knowledge of the time and space scales of the different recourses that support and feed the farm system will allow for appropriate practices	Ms Worbs; Milestad and Darnhofer, 2003 (question and score)

	9.7 Institutional framework	19. If you want/need to adapt your farming system, are the current norms/rules/governmental policies allowing you to undertake the needed infrastructural work (e.g. construction work) ? +If no indicate what are the constraints hindering you	Level of institutional constraints	Flexible /not flexible / no influence	-	Flexible=10 No influence=5 Not flexible=0	The ability of farmers to adapt and transform their farms is, amongst others, strengthened or eroded by government policies	Darnhofer, 2014 (question) Ms. Barjolle (score)
		19. Are the administrative constraints restraining your ability to adapt your farming system (e.g. climate disturbance, economic disturbance)?	Level of administrative constraints	Yes/No	-	Yes= 0, No= 10	Adequate governance regime strengthen farm resilience	Darnhofer, 2014 (question and score)

10. Globally autonomous and locally interdependent Less reliance on commodity markets and reduced external inputs; more sales to local markets, reliance on local resources; existence of farmer co-ops, close relationships between producer and consumer, and shared resources such as equipment	10.1 Direct selling /trading to consumers	51. Do you sell/trade some of those products directly to consumers?	Whether items are sold/ traded directly to producers	Yes/ No	Yes= 10, No= 0		*Unchanged*	*Unchanged*
		51. If yes, what % of your products is sold through direct selling?	Percentage of products sold through direct selling	% of products sold through direct selling	-	%/10=score	The face-to-face interactions that take place at farmers' markets allow a feedback which enables learning that may enhance the adaptive capacity of the involved persons and then build social-ecological resilience into the food system	Milestad et al., 2010 (question and score); Ms Barjolle approved question and score
		51. If yes, at which frequency?	Frequency of direct selling	Every week/every months /once per season /once a year/Never	-	Every week=10 every month=7 once per season=5 once a year=2 Never=0	The more frequent a farmer sells directly to the consumer, the more profit he will make out of those products sold without intermediaries; furthermore, face-to-face interactions with the consumers are an opportunity for learning which improves their adaptive capacity	Milestad et al., 2010 (question and score); Ms Barjolle approved question and score
	10.2 Direct buying /trading with producers	49. Do you buy/trade most of your products directly from producers (e.g. input providers, other farmers)?	Whether items are bought/ traded directly from producers	Yes/ No	Yes= 10, No= 0		Wording change to add accuracy	Question and Score approved by Ms. Barjolle
	10.3 Local farm inputs	46. ~~Are you at a walking distance from the location of your source of inputs?~~ Are you less than 50 km from the location of your main source of inputs?	~~Average ease of access for inputs~~ Average distance from the main inputs	~~Yes, easily; Yes, with some difficulty; No; Not applicable (for~~	~~*10 for each yes, 5 for each yes with difficulty, 0 for each no and then average across applicable categories*~~	Yes = 10, No=0	The closest the source of input is, the more accessible is the input	Mr. Bourguignon (question and score)

				~~a given input)~~ Yes/No				
		6. What % of your main animal feed (in energy intake not kg) is imported from another country?	Percentage of imported feed	Percentage of imported feed	-	0%=10 1-10%=8 11-20%=6 21-40%=4 41-80%= 2 more than 80=0 Do not know= not applicable/no score	The more inputs are imported, the more the system is relying on international markets which in turn is more vulnerable to forces that are outside its control	Mr. Schut (question) Ms Barjolle (score)
		46. What part approximately (in %) of all your inputs is on-farm?	Share of on-farm inputs	% of on-farm input	-	%/10=score	The capacity of self-organization, which is one of the characteristic of farm resilience, incudes a decreased dependence on external inputs (amongst others)	Milestad and Darnhofer, 2003 (question and score)
		23. Land holding: Total land under owned property (utilised agricultural land + pasture land+other land) (hectares)	Area of owned land	(Total # (hectares) inserted in: 'Owned land' column (agricultural and pasture land together))/ Total land accessible	-	%/10=score	The more land is under owned property, the more autonomous and resilient is the farm system	Ms Barjolle (question and score)

				*100				
	10.4 Previous collective action	37. If there were common issues in your village or neighbourhood that needed attention during the last year, how often did you join together with others to address them?	Frequency (and presence) of collective action	Never , Rarely, Sometimes, Frequently, or Not applicable	Never= 0 Rarely= 4 Sometimes= 7 Frequently= 10		*Unchanged*	Score the same as before, approved by Mr.Charles
		37. Do you share machinery with other farmers?	Whether machinery are shared with other farmers	Yes/No	-	Yes = 10 No = 0	The share of machinery show coordination capacity/socially self-organization which will prevent to hold inefficiently high stocks of machinery, what will reduce costs	Ms Worbs ; Petrick and Kloss, 2012 (question and score)
	~~*10.5 Ability to breed animals at local level*~~	~~7. Have you tried breeding to obtain improved animals?~~	~~Knowledge on breeding animals~~	~~Yes/ No~~	~~Yes= 10, No= 0~~		Deleted because in most developed countries , researchers do the breeding	Delete approved by Mr.Schut and Ms Barjolle
	10.6 Reliance on local species	9. Do you use newly introduced (varieties~~/species~~ which have been used in the region ~~community~~ for less than 15 years) non-indigenous varieties ~~or species~~, such as modern cultivars, imported cultivars, High Yield Varieties, private sector seeds, etc.?	Use of newly introduced non-local varieties (both animals and plants)	Average response across two questions (if replied to both) If yes to crop and yes to animal = 0+0/2= 0 If yes to	Yes= 0, No= 10		Wording change to add accuracy	Mr. Charles (question's wording change)

				animal, no to crop=(0+10)/ 2= 5				
	10.7 ~~Access to local market~~ Use of local farmers markets	51. ~~Do you have access to local farmers' market?~~ Do you sell your products at a local farmer's markets?	~~Degree of market access for selling~~ Frequency of selling at local farmer's market	No/1 - 3 times a week/ 1-2 times a month/ Always (4+ times a week)	~~No access= 0~~ ~~Intermittent= 4~~ ~~Sustained access= 10~~	No = 0 1-2 times a month = 4 1-3 times a week = 7 Always= 10	Wording change since access is, in most cases, not an issue in a developed countries context; Face-to-face interactions with the consumers build networks and are an opportunity for learning which improves their adaptive capacity	Ms Worbs (question) Ms Barjolle, Milestad et al., 2010 (score)
	10.8 Reliance on local energy source s	28. Which energy sources are used in your farm system?	How many environmentally friendly energy sources are used	Local energy sources include : Solar, fuel wood, charcoal, domestic waste, agricultural residues, wood residues, manure, wind	~~0= 0~~ ~~Solar= 4~~ ~~Domestic waste= 4~~ ~~Agricultural residues= 4~~ ~~Wood residues= 4~~ ~~Manure= 4~~ ~~Other options= 3~~ ~~2+= 10 (maximum of 10)~~	0= 0 Solar= 4 Domestic waste= 4 Agricultural residues= 4 Wood residues= 4 Manure= 4 Wind=4 Other options= 2 2+= 10 (maximum of 10)		Mr. Charles (score and "wind")
	10.9 Animal disease control	15. ~~What types of animal disease control methods do you use?~~ How many different methods of animal disease control do you use for your animals/livestocks? (e.g.	Different methods of control used	# from list	~~0= 0, 1= 5, 2= 7, 3+= 10~~	0-1= 0, 2=2, 3= 6, 4+= 10	Score needed to be more strict because there are more animal disease control methods available in developed countries; Also, the score needed	Mr. Forestier (question and score)

		antibiotics, vaccines, natural remedies, treatments against internal and external parasites, integrated animal health management (e.g. hygiene, spacing, feed and culling practices))					to be more strict because hygiene is and must be the first disease control method and antibiotic is a current practice	
	10.10 Pesticide use	17. Did you use synthetic pesticides over the last cropping season ?	Use of synthetic pesticide	Yes/ No for three different options	If answer Yes (to any type of pesticide)= 0 If answers No= 10		*Unchanged*	*Unchanged*
		30. Did you use natural organic fertilizers (animal manure/ compost) this season? + If you do use natural fertilizer, do you check the soil and plants first to see whether they need it?	Natural fertilizers use and Whether soil/plant have been check before using fertilizer	Yes/ No and Yes/ No	~~Yes synthetic + Yes organic= 5~~ ~~Yes synthetic + No organic= 2.5~~ ~~No synthetic + No organic= 0~~ ~~No synthetic + Yes organic= 10~~	Yes natural organic + Yes check= 10 Yes natural organic + No check=2 No fertilizer at all=0	Score from synthetic inorganic fertilizers and natural organic fertilizer have been separated in order to give more importance of whether soil/plant have been checked before the use of fertilizer	Mr. Six and Mr. Jörin (question) Mr. Charles approved score; "animal manure/compost" comes from Ms. Barjolle

11. Honours legacy Maintenance of heirloom seeds and engagement of elders, incorporation of traditional cultivation techniques with modern knowledge	11.1 Elder participation	3. Describe the role that elders/grandparents play within the household ~~community~~. e.g. caring for smaller children, assisting household, etc. ~~or community decisions~~.	Whether elders/grandparents play a role in the community	Yes/ No	Yes= 10, No= 0		Wording change to add accuracy	Ms Worbs and me (question)
	11.2 Agricultural learning	14. ~~Do you have access to information on cropping/livestock practices?~~ Do you use information and extension services on cropping/livestock practices?	~~Access to~~ Whether information on cropping/livestock practices are used	Yes/ No	-	Yes=10, No= 0	Wording change since access is, in most cases, not an issue in a developed countries context; The use of information is essential to access to knowledge about managing/adapting the farm to keep/make him strong/stronger and to keep updated about the dynamic system	Ms Worbs (question) Ms Barjolle (score)
		14. ~~If yes, how do you get this information?~~ How do you get most frequently in touch with the relevant information (Newspaper,internet,radio,etc.) ?	Sources of information on cropping/livestock practices	# of sources	~~0= 0,~~ ~~1= 4,~~ ~~2= 8~~ ~~3+= 10~~	0= 0, 1=2 2= 5, 3=6 4= 7 5+= 10	Score needed to be more strict because there are more information sources available in developed countries	Ms Barjolle (question) Mr. Mayor (score)
	11.3 Traditional activities	2. Traditional activity (selected from list)	Number of traditional activities practiced	# from list of activities	0= 0 1= 7 2+= 10		*Unchanged*	Score approved by Mr.Charles
	11.4 Preservation of traditional knowledge	12. Do you know of any stories, tales or legends raising awareness about climate changes?	Whether traditional (e.g farmer to his children)knowledge ~~related to~~ making aware of climate change exists	Yes/ No	Yes= 10, No= 0		Wording change to add accuracy to make sure that the traditional knowledge is about raising awareness	Mr. Schut (question)
	11.5 Tree products	10. What do you use products from these	Use of natural products from trees	# of uses of	0= 0, 1= 7,		*Unchanged*	Score approved by Mr.Charles

		spontaneous/natural trees for?		tree products for: Natural remedies (animals);Natural remedies (people); Products for the protection of crops (e.g. Neem)	2+= 10		

12. Builds human capital Investment in infrastructure and institutions for the education of children and adults, support for social events in farming communities, programs for preservation of local knowledge	12.1 Household health	3. How many are unable to work due to health reasons ?	% of the household unable to work	#(people unable to work) across categories/# (total number of people in household)*100	~~0%= 10, 0-10%= 7, 11-20%= 5, 21-30%= 3, 30%+= 0~~	0%= 10 1-10%= 7 11-20%= 5 21-30%= 3 30%+= 0	Score adjusted to be consistent	Score approved by Mr.Charles
		3. How many hours does the head of the farm works per week (on-farm and off-farm together)?	Working hours per week	Less than 42/42-50/ 51-70/ Above 70	-	Less than 42 =10 42-50=8 51-70=2 Above 70 = 0	Chronic work overload is not enabling prosperity which lowers resilience, given that to have a prosperous and resilient farm you need a prosperous and resilient family	Darnhofer and Strauss, 2014 (question) Ms. Barjolle (score)
		3. Did the head of the farm choose freely his profession or did he have family pressure to take over the farm?	Freedom to choose a profession	Yes, he could choose freely / A mix of both/ He couldn't choose freely but he is happy with the job / No, he	-	Yes, he could choose freely =10 A mix of both=5 He couldn't choose freely but he is happy with the job = 5 No, he couldn't choose freely, he has been forced into a job he does not enjoy =0	In the face of adversity, to be resilient, the individual must gather motivation (Resnick, 2010). Motivation will be bigger by someone that could choose freely his profession	Ms.Darnhofer (approved my question and adapted my score)

				couldn't choose freely, he has been forced into a job he does not enjoy				
		17. Over the past season, how often did you use protective gear?	Frequency of use of protective clothes when applying pesticide	Set of options : never, sometimes, always	Never= 0, sometimes= 5, always= 10		*Unchanged*	Score approved by Mr.Charles
		22. Have you encountered any of the following water quality problems?	Whether water quality problem which can affect the household's health were encountered	Presence/absence of water pollution or organic dumping problems (or other problems reported to affect health)	No in all=0 Yes in 1=7 Yes in 2=4 Yes in 3=1 Yes in 4+=0		*Unchanged*	Score approved by Ms Barjolle
		~~35. Did anyone in the household eat the food in question over the last day and night?~~ 33. Is everybody in the household having access to a diverse diet?	~~Household Dietary Diversity Score (HDDS) going from 0 to 12~~ Whether the diet is diverse	~~Yes/ No for each food category in list. There are 12 categories of~~	~~If HHDS= 1,score= 0; if HHDS= 2,score= 1; HHDS= 3, score= 2 [...] if HHDS= 11+, score= 10~~	Yes=10,No=0	Wording change since diet diversity is not a issue in most cases of developed countries	Ms Barjolle (question and score)

				~~foods, so HDDS goes from 0 to 12~~ Yes/No				
	12.2 Knowledge of practices to improve the land	25. Which land improving practices do you use?	# of land improving practices used	# of practices selected from list	~~0= 0 1= 3 2= 6 3+= 10~~	0= 0 1= 1, 2= 3, 3= 5 4= 7 5= 9 6+=10	Question changed because for a system to be resilient, it has to use land improving practices and not whatever practice; Score needed to be more strict because more land improving practices are available in developed countries	Ms. Barjolle (question) Mr.Charles (score)
		26. ~~Do you have any leguminous plant growing on your farmland?~~ ~~+ If yes, did you plant it?~~ Do you grow every year any leguminous crop / grass-leguminous mixture in your crop rotation?	Presence ~~and use~~ of leguminous plants	~~Yes/ No answers to the two questions~~ Yes every year/ Yes but not every year/Never/Not applicable	~~Yes to first question+ Yes to second question= 10~~ ~~Yes to first question + No to second question = 5~~ ~~No to first question + No to second question =0~~	Yes every year = 10 Yes but not every year=5 Never=0	Wording change because farmers in developed countries plant usually all of their crops on purpose; "in your crop rotation" replaced " on your farmland" to make sure that the marginal leguminous mixture are not taken into account	Mr.Charles (question and score)
		27. Is your land bordered by wild/ protected borders/unmanaged land? If so, have you observed many plants and insects on that land?	Existence of buffer zones and observance of wild plant/ insect species	None of it Less than 7%, 7% or	~~None of it = 0~~ ~~Some + No = 2~~ ~~Some + Yes = 5~~ ~~Most + No =4~~ ~~Most + Yes = 6~~ ~~All + No = 7.5~~	None of it = 0 Less than 7%+ No = 2 Less than 7%+ Yes = 5 7% or more but	The score has been changed according to the Swiss regulation about protected borders/buffer zones	Ms Barjolle (question et score); Mr. Charles (score)

				more but less than 15%, 15% or more, Not applicable	~~All +~~ Yes = 10	less than 15%+ No =4 7% or more but less than 15% + Yes = 6 15% or more + No = 7.5 15% or more+ Yes = 10		
		30. Did you use natural organic fertilizers (animal manure/ compost) this season? + If you do use natural fertilizer, do you check the soil and plants first to see whether they need it?	Natural fertilizers use and Whether soil/plant have been check before using fertilizer	Yes/ No and Yes/ No	~~Yes synthetic + Yes organic= 5~~ ~~Yes synthetic + No organic= 2.5~~ ~~No synthetic + No organic= 0~~ ~~No synthetic + Yes organic= 10~~	Yes natural organic + Yes check= 10 Yes natural organic + No check=2 No fertilizer at all=0	Score from synthetic inorganic fertilizers and natural organic fertilizer have been separated in order to give more importance of whether soil/plant have been checked before the use of fertilizer	Mr. Six and Mr. Jörin (question) Mr. Charles approved score; "animal manure/compost" comes from Ms. Barjolle
	12.3 Infrastructure	13. ~~Do you have any of the following buildings in your community municipality?/ Do you have access to use any of the following buildings in your community municipality?~~ Do you have any of the following infrastructures in a radius of 10km around your farm? Do you use any of those infrastructures?	# of buildings ~~with access to~~ used	Yes/ No for following buildings: Church, community centre, school, health centre, firefighter, post office	~~0= 0, 1= 5, 2+= 10~~	0=0 1=1 2=2 3=4 4=6 5 and more=10	Score needed to be more strict because in developed countries more buildings/infrastructures are available	Ms Worbs and Mr. Schut (question) Mr. Mayor (score)
	12.4 Group participation	32. Are you a member of any groups, organizations or associations? + for each give ~~provide the name and~~ degree of participation (Leader, Very Active, quite Active, Not active)	# of groups which have at least 'quite active' participation level	# ticked from all options given in table	~~0= 0,~~ ~~1= 7,~~ ~~2+= 10~~	0= 0 1=2 2-3= 5 4+= 10	In a developed countries context, it is the average to be "quite active" in 2-3 groups so the scale needed to be adjusted;	Mr. Charles (score) Ms Barjolle (by question: "name" delete)

							Deleted "name" to keep only relevant information with reference to a developed countries context	
		32. Degree of participation (in groups)	Degree of participation	% of groups in which you participate where you are: leader, very active or quite active	~~0= 0, 100%= 10~~	%/10=score	The more a farmer participates, the more he will be socially integrated and the more he will be able to exchange knowledge with others. Also the more active he is, the more influence he will have in case he needs a change in the system to adapt his farming system	Mr. Charles (score)
	12.5 Household education ~~equality (gender, most vulnerable members) (power and agency)~~	~~2. For each category indicate the number of people in the household involved.~~	~~Distribution of tasks across members of the family~~	~~Take as reference, number of tasks performed by man= n~~	~~If man performs n tasks, women perform between n and 90% of n, children perform [80%of n]= 10; If women do n+10% of n (i.e. 10% than man) OR children do 90% of n (i.e. only 10% less than man)= 6 If women do n+20% OR children do 100% of n,= 3, If both of the above occur (women do n+20% and children do n), or any more unequal distribution =0~~[1]		*Deleted*	*Deleted*
		3. ~~Who has completed primary ?~~ How many have completed agricultural education?	% of household members who completed ~~primary education~~ agricultural education	~~# (people who completed primary education) across~~	~~0-9%= 0 10-24%= 2.5 25-50%= 5 50-74%= 7.5 >75%= 10~~	(%)/10= score	Farm management based on the knowledge of the time and space scales of the different resources that support and feed the farm system will allow for appropriate practices	Milestad and Darnhofer, 2003 (question and score)

				~~categories/# (total number of people in household)*100~~ # (people who completed agricultural education) across categories/# (total number of people in household)*100				
		~~2. Who has completed primary education? (gender)~~	~~Ratio of girls (0-15) who complete primary education over boys value~~	~~# of girls/# of boys~~	~~Score= Ratio*10 If ≥1= 10~~		Deleted since primary education is mandatory is most developed countries	*Deleted*

		~~46. Who in your family usually has the final say on the following decisions:~~	~~Level of mutual decision making~~	~~For each question asked options include: You, your partner, you and your partner jointly, someone else~~	~~You= 10~~ ~~Your partner= 5~~ ~~You and your partner jointly= 10~~ ~~Someone else= 0~~ ~~Final score= average of score for each applicable question~~		Deleted to keep only relevant information with reference to a developed countries context	Deleted approved by Mr. Oehninger
	12.6 Investment in human capital	45. Which have been your largest expenditures last year?	Rank given to 'education' expenditure item	1,2,3,4, 5, none	If rank=1= 10 rank 2,= 8 ranked 3= 6 ranked 4= 4 ranked 5= 2 If not mentioned= 0		*Unchanged*	Score approved by Mr.Charles and Ms Barjolle
	12.7 Staff education	3. If you employ people, did they participate in extension services / agricultural education in the last 3 years?	If employees are supported	Yes/No	-	Yes=10 No=0	Farm management based on the knowledge of the time and space scales of the different recourses that support and feed the farm system will allow for appropriate practices	Ms Worbs ; Milestad and Darnhofer, 2003 (question and score)

13. Reasonably profitable Farmers and farm workers earn a liveable wage; agriculture sector does not rely on distortionary subsidies		~~47. Have you needed financial support over the past 5 years?~~	~~Financial support~~	~~*Yes/ No*~~	~~*Yes= 0*~~ ~~*No= 10*~~		Deleted because question has been included in new questions	*Deleted*
	13.1 ~~Financial support~~ Source of funding	43. Which percentage represents your equity compared to the total assets?	Proportion of equity	% of equity	-	Less than 45% of equity=0 45-55% of equity=5 More than 55% of equity=10	5% corresponds to the Swiss average of short-term borrowed funds between 2011 and 2013	Question and score approved by Ms Barjolle and USP (2015)
	13.2 ~~Non-farm income generating activities (IGAs)~~ Income generating activities external to the farm	41~~. Do you have any non-farm Income Generating Activities?~~ Does a person of your household (other than yourself) have any Income Generating Activities external to the farm (e.g. employee in a firm, a salary on someone else's farm, etc.)?	~~Non-farm~~ IGAs external to the farm	Yes, all year; Yes, seasonally; Yes, occasionally; No	Yes, all year= 10, Yes, seasonally= 7 Yes, occasionally= 3 No= 0		Question changed because a farmer is more resilient if his household has more income sources than if he has different income sources by himself since the latter could lead to work overload what would compromise his resilience	Ms Barjolle (question) Score approved by Mr. Mayor
		41. Could your farm subsist without your IGA external to the farm ?	Subsistence of the farm without the income external to the farm	Yes/No	-	Yes= 10 No =0		My suggestions approved by Ms Barjolle (question and score)

	13.3 Market prices/ costs	53. Describe the most profitable (the ones that brings the largest total quantity of money) ~~important~~ products you sell	~~Whether selling prices are too high, too low, stable or unpredictable~~ Evolution of the selling prices	Price options for each product sold, ~~# of products sold Options considered: Too high, Fluctuating, Too low and Stable (others do not count)~~ Too low/High enough / Increasing/Stable/Decreasing/Unpredictable	~~If Too low= 0 Fluctuating= 2 If too high= 5 If stable=10 Average across the products sold Often= 10 Sometimes= 5 Very rarely/never = 0~~	Too low= 0 High enough= 10 Increasing=8 Stable=5 Decreasing= 0 Unpredictable=0	Wording change to add accuracy; Score change to be more accurate	Mr. Oehninger and Mr. Bourguignon (question) Ms. Barjolle (score)
		50. Do you feel threatened by the low prices of the imported competing products? (answer for each product)	Threat from imported competing products	Yes/No	-	Yes = 0 No =10	To feel threatened by competing products is a sign of weakness from the system which reflects low resilience	Question and score approved by Ms. Barjolle

		50. How are you involved in the upgrading channels /processing of most of your products? (e.g. For milk producers-> member of a cheese factory)	Level of involvement in the upgrading channels most products	Often/ Sometimes/ Very rarely/ never	-	Average across the products sold: Often= 10 Sometimes= 5 Very rarely=2 never = 0	The more a farmer is involved in the upgrading channels of his products, the more he will be interacting with the other stakeholders and will therefore be able to influence the system and get more information what will allow him to respond better in case of disturbances	Mr. Kohli (question) Mr. Charles (score)
		45. Which have been your largest expenditures last year?	What are the major costs to the household	Categorize into capacity expenditures and less worth while costs	0= 0, 1= 5, 2= 7, 3+= 10		*Unchanged*	*Unchanged*
		45. Are you financially appropriately rewarded for what you do for the environment/ecology?	Whether they are appropriately rewarded	Yes/No	-	Yes = 10 No = 0	In the face of adversity, to be resilient, the individual must gather motivation. The latter could be enhanced by appropriate reward for an effort	Resnick, 2011 (question and score)
	13.4 Insurance	39. ~~Are your crops and livestock ensured against loss?~~ What did you insure (from the following)	~~Whether livestock and crops are protected by insurance~~ Whether livestock/ crops / income/buildings are insured	Yes/ No/Not applicable **(for all** ~~both livestock and crops~~**)**	Yes= 10, No= 0 ~~(average of the two if they have both crops and livestock)~~ (average of all)		Question change because in developed countries the insurance system has more components available	Mr. Oehninger and Mr. Bourguignon (question) Score (existed already)

	13.5 Savings	42. Do you have more savings than 5 years ago?	Whether savings have increased	Yes/ No	Yes= 10, No= 0		*Unchanged*	*Unchanged*
		42. Do you have savings?	Whether the household has financial savings	Yes/ No	Yes= 10, No= 0		*Unchanged*	*Unchanged*
		38. Rank by importance the major productive assets that you own (1= most important, 6=less important)	# of productive assets owned	# of productive assets owned Land Livestock Seeds, Buildings Equipment ,Others	~~1= 4~~ ~~2= 7~~ ~~3+ =10~~	1= 2 2=5 3=7 4+=10	Score needed to be more strict because it is easier to own productive assets in developed countries	Mr.Charles (score)
	13.6 Investment to adapt or transform	44. If you want/need to adapt your farm, are your financial resources leaving you some room for manoeuvre (e.g. invest in infrastructural work, employ an additional worker)?	Investment to adapt the farm	Yes, plenty of 'room to manoeuvre' /Some room for manoeuvre (i.e. there are limits to what I can do) / No room for manoeuvre (e.g. very high	-	Yes, plenty of 'room to manoeuvre' = 10 Some room for manoeuvre (i.e. there are limits to what I can do) = 5 No room for manoeuvre (e.g. very high debt load) = 0	A way to get over a shock can be the mobilisation of financial reserves	Darnhofer, 2014 (question) Ms. Darnhofer approved the question and adapted my score

				debt load)				
		44.Without borrowing any money, do you have currently the financial capacity to maintain a good state of operation of your machine equipment/ fixed installations?	Financial capacity to maintain a good state of operation of the equipment	Yes/No	-	Yes=10, No= 0	For staying up to date and being able to adapt in case it is needed, it is important to have the financial capacity to maintain a good state of operation of machines equipment/ fixed installations	Mr. Bourguignon (question and score)
	13.7 Agricultural/Farm income	40. How has the agricultural income of the farm evolved in the past 5 years?	Evolution of the agricultural income	Deficit increase / Stable deficit / No deficit and no profit/ Stable profit / Profit increase	-	Deficit increase = 0 Stable deficit = 2 No deficit and no profit= 4 Stable profit = 8 Profit increase = 10	Deficit lowers resilience, profit enhances resilience	Mr. Forestier (question) Ms. Barjolle (score)
		40. What percentage is government financial support (direct payments) over the total agricultural turnover of the farm in question?	Share of the governmental support over total agricultural turnover	% of the governmental support over total agricultural	-	0-10%=10 11-30%=7 31-45%=5 46-60%=3 More than 60%=0	The higher the government financial support share, the least resilient are farming systems in the country in question	Question and score approved by Mr. Kohli

				income				
		40. Do you think that your farm could survive without the government's financial support?	Whether the farm could survive without government support	Yes/No	-	Yes= 10, No =0	A farm that cannot survive without governmental financial support reflects financial dependency which in turn is more vulnerable to forces that are outside its control	Mr. Schut ; Cabell and Oelofse, 2012 (question) Ms. Barjolle ; Cabell and Oelofse, 2012 (score)
		45. Are your debts threatening your farm with imminent bankruptcy?	Whether their debts could generate imminent bankruptcy	Yes/No	-	Yes = 0 No = 10	Farms that go bankrupt are not resilient	Mr. Droz approved question and score

Appendix 5: Questionnaire for farmers in English (derived from the SHARP computerised application of FAO (Choptiany et al., 2015) and adapted by the author)

In green = what has been added/changed; crossed out = what has been removed

Welcome to the Self-evaluation and Holistic Assessment of climate Resilience for farmers and Pastoralists (SHARP)

ID #_____

***Country:_____**

***Region/Province: _____**

District: _____

Village/Town: _____

~~**Agro-pastoral/farmer field school name:_____**~~

(not mandatory)Latitude: ____ Longitude: _____ (option to get GPS coordinates)

Data collection initiated on:_____

(not mandatory)Data collected by:_____

***Name of respondent (farmer/~~pastoralist~~) :_____**

(not mandatory)Name of head of household (if different from respondent): _____

***Relationship of respondent with head of the farm ~~household~~ (*Tick correct*): ~~household~~ head of the farm, spouse, parents/parents in law, son/daughter, brother/sister, other family member, other living in household (specify:_____), collaborator, other (specify)**

*Gender

☐ Male ☐ Female

*Age_____

*Practice

☐ ~~Farmer~~ Crops ☐ ~~Pastoralist~~ Livestock ☐ ~~Agro-pastoralist~~ Mixed

*Farm typology

☐ Certified organic Farm ☐ Conventional Farm

*Farm size (hectares)

☐ Less than 5 ha ☐ 5-10 ha ☐ 11-30 ha ☐ 31-50ha

☐ 51-100ha ☐ More than 100ha

This process will be conducted by farmers~~/pastoralists~~ in collaboration with ~~field school~~ facilitators.
Please answer all questions where appropriate. The SHARP survey has been designed in a flow-chart manner so that some questions can be skipped if they do not apply. Usually there will be a question with a possible "yes/no" answer. Either the "yes" or the "no" should be ticked. If the answer is "no" then the participant may move on to the next question. If the answer is "yes" then usually more information is requested to explain or elaborate. Mandatory questions are marked with an asterisk.
SHARP is not necessarily intended to be completed in one session and will require interactions with facilitators as described below. When an answer is not known, please write "unsure" or an equivalent response.

Production systems and practices						
3 ~~2~~. Household (*9.6,11.1, 12.1,12.5,12.7*)*						
Question/ person	Men (16-65)	Women (16-65)	Children (0-15)		Women (66+)	Men (66+)
			Boys	Girls		
*For each category, how many people are there in your household?						
*Who is the head of the farm ~~household~~ (*tick correct category)?*						
For the following questions, indicate for each category the number of people involved/concerned:						
How many participate in the cultivation of crops?						
How many participate in livestock activities?						
How many are involved in other income-generating activities?						
How many are unable to work due to health reasons?						
~~How many have completed primary education?~~ *How many have completed agricultural education ?						
~~How many have completed secondary education?~~						
* How many hours does the head of the farm works per week (on-farm and off-farm together)? (Less than 42/42-50/ 51-70/ Above 70)						
*If you employ people did they participate in extension services / agricultural education in the last 3 years?		Yes		No		Not applicable
*Did the head of the farm choose freely his profession or did he have family pressure to take over the farm?		No, he couldn't choose freely, he has been forced into a job he does not enjoy		He couldn't choose freely but he is happy with the job	A mix of both	Yes, he could choose freely/

~~If you practice any additional activity (ies), please describe it (them) here. (income generating activities)~~					
~~Describe other activities that other members of the household engage in. (income generating activities)~~					
*Do the elders/grandparents play a role within the household ~~community~~?	*Women			*Men	
	Yes/ No			Yes/ No	
Describe the role that elders play within the household ~~community~~. e.g. caring for smaller children, assisting household, etc. ~~or community decisions.~~					
*To what extent are you satisfied with the role you play within the household?	Not at all	A little	Average	A lot	Completely
*How important do you consider your role within the household?	None	A little	Average	A lot	Very

2 ~~3~~. Production types (*4.2, 11.3*)*						
***Does anyone in your household carry out any of these activities on your farm?**			Traditional activity	*Main activity	~~*For how many years have you carried out this activity?~~	~~Please elaborate as needed~~
Crop production (cereals, leguminous, oleaginous ~~food crops, vegetables, cash crops~~)?	Yes	No				
Livestock (animal production for fattening~~, feed production, herding, penning, pastoralism etc.~~)?	Yes	No				
Dairy farming ?	Yes	No				
Vegetable growing (market garden/olericulture) ?	Yes	No				
Arboriculture ?	Yes	No				
Viticulture ?	Yes	No				
Agroforestry (tree production, assisted natural regeneration, tree planting)?	Yes	No				
Aquaculture (production of fingerlings, fish keeping)?	Yes	No				
Bee keeping?	Yes	No				
Fishing?	Yes	No				
Poultry farming?	Yes	No				
Other activities (*Specify*): _____	Yes	No				

*What is the purpose (or purposes) of your agricultural system (*tick options*)?	~~Local market~~ Corporate farm	~~On-farm consumption~~ Family farm		Other (*specify*) _____	
~~*Does anyone in your household carry out off farm activities or other natural resource dependent activities?~~	~~Charcoal production~~ ~~Agritourism~~	~~Brick making~~ ~~Woodcutter~~	~~Pottery~~ ~~Bakery~~	~~Crafts~~	
	~~Trade Animal pension (e.g. horse)~~	~~Tour guide~~	~~Remittance payment~~	~~Other (*specify*) _____~~	
*To what extent are the activities practiced sufficient for providing income to meet household needs?	Not at all	A little	Average	A lot	Completely
*To what extent is the diversity of activities practiced important to your farm system?	Not at all	A little	Average	A lot	Very

7~~4~~. Aquaculture (*4.1,5.1,5.10*)*					
*Do you practice aquaculture? *Aquaculture is the breeding of aquatic organisms, including fish, molluscs, crustaceans and aquatic plants. Practicing it implies intervention to improve production: i.e. seeding, feeding, protection against preying, etc. Practicing it also implies individual or shared property of the breeding stock.*				Yes	No
*If yes, what species do you manage? E.g. Shrimp, tilapia	1.	2.	3.	4.	
*For each species mentioned above, how many breeds do you manage?					
For each species mentioned do you provide food supplements?					
If so, which ones?					
If so, under which circumstances do you supply food supplements?					
*Does the feed meet the requirements of the species you breed?	Not at all	A little	Average	A lot	Completely
*How important is fish nutrition to your farm system?	Not at all	A little	Average	A lot	Very

4 ~~5~~. Crops (annual and perennial) (*2.1, 4.1, 5.1,6.8*)*								
*Do you cultivate any crops?	Yes	No						
If yes, which crops do you cultivate?	1.	2.	3.	4.	5.	6.	7.	8.

*For each species mentioned above, how many varieties of crops do you cultivate (please name them if you remember)?						
*~~What is the main source of your main variety?~~	~~Self~~	~~Store (shop)~~	~~Friend~~	~~Government~~	~~NGO~~	~~Other (specify)~~

Perennial crops						
*Do you grow perennial crops (*plants that can live several years*)?	Yes	No	If so, which ones?			

*Are the number and variety of crops you cultivate sufficient for your farm system?	Not at all	A little	Average	A lot	Completely
*How important is cultivating a mixture of different crops (including perennials) for your farm system?	Not at all	A little	Average	A lot	Very

5 ~~6~~. Livestock practices (*4.1, 5.1,8.8*)*

*Do you have any animals (livestock) on your farm?									Yes	No
Practice	Cattle - meat	Cattle - dairy	Goat	Sheep	Buffalos	Pig	Poultry (chickens, turkeys etc.)	Horses	Donkey /mules	Other (*specify*): _____
*Approximately, how many animals do you own?										
*How many different breeds/ varieties per category?										
~~Do you tether your animals?~~ *Do you follow the guidelines/regulations from Particularly Animal-friendly Stabling (PAS)? (Yes, No, Not applicable)										
~~Do you practice transhumant/ livestock nomadism *(tick when yes)?*~~ *Do you follow the norms from Regular Outdoor Exercise for Livestock (ROEL)?	Yes						No		Not applicable	
~~Do you use paddocks (e.g. pig pens, corrals) to keep your livestock *(tick when yes)?*~~										
~~If you have other species, not mentioned in the above table, please describe them~~										

*~~Do you use any other (non-food related) practices to manage your livestock *(if yes, specify which ones and for which animals)?*~~					
*Are the number and variety of livestock sufficient for your farm system?	Not at all	A little	Average	A lot	Completely

*How important is to have a set of different livestock types for your farm system?	Not at all	A little	Average	A lot	Very

~~7. Animal/livestock breeding (*7.3, 10.5*)~~ (not relevant for CH)									
~~Practice~~	~~Cattle - meat~~	~~Cattle - dairy~~	~~Goat~~	~~Sheep~~	~~Pig~~	~~Poultry~~	~~Donkey~~	~~Dog~~	~~Other *specify*~~
~~Have you tried breeding to obtain improved animals *(tick when yes)*?~~									
~~*If so, following which selection criteria (colour, size, weight, abiotic (e.g. temperature) or biotic (e.g. disease) resistance), milk production?~~									
~~*If not, why?~~									
~~*How much are you able to improve your animals to meet your farming needs?~~	~~Not at all~~	~~A little~~	~~Average~~	~~A lot~~	~~Completely~~				
~~*How important is livestock breeding for your farming system?~~	~~Not at all~~	~~A little~~	~~Average~~	~~A lot~~	~~Very~~				

6 ~~8~~. Animal nutrition (*5.10,10.3*) * (mandatory for CH)										
	Cattle - meat	Cattle - dairy	Goat	Sheep	Pig	Poultry	Horses	Buffalos	Donkey /mules	Other *specify*
~~Do you give food supplements to your animals (such as pods)? *(tick when yes)*~~										
~~*If so, which foods?~~										
*~~If so, when do you give these foods? (specific periods/ circumstances)?~~										
Do you keep the animals grazing on pasture or agricultural lands during part or throughout the year? *(Tick if yes)*										
~~If so, when are they on pasture land?~~										

*How many other nutritive sources than pasture/grass do you give to your cattle? (e.g. corn (whole plant or cob), concentrated feed, potatoes, by-product from bakery, whey, straw, etc)	

*How many other nutritive sources than concentrated feed and/or cereals produced on-farm do you give to your pigs? (e.g. whey, by-product from bakery, cheese, etc.)					
*Do you give to your poultry other nutritive sources than concentrated feed and/or cereals produced on-farm?	Yes/No/Not applicable				
*What % of your main animal feed (in energy intake not kg) is imported from another country ? (0%,1-10% ;11-20% ;21-40% ;41-80% ;more than 80 ;Do not know)					
*Do you store some stocks of feed in case of shortage?	Yes		No		
*Is the combination of supplement feed you give your animals and their main feed ~~pasture access~~ sufficient to meet their needs?	Not at all	A little	Average	A lot	Completely
~~Please elaborate~~					
*How important is livestock nutrition to your farm system?	Not at all	A little	Average	A lot	Very

8 ~~9~~. Seed/breed sources (*3.1, 5.8*)*

~~In general which sources do you have access to?~~ *In general, which sources do you use?	*Sources of seeds/vegetative material (seeds, seedlings ~~vines, sticks~~, etc.)		*Breed sources for livestock (male improver, artificial insemination, etc.)	
~~Aid (seed air or other)~~	~~Yes~~	~~No~~	~~Yes~~	~~No~~
Local shops/ market	Yes	No	Yes	No
Friends/ neighbours/family/other farmer	Yes	No	Yes	No
Own production (stock)	Yes	No	Yes	No
Dealer (agricultural input traders – suppliers/ stockists)	Yes	No	Yes	No
~~Seed bank~~	~~Yes~~	~~No~~	~~Yes~~	~~No~~
Seed producers groups or enterprises	Yes	No	Yes	No
~~Government~~	~~Yes~~	~~No~~	~~Yes~~	~~No~~
Other (specify) _____	Yes	No	Yes	No

*To what extent does this combination of seed sources meet the needs of your farm system?	Not at all	A little	Average	A lot	Completely
*How important is it to have access to several sources of vegetal seeds for your farm system?	Not at all	A little	Average	A lot	Very
*To what extent does this combination of sources of livestock meet the needs of your farm system?	Not at all	A little	Average	A lot	Completely
*How important is it to have access to multiple sources of livestock for your farm system?	Not at all	A little	Average	A lot	Very

9 ~~10~~. Utilisation of new varieties and breeds (*2.2, 7.5, 10.6*) * (mandatory for CH)										
*Do you use newly introduced (*varieties~~/species~~ which have been used in the region ~~community~~ for less than 15 years*) non-indigenous varieties, such as modern cultivars, imported cultivars, High Yield Varieties, private sector seeds, etc.?	Yes	No	I do not know	If yes, which ones (*give name of variety for each crop and specify crop species*)?						
*Do you use newly introduced (*varieties~~/species~~ which have been used in the region ~~community~~ for less than 30 years*) non-local breeds, such as imported breeds, High Output Breeds, etc.?	Yes	No		If yes, which ones (*give name of breed for each animal and specify animal species*)?						
If you use newly introduced varieties/breeds, why? If no, why not?				*Did some of these newly introduced varieties or breeds adapt well to the environmental conditions of the farm?	Yes	No				
				Were some of these newly introduced varieties or breeds poorly resistant to local biotic and abiotic stresses?	Yes	No	Do not know			
				*If yes, describe how.						
*Approximately what percentage of your crops is a newly-introduced variety?				*Approximately what percentage of your animal breeds is newly-introduced?						
*Have some indigenous (local) plants become dis-adaptive due to change in climate?	Yes	No	Do not know	*If yes, which ones?		*If yes, in which way?				
*Have some local breeds become dis-adaptive due to change in climate?	Yes	No	Do not know	*If yes, which ones?		*If yes, in which way?				
*To what extent does the combination of local/indigenous and newly introduced variety ~~species~~ you use meet the needs of your farm system?	Not at all	A little	Average	A lot	Completely					
*How important is this combination of indigenous and newly introduced (improved) ~~species~~/varieties to your farm system?	Not at all	A little	Average	A lot	Very					

10 ~~11~~. Trees and Agroforestry (*2.7, 4.1, 5.1, 6.2, 8.7, 11.5*)*						
Planted trees (Agroforestry)						
*~~Have you planted any trees on your land?~~ Do you practice agroforestry?	Yes	No				
*~~Approximately, how many trees have you planted in your farm system?~~ Approximately how many tree species have you planted in your farm?		*~~Of which species?~~				
*Have you planted different varieties of the same tree species?	Yes	No	~~For what reasons?~~			
*For which use have you planted	Wood for charcoal /	Trees for	Feed products	Food product	Fertilizers	Wood for construction material

these trees (*circle the uses made*)?	firewood	shade	(animals)	(people)		
	Natural remedies (animals)		Natural remedies (people)	Products for the protection of crops ~~(e.g. Neem extract)~~	Other (*specify*): _____	

Naturally Occurring Trees (not planted)

*In general what is the overall percentage of your agricultural land covered by trees – including natural and planted (approximately)?	0% 1-10% 11-20% 21-40% 41-60% 61 + %	Which species are naturally occurring?

*What do you use products from these spontaneous/natural trees for? *(circle the products used)*	~~I do not use them~~	Wood for charcoal / firewood	Wood for construction material	Trees for shade	Feed products (animals)	Food product (people)
	Fertilizers	Natural remedies (animals)	Natural remedies (people)	Products for the protection of crops ~~(e.g. Neem)~~	Other (*specify*): _____	

*To what extent does your access to trees (both planted and spontaneous) meet the needs of your farm system?	Not at all	A little	Average	A lot	Completely
*How important are trees to your farm system?	Not at all	A little	Average	A lot	Very

11 ~~12~~. Crop and livestock losses (*1.4, 7.2*) * (mandatory for CH)

*Over the past 10 years have you lost a significantly large portion of your crops (pre-harvest loss)?	Yes	No	*From what *(tick)*?	Pest	Diseases (bacteria, virus, fungi)	Drought	Frost	Hail	Flood	Heavy rain	~~Unfenced animals~~ Strong wind	Poor quality seeds	Other (*specify*) _____

*Over the last 10 years, have you a significantly large portion of your livestock?	Yes	No	*From what*(tick)*?	~~Cattle raiding~~	Disease	Drought	Flood	Unfenced animals	Theft of animals	Other (*specify*) _____

*How did you cope with this loss?	Crop		Livestock	
	Internal coping capacities/ strategies	External support	Internal coping capacities/ strategies	External support
(*Please describe how*)				

*To what extent were you able to mitigate the negative impacts of these losses?	Not at all	A little	Average	A lot	Completely
*To what extent did these events affect your farm system?	Not at all	A bit	Average	A lot	Very

12 ~~13~~. Record keeping (*9.4, 11.4*)*

*Do you keep records for any of the following:				~~If yes, how? – If no, why?~~
Crop yields?	Yes	No	Not applicable	
Rainfall patterns?	Yes	No	Not applicable	
Invasive species?	Yes	No	Not applicable	
Weeding (fight against weeds)?	Yes	No	Not applicable	
Soil analysis?	Yes	No	Not applicable	
Irrigation water?	Yes	No	Not applicable	
Fertilizers?	Yes	No	Not	

			applicable	
Phytosanitary products?	Yes	No	Not applicable	
Fuel?	Yes	No	Not applicable	
Number of livestock/animals	Yes	No	Not applicable	
Other (*specify*)? _____	Yes	No	Not applicable	
Do you know of any stories, tales or legends raising awareness about climate changes?	Yes	No	~~If yes, how were they passed on to you?~~	

*Is your record keeping adequate for understanding and observing trends over time? Would it be in the case you do not currently keep records?	Not at all	A little	Average	A lot	Completely
*How important is/would be record keeping to your farm system?	Not at all	A little	Average	A lot	Very

13 ~~14.~~ Infrastructure (*12.3*) * (mandatory for CH)

What kind of infrastructure do you have in a radius of 10km around your farm ~~in your community~~?	*Do you have any of the following infrastructures in a radius of 10km around your farm? ~~buildings in your community?~~		*Do you use ~~have access to~~ any of those infrastructures ~~the following buildings in your community~~?	
Religious facility (Church, Mosque…)	Yes	No	Yes	No
Community centre (cultural facility etc.)	Yes	No	Yes	No
Firefighter	Yes	No	Yes	No
Post office	Yes	No	Yes	No
School	Yes	No	Yes	No
Health centre	Yes	No	Yes	No
Veterinary clinic	Yes	No	Yes	No
Input shops	Yes	No	Yes	No
~~Cereal bank~~	~~Yes~~	~~No~~	~~Yes~~	~~No~~
~~Granary/~~ storage facilities	Yes	No	Yes	No
Other (*specify*)	Yes	No	Yes	No

~~*(If yes)~~ Please ~~elaborate~~	

*To what extent do these buildings fulfil their function?	Not at all	A little	Average	A lot	Completely
*How important are these buildings to your farm system?	Not at all	A little	Average	A lot	Very

14 ~~15. Access to~~ Information on climate change, cropping practices, and meteorological forecasts (*3.3, 7.2, 9.2, 9.3, 9.5, 11.2*)*

Climate Change

*Are you aware of climate change?	Yes	No

*Over the last ten years, have you observed any changes relating to the weather?	*If yes, what changes have you noticed?

Yes	No	Increased rainfall-	Decreased rainfall-	Late rainfall	Increased rainfall variability-	Increased temperature-	Flooding	~~Late onset of rainy season~~ Later begin of spring season	~~Shorter rainy season~~ Early begin of spring season
		Decreased temperature	Unusual pest infestation	Unusual drought	Other (specify)				

(not mandatory) If yes, how did these impact your farm system?	

Climatic information

~~Do you have means to predict climatic variations?~~	~~Yes~~	~~No~~	~~If yes, how? If no, why?~~	

*~~Do you have access to weather forecast services~~ Do you use weather forecast services (including preventive information on potential climatic threats e.g. floods droughts, late rains; e.g. Agrometeo)?	Yes	No
(not mandatory) If yes, please elaborate on the quality of access. If no why?		

*To what extent is your access to meteorological information sufficient for your farm system?	Not at all	A little	Average	A lot	Completely
*How important is meteorological information to manage your farm system?	Not at all	A little	Average	A lot	Very

Production practices

*~~Do you have access to information on cropping/livestock practices?~~ Do you use information and extension services on cropping/livestock practices?			Yes				No			
~~If yes, how do you get this information?~~* How do you get most frequently in touch with the relevant information?	Radio	Newspaper	Professional journal	Television	Extension agent	~~APFS/FFS~~ Agricultural Group/organization/association	Other farmers	Internet resources	Other	
Please elaborate on limits to your access to this kind of information (if applicable)										
*Do you have enough knowledge/skills to diversify your farming system?			Yes				No			
*Do you know what Conservation Agriculture is about? (practice based on the following 4 principles: Maintaining soil cover ; Use of crop rotations and cover crops; Reducing (eliminating) mechanical soil disturbance by tillage; Restricting in-field traffic)			Yes				No			
* From how many different sources do you get information about pesticide use? (e.g. seller of pesticide, agronomist, internet, extension services, other farmers, etc.)			One source		Two sources		Three sources or more			
*Are you aware of the phosphor crisis?			Yes				No			
*How much has the information on production practices been useful to your farm system?				Not at all	A little		Average	A lot	Completely	
*How important is this information in terms of climate change				Not at all	A little		Average	A lot	Very	

adaptation?					

15 ~~16~~. Animal disease control practices (*4.4,10.9*)*

*Do you use disease control for your animals/livestock?	Yes	No

~~* How many types of each animal disease control methods do you use *(Circle the ones you use)*~~?

	~~Number of different types for each method:~~	
~~Antibiotics~~	~~*If yes, what type of antibiotics?~~	
	~~*What dose do you use? (ml/animal)~~	
~~Vaccines~~	~~*If yes, which ones?~~	
~~Natural remedies~~	~~*If yes, which ones?~~	
~~Treatments against internal and external parasites~~	~~*If yes, which ones?~~	
~~Integrated animal health management (e.g. hygiene, spacing, feed and culling practices)~~	~~*If yes, which ones?~~	
~~Other (please specify) _____~~	~~Which ones?~~	
*How many different methods of animal disease control do you use for your animals/ livestocks? (e.g. antibiotics, vaccines, natural remedies, treatments against internal and external parasites, integrated animal health management (e.g. hygiene, spacing, feed and culling practices))		

*To what extent are you able to control disease in your animals?	Not at all	A little	Average	A lot	Completely
*How important is disease control to your farm system?	Not at all	A little	Average	A lot	Very

16 ~~17~~. Pest management practices (*4.4*) * (mandatory for CH)

*Do you use pest/disease management practices on your crops?	Yes	No

*What pest control practices did you use over the last cropping season (*Tick those used*)?

Natural pesticides ~~(e.g. Neem extract)~~ *If yes, which ones?*	Pest resistant varieties or seeds ~~*If yes, which ones?*~~	Biological control methods (e.g. parasitoids, ladybugs) ~~*If yes, which ones?*~~
Synthetic pesticides	Plants thinning	Nursery treatment
Crop rotation to reduce weeds/ pest growth	Manually catching the pests found on crops	Using traps or plant traps
	Mechanical control	Others (*specify*)- _____
Why have you chosen to use this specific set of pest control practices?		
*~~What constraints have you encountered when applying pest/disease management practices?~~		

*To what extent do the practices you use allow for sufficient pest/disease control?	Not at all	A little	Average	A lot	Completely
*How important is pest/disease control for your farm system?	Not at all	A little	Average	A lot	Very

17 ~~18~~. Synthetic Pesticide use (*2.3, 8.6, 10.10, 12.1*)*

Over the last cropping season…

Pesticide	*Insecticide		*Herbicide		*Fungicide	
*Have you used synthetic pesticides?	Yes	No	Yes	No	Yes	No
~~*What brands/label did you use?~~						
~~*What quantity of pesticide did you use? (L/ha/pesticide used)~~						
~~*For which crops?~~						

*Did you look for pests/diseases on your crops before spraying?	Yes/No	Yes/No	Yes/No

*Over the past season, how often did you use protective gear?			*If yes, what kind of protection do you use? (e.g. eye goggles, gloves, mask).				
Always	Sometimes	Never	Eye goggles	Gloves	Mask	Jacket	Other
~~Why?~~							

*What do you do with the containers after you have used the products? *(Tick the practices you use)*				
Give to collectors (such as recycling facilities)	Thrown away in the trash	Re-use	Burned	
Thrown near a water stream	Throw away on ground	Other		

*To what extent did synthetic pesticide use allow you to control pests effectively?	Not at all	A little	Average	A lot	Completely
*How important are synthetic pesticides to your farm system?	Not at all	A little	Average	A lot	Very

18 ~~19~~. Intercropping (*3.2, 6.6*) * (mandatory for CH)

*Do you grow two or more crops in association?	Yes	No

Elaborate: _____

*What percentage of your cultivated crops is intercropped?		
*Do you grow plants in association with aquaculture ~~(rice-fish farming)~~?	Yes	No

Elaborate on how different elements of your farm system are integrated (e.g. livestock, crops, fish, trees): _____

*To what extent is the combination of your crops meeting your needs?	Not at all	A little	Average	A lot	Completely
*How important is intercropping (and the integration of different elements of the farm system) to your farm system?	Not at all	A little	Average	A lot	Very

Governance (Institutional framework)					
19 ~~20.~~ Government policies and programmes on climate change and sustainable agriculture (*9.7*)* (mandatory for CH)					
*Are you aware of any governmental policies or programmes on climate change and sustainable agriculture that affect you?	Yes		No		Do not know
If yes, please elaborate on what their impact is to you:	**None**	**Direct money/ support**	**Education/ training**		**Other**
*If you want/need to adapt your farming system, are the current norms/rules/governmental policies allowing you to undertake the needed infrastructural work? (e.g. construction work) ?	Yes they are flexible	No influence	No, they are not flexible		
*If no, indicate what are the constraints hindering you					
*Are the administrative constraints restraining your ability to adapt your farming system (e.g. climate disturbance, economic disturbance)?	Yes		No		
*How helpful is government support to your livelihood?	Not at all	A little	Average	A lot	Completely
*How important is government support to your livelihood?	Not at all	A little	Average	A lot	Completely
~~21. Customary rules on climate change and sustainable development~~ (not relevant for CH)					
~~*Are there customary rules or land committees) related to climate change and agriculture?~~	~~**Yes**~~	~~**No**~~	~~**Do not know**~~		
~~Please elaborate~~					
~~*Do these rules have a positive impact on your livelihood?~~	~~Not at all~~	~~A little~~	~~Average~~	~~Alot~~	~~Completely~~
~~*How important are these rules to your livelihood?~~	~~Not at all~~	~~A little~~	~~Average~~	~~Alot~~	~~Completely~~

Environment				
20 ~~22.~~ Water sources ~~access~~ (*1.5, 2.8, 5.3*)*				
*For each water source that you can use for irrigation/water for animals, ~~you have access to,~~ please specify:				
Water sources:	*Type of water source: *(choose between: well, dam (water impoundment structure), River/water stream/lake, borehole, rainwater recovery basin, irrigation network, other to be specified (except rain), no access to irrigation)*	~~*Distance to the nearest water source from your home (in kilometres):~~	~~*Time needed to walk and collect water to the nearest collection point (*in minutes*) (includes the time needed to both walk and collect water)~~	*Have you seen any ~~negative~~ changes in quantity with these water sources during the past 5 years?
*1				Negative /No change/Improvement/ Not applicable
2				Negative /No change/Improvement/ Not applicable
3				Negative /No change/Improvement/ Not applicable
4				Negative /No change/Improvement/ Not applicable

5				Negative /No change/Improvement/ Not applicable

*Is your water access sufficient for the quantitative needs of your farm system ~~and household consumption~~?	Not at all	A little	Average	A lot		Completely
*How important is it to have access to water sources for your farm system?	Not at all	A little	Average	A lot		Very

21 ~~23.~~ Water conservation techniques and practices (*8.5*) * (mandatory for CH)

*In your farming system ~~and household consumption~~, do you use techniques and practices for water conservation (*Tick the appropriate answers*)?

Cisterns (water harvesting tanks/ditches)	Irrigation – funnelling water	Planting pits, and semi circular bunds	Water retention ditches, stone bunds, vegetation strips, contour lines and trenches (furrows)
Water early morning or late at night (when the temperature is lower)	Terracing	Mulching (laying a thin layer of vegetal cover on the ground)	Cover crops
Drip irrigation	Graded ditches/waterways (to drain)	Dams	~~No~~
Other *(specify)*:			

*How much do the water conservation practices you use allow you to save water in your farming system ~~and household consumption~~?	Not at all	A little	Average	A lot	Completely
*How important is water conservation for your farm system ~~and household consumption~~?	Not at all	A little	Average	A lot	Very

22 ~~24.~~ Water quality *(8.2, 12.1)* * (mandatory for CH)

*Have you encountered any of the following water quality problems:				*If yes, explain the nature of the problem:
Pollution from pesticides or other chemicals (oil, industrial by-products)?	Yes	No	Not applicable	
Nutrient runoff (~~manure or~~ fertilizers)?	Yes	No	Not applicable	
Increased sediments and siltation (mud pollution)?	Yes	No	Not applicable	
Dumping of organic waste (e.g. manure, faecal matters)?	Yes	No	Not applicable	
Pollution of ground water	Yes	No	Not applicable	
Other (*specify*) _____	Yes	No	Not applicable	

*Is the water you have access to suitable for human consumption?	Not at all	A little	Average	A lot	Completely	
*Is the water you have access to suitable for animal consumption?	Not at all	A little	Average	A lot	Completely	Not applicable
*Is the water you have access to suitable for agricultural use?	Not at all	A little	Average	A lot	Completely	
*How important is water quality to your farm system?	Not at all	A little	Average	A lot	Very	

23 ~~25~~. Land holding ~~access~~ *(6.5,10.3)**

Type	Owned land ~~Private plots~~ (ha.)	Land under fixed written	Land under oral tenancy	~~Community land (ha.)~~	~~Government land~~ Other (ha.)

	tenancy agreement (ha.)	agreement (ha.)			
Utilised Agricultural Land ~~Total accessible agricultural land, if applicable~~ (hectares):					
Pasture land (hectares):					
Other land which doesn't belong to Utilised Agricultural land or Pasture land (hectares)					
*Total land you have access to (hectares) :					
*~~Total area of owned land, if applicable~~ ~~Total number of fields you have access to:~~ *How many different clusters of plots (plots with same management type) do you have?					
~~For each type of land, what do you use the land for (Crops, fruit farming, pasture)?~~					
~~What factors limit your access to land?~~					

*Is the share, of the land that you own, adequate for the subsistence of your farm ~~household~~?	Not at all	A little	Average	A lot	Completely
*How important is it for your farm to be the owner of your land ~~How important is it for your household to have access to communal land?~~	Not at all	A little	Average	A lot	Very

24 ~~26.~~ Soil quality and land degradation (*6.3, 8.1, 8.2, 8.9*) * (mandatory for CH)

*How many different types of soil can you observe on your field (approximately)?						
*Is the soil on your land (*Tick the appropriate answer*):						
Sandy?	Loamy?	Clay?	Stony?	~~Do not know~~		
*~~On average, how rich in Soil Organic Matter is your soil?~~ According to you, on average, how rich is your Soil Organic Matter?	Not at all	Very little	Average	Quite rich	A lot/very	Do not know
*Do you make an organic matter balance?	Yes	No				
*In general, is your soil fertile?	No	A little	Average	A lot	Fully	
*How much does the fertility status of your soil affect your farm system?	Not at all	A little	Average	A lot	Very	

*Have you observed one or several of the following types of soil degradation processes these last five years (*Tick*)?

Erosion (from wind) Loss of topsoil	Erosion (from water) - Loss of topsoil	Soil salination/ alkalinisation (preventing crops from growing)	Compaction (hard ground)	
Diversity decline in species composition (Shift of flora and invasive species)	Increased pest and weed competition	Deforestation (reduction in trees and shrubs)	Soil pollution (poisoned soil)	
Fertility decline and reduced organic matter content	Grazing area quality degradation	Other: _____		
Gully erosion	Landslides	Riverbank erosion	Coastal erosion	Reduction of vegetation cover

Acidification	Sealing and crusting	Waterlogging	~~Subsidence of organic soils~~	Loss of habitats
Aridification (decreased soil moisture)				
*For each of the selected, on which extent (% of total land from the farm)?				
*For each of the selected, choose the degree	Light	Moderate	Strong	Extreme
For each of the selected, choose the trend	Increasing		No change	Decreasing

*In your varietal /species choice of crops, do you take into account the local climate and environmental conditions (soil, water availability, geography) ?	Yes	No	Not applicable
*In your varietal/species choice of animals, do you take into account the local climate and environmental conditions (soil, water availability, geography) ?	Yes	No	Not applicable

*Is the land you have access to suitable for your farming activities?	No	A little	Average	A lot	Completely
*How much of an impact does land degradation have on your farm system?	None	A little	Some	A lot	Very

25 ~~27.~~ Land management practices (*2.4,2.9,5.5, 6.1, 6.4, 8.3, 8.5,12.2*)*

*Do you use land improving practices?	Yes		No	Not applicable
*Which land improving practices do you use?	*Response		Please elaborate	
Liming (i.e. the application of calcium- and magnesium-rich materials to soil to neutralise soil acidity and increase activity of soil bacteria)	Yes	No		
Fallowing/shifting cultivation	Yes	No		
~~Zero/minimum tillage /~~ Direct seeding	Yes	No		
Minimum tillage	Yes	No		
~~Ploughing~~	~~Yes~~	~~No~~		
Rotational grazing	Yes	No		
Crop rotation	Yes	No		
Wind break/hedge	Yes	No		
Intercropping	Yes	No		
Mulching	Yes	No		
Cover crops	Yes	No		
Manuring/composting	Yes	No		
Vegetative strips	Yes	No		
Agroforestry, afforestation, forest protection	Yes	No		
Gully control/rehabilitation	Yes	No		

Terracing	Yes	No			
Other land improving ~~management~~ practices	Yes	No			
~~Which land management approaches do you use?~~	~~Agro-forestry-livestock integration~~	~~Integrated watershed management~~	~~Improved stoves~~		
	~~High labour intensity~~	~~Contour line~~	~~Other (*specify*)~~		
* Do you have practices promoting the development of the mycorrhizes? (e.g. direct seeding)	Yes	No	Not applicable		
*Do you recycle your crop residue on your own field?	Yes	No	Not applicable		
* What % of your total land is covered (with crop residue, cover crops, volunteers or weeds) between 2 main crops?					
*To what extent do the land management practices used improve the quality of your farm land?	Not at all	A little	Average	A lot	Completely
*How important are land management practices to your farm system?	Not at all	A little	Average	A lot	Very

*What do you think are the main causes of soil/land degradation?	
Cultivation of vulnerable soils	Missing erosion control measures
Ploughing	Burning
Too short a fallowing period	Over irrigation
Bush encroachment	Spread of weed and invasive species
Expansion of settlements	Conversion to agricultural land
Excessive number of livestock	Overgrazing
Industrial activities	Over-extraction of ground water
Heavy machinery	
Inappropriate use of fertilizer, and agro-chemicals	
Insufficient drainage	
Commercial forestry	
Excessive wood harvesting	
Change in livestock composition	
Other (please specify)	

26 ~~28.~~ Leguminous plants (*2.4, 8.3, 12.2*)*

*~~Do you have any leguminous plants growing on your farmland?~~ Do you grow every year any leguminous crop / grass-leguminous mixture in your crop rotation ?	Yes every year	Yes but not every year	~~Do not know~~	Never	Not applicable	*What species/type?
~~*If yes, did you plant them?~~	~~Yes~~	~~No~~				~~*If yes, for which purpose?~~

*To what extent did planted leguminous plants benefit ~~affect~~ your farm yield?	Not at all	A little	Average	A lot	Completely
*What is the importance of leguminous plants to your farm system?	Not at all	A little	Average	A lot	Very

27 ~~29~~. Buffer zones (unmanaged areas surrounding the field) (*2.5, 4.1, 7.4, 12.2*) * (mandatory for CH)

*Is your land bordered by wild/ protected borders/unmanaged land?	15% or more	7% or more but less than 15%	Less than 7%	None of it	Not applicable	
*If so, have you observed many plants and insects on that land?	Yes	No	Please elaborate on the types of species observed:			
*Does the presence of wild unmanaged areas reduce yield losses caused by pest populations?	Not at all	A little	Average	A lot	Completely	
*Is the presence of wild unmanaged areas of land important for your farm system?	Not at all	A little	Average	A lot	Very	

28 ~~30.~~ Energy sources (*2.8, 5.4, 10.8*) * (mandatory for CH)

*Which energy sources are used in your farm system (*tick*)?

Energy type	~~Cooking~~	Heating	Lighting	Machinery
Solar (including solar driers, solar cookers, solar pumps, solar fridges, solar chillers, solar ice-makers)				
Wind				
Water				
Fuel wood				
Charcoal				
Domestic waste				
Agricultural residues				
Wood residues				
Manure				
Oil				
Paraffin				
Diesel				
Natural Gas				
Biogas(from manure/compost)				
Electricity (public source)				
Other (specify)				

*How much of your energy is provided by external suppliers?	All or most of energy from external suppliers (0-20% on-farm)	Around half of the energy supply (20-50% on-farm)	More than half of the energy is produced on-farm (50-80%)	All/most of the energy (80-100%) is produced on-farm	
*Are the energy sources used sufficient to meeting the needs of your farm system?	Not at all	A little	Average	A lot	Completely
*How important is access to energy to your farm system (referring to ~~cooking,~~ heating, lighting and machinery)?	Not at all	A little	Average	A lot	Very

29 ~~31~~. Energy conservation (*2.8,8.4*) * (mandatory for CH)

*Do you use energy conservation practices to reduce energy cost in the farm ~~household~~?	Yes	No
~~If so, why?~~		

*Which methods do you use?

Energy-saving light bulbs	Biogas plant	~~Recycling/re-using (e.g. of fuel wood to make charcoal)~~	~~Energy saving stoves (for cooking)~~ Efficient isolation

Others (*specify*) _____					
*Do you stock your liquid manure in an open container or in a closed container?	Open		Closed	Not applicable	
*Do you stock your manure (not liquid) in an open container or in a closed container?	Open		Closed	Not applicable	
*If one of them is closed, do you use a biogas plant for on-farm energy?	Yes		No		
*If yes, is the biogas plant on-farm?	Yes		No		
*To what extent do these methods allow you to make energy savings?	Not at all	A little	Average	A lot	Completely
*How important is energy saving for your farm system?	Not at all	A little	Average	A lot	Very

30 ~~32.~~ Fertilizers *(2.6, 2.9,3.7,4.4,5.6, 6.9,8.3, 10.10, 12.2)***

*Did you use synthetic inorganic fertilisers this season?	Yes		No		
*If you do use synthetic fertilizer, do you check the soil and plants first to see whether they need it?	Yes		No		
*If you do not use them, why? (*Tick option*)					
I do not want to (*explain why*) _____	Expensive				
~~Too far/difficult to access~~	~~Lack of knowledge of how to use~~				
~~Not available~~	Other (*specify*):_____				
*Is your access to synthetic ~~inorganic~~ fertilisers sufficient for the needs of your farm system?	Not at all	A little	Average	A lot	Completely
*How important is access to synthetic fertilizer sources to your farm system?	Not at all	A bit	Average	A lot	Very
*Did you use natural organic fertilizers (animal manure/compost) this season?	Yes		No		

*Which ones?	Response		If not, why?	If yes, do you prepare them yourself?
Compost~~/plant manure~~	Yes	No		Yes/No
Animal manure	Yes	No		Yes/No
*If you do use natural fertilizer, do you check the soil and plants first to see whether they need it?	Yes		No	
*Do you combine natural and synthetic fertilizer?	Yes		No	
*If yes do you check the soil and plants first to see whether they need it?	Yes		No	
*Do you use cover crops	Yes	No	*If yes, do you use the cover crops for something else (fodder, wood, food etc.)?	
*If you use cover crops, which ones?				
Others (*specify*)				

***In general, where do you source your fertilizer from?**

Farm	Yes	No
~~Shop~~ Agricultural cooperative	Yes	No
~~Aid~~ Other distributor	Yes	No
~~Friends/ neighbours~~ Another farm	Yes	No

Extension worker	Yes				No
~~Directly from seller (e.g. meet a person at your farm)~~	~~Yes~~				~~No~~
Other	Yes				No
*Is your access to natural fertilisers sufficient for the needs of your farm system?	Not at all	A little	Average	A lot	Completely
*How important is access to natural fertilizer sources to your farm system?	Not at all	A little	Average	A lot	Very

31 ~~33.~~ Weed species and management *(4.4,6.7, 7.1)* * (mandatory for CH)

*Approximately, what percentage of your fields is covered by weeds?	

*In your field, what weed management practices do you use? *(tick when used)*	Cover crops	Mulching	Hand weeding	Mechanical	Stale-seedbed	Herbicides	~~Other crops~~ Crop rotation	Livestock grazing	Preventive measures (e.g. work with clean machines /wheels to avoid weed seed spreading)	Other

*How many types of invasive weed species (i.*e. ~~common alien~~ local or external species which negatively affect a region economically, environmentally and/or ecologically*), ~~such as *Striga*,~~ have you observed in your fields in the past 10 years?	

*Do these weed species negatively impact your farm system?	Yes	No	*If yes, how (toxicity, out-competing, preventing growth, reducing crop growth, attracting pests, other)?
*Which species?			

*To what extent are the methods you use effective in curtailing the negative impacts of weeds on your farm system?	Not at all	A little	Average	A lot	Completely
*To what extent are invasive weed species damaging to your farm system?	Not at all	A little	Average	A lot	Very

Social							
32 ~~34.~~ Group membership (*1.1, 1.2, 9.1, 12.4*)*							
*Are you a member of any groups, organizations or associations?			Yes		No		
*If yes, tick the groups of which you are a member:							
~~Seed bank~~		Farmers'/ fisherfolk group			Listening clubs		
~~AP/FFS~~ Agricultural Extension group		Cooperatives/ producers' organizations			Traders' association/ business group		
Professional association		Trade union			Credit/finance group		
Water/waste group		Neighbourhood/ village/ regional association			Civic group		
Religious group		Cultural association			Political group		
Youth group		Women's group			Parent group / School committee		
Health committee		Sports group			Other (*specify*): _____		
*For the groups of which you are a member, please describe:							
~~Name of the group~~		*Type of group			*Degree of participation (Leader, Very Active, quite Active, Not active)		*Frequency to which you meet with the group/organization/association (once a week/once every two weeks/once a month/two times a year or less/ Never)
*With who do you exchange directly knowledge?							
Researcher/agronomists	Government representative	Distributor	Direct buyer from his products	Other farmers	Family member working on the farm	Citizen consumer	Other
~~Were any of those groups initiated/started by the community?~~				~~Yes~~		~~No~~	
*Do you feel that the group of which you are part is able to influence government policies?				Yes		No	
Please elaborate							
*In general, to what extent do these groups benefit you?	Not at all	A little	Average		A lot	Completely	
*At the level of your farm system, is group membership important?	Not at all	A little	Average		A lot	Very	
*To what extent has membership to the groups given you knowledge to improve your farm system?	Not at all	A little	Average		A lot	Completely	
*What is the importance of the information received by these groups for your farm system?	Not at all	A little	Average		A lot	Very	
33 ~~35.~~ Meals (*5.9, 12.1*)*							

*Is everybody in the household having access to a diverse diet?	Yes	No

~~Now I would like to ask you about the **types of foods that you or anyone else in your household ate yesterday during the day and at night.** *[the facilitator asks the respondent to recall all the foods which were eaten in the household the previous day and list them. After that he goes over the list with respondent and fills in with information]*~~

~~Food type~~	~~*Did anyone in the household eat the food in question over the last day and night?~~				~~Could you specify the main Food Source for this food type over the past 7 days: *(choose among: own production, hunting/fishing, gathering, borrowed, purchase, exchange labour for food, exchange items for food, gift (food) from family relatives, food aid (NGOs, etc.), other (specify)*~~
~~Any [INSERT ANY LOCAL FOODS], bread, rice noodles, biscuits, or any other foods made from millet, sorghum, maize, rice, wheat, millet, or [INSERT ANY OTHER LOCALLY AVAILABLE GRAIN]?~~	~~Yes~~	~~No~~	~~Do not know~~	~~Refused~~	
~~Any potatoes, sweet potatoes, yams, manioc, cassava or any other foods made from roots or tubers?~~	~~Yes~~	~~No~~			
~~Any vegetables?~~	~~Yes~~	~~No~~			
~~Any fruits?~~	~~Yes~~	~~No~~			
~~Any beef, pork, lamb, goat, rabbit wild game, chicken, duck, or other birds, liver, kidney, heart, or other organ meats?~~	~~Yes~~	~~No~~			
~~Any eggs?~~	~~Yes~~	~~No~~			
~~Any fresh or dried fish or shellfish?~~	~~Yes~~	~~No~~			
~~Any foods made from beans, peas, lentils, or nuts?~~	~~Yes~~	~~No~~			
~~Any cheese, yogurt, milk or other milk products?~~	~~Yes~~	~~No~~			
~~Any foods made with oil, fat (animal or vegetable origin), or butter?~~	~~Yes~~	~~No~~			
~~Any sugar or honey?~~	~~Yes~~	~~No~~			
~~Any other foods, such as condiments, coffee, tea?~~	~~Yes~~	~~No~~			

~~At the moment, which are your food stocks? (*specify quantity in kg*)~~

~~Cereals:~~		~~Tubers:~~	
~~Please add any other information on your household's diet.~~			

*Was the food you had yesterday sufficient to meet your household's needs?	Not at all	A little	Average	A lot	Completely
*How important is the diversity of food for your household's alimentation?	Not at all	A little	Average	A lot	Very

34 ~~36.~~ Disturbances (*1.1,7.2, 9.2*) * (mandatory for CH)

*What types of disturbances have you experienced in the past 10 years? (*Tick relevant options*)	~~Locust/~~Pest outbreak		Fire	Wrong timing of rains		
	Floods	Droughts	Disease (crop, livestock, human)	~~Livestock raiding~~ Snow	Hail	Wind-storm

	Conflict: _____	~~None~~	Other(*specify)*: _____

*Have you modified your habits in response to climatic changes?	Yes	No	*If yes, How? If not, why?	

*In case of a shock/disturbance, would you feel able to deal with it? (I.e. adopt a new management strategy for the farm, adapt habits etc.)	Not at all	A little	Average	A lot	Completely
*In case of a shock/disturbance, is your entourage (relatives, friends, acquaintance) giving you enough emotional/moral support or are you left to your own devices?	Entourage giving enough support		Left to your own devices		
*How adequate were your responses to addressing the disturbances?	Not at all	A little	Average	A lot	Completely
*To what extent did these disturbances affect your farm system?	Not at all	A little	Average	A lot	Very

35 ~~37.~~ Veterinary Access (*3.4*)*

*Do you have access to veterinary services?	Yes and it is good quality	Yes but it is problematic (unqualified personnel, expensive, distant, etc.)	No
*~~Please describe the services to which you have access and their quality level.~~			

*Does your access to veterinary services meet the needs of your farm system?	Not at all	A little	Average	A lot	Completely
*How important is veterinary access to your farming system?	Not at all	A little	Average	A lot	Very

37 ~~38.~~ Previous collective action (*1.4, 3.5, 10.4*) * (mandatory for CH)

*If ~~When~~ there were common issues in your village or neighbourhood that needed attention during the last year, how often did you join together with other farmers to address them? *Examples of common issues: problems due to livestock close to dwellings, seasonal work on weekends, etc.* ~~*This would include instances where you have joined to decide together to avoid dumping animal dung in water to ensure its quality, signing up petitions to signal issues to the government, setting up credit/saving groups*~~	Never	Rarely	Sometimes	Frequently	Not applicable

Please elaborate					
*Do you share machinery with other farmers?	Yes		No		
*Do you exchange plots of land with other farmers?	Yes		No		
*To what extent have those collective actions contributed to solving the problem?	Not at all	A little	Average	A lot	Completely
*To what extent are those collective actions important for your farm system?	Not at all	A little	Average	A lot	Very

36 ~~45.~~ Trust and cooperation (*1.6, 3.5*) (sensitive question)*

*Generally speaking, would you say that most people in your village/ neighbourhood can be trusted or that you can't be too careful in dealing with people?	People can be trusted	You can't be too careful
*In your village/ neighbourhood do you generally trust others in matters of lending and borrowing?	Yes	No

Please explain why:	

*If a community project does not directly benefit you but has benefits for many others in the village/neighbourhood, would you contribute time or money to the project? (*Tick* contributions you would make)	Time	Money	None	Other

*Do you have support to fulfil your household duties (cooking, laundry, cleaning, children care)?

Cooking	Need support but get none	Need support and get some, but need more (not enough)	Need support, and get all support I need	No support,

				but need none
Laundry	Need support but get none	Need support and get some, but need more (not enough)	Need support, and get all support I need	No support, but need none
Cleaning of the house	Need support but get none	Need support and get some, but need more (not enough)	Need support, and get all support I need	No support, but need none
Children care	Need support but get none	Need support and get some, but need more (not enough)	Need support, and get all support I need	No support, but need none
Others (specify)	Need support but get none	Need support and get some, but need more (not enough)	Need support, and get all support I need	No support, but need none

*To what extent are trust and cooperation sufficient in your village/ neighbourhood ~~your community~~?	Not at all	A little	Average	A lot	Completely
*How important is trust and cooperation in your village/ neighbourhood ~~your community~~ to your farm system?	Not at all	A little	Average	A lot	Very

~~46. Household decision-making (*12.5*) (sensitive question)~~ (not relevant for CH)

*~~Who in your family usually has the final say on the following decisions:~~

~~Who usually makes decisions about health care for yourself?~~	~~You~~	~~your partner~~	~~you and your partner jointly~~	~~someone else~~
~~Who usually makes decisions about making major household purchases?~~	~~You~~	~~your partner~~	~~you and your partner jointly~~	~~someone else~~
~~Who usually makes decisions about making purchases for daily household needs?~~	~~You~~	~~your partner~~	~~you and your partner jointly~~	~~someone else~~
~~Who usually makes decisions about making visits to your family or relatives?~~	~~You~~	~~your partner~~	~~you and your partner jointly~~	~~someone else~~

*~~Regarding financial decisions within the household, who in your family usually has the final say on the following decisions:~~

~~Who usually decides how your partner's earnings will be used?~~	~~You~~	~~your partner~~	~~you and your partner jointly~~	~~someone else~~	~~Not applicable~~
~~Who usually decides how the money you earn will be used?~~	~~You~~	~~your partner~~	~~you and your partner jointly~~	~~someone else~~	~~Not applicable~~

~~*To what extent are you satisfied with the decision-making process in the household?~~	~~Not at all~~	~~A little~~	~~Average~~	~~A lot~~	~~Completely~~

Please elaborate					
*How important is decision-making for your farm system?	Not at all	A little	Average	A lot	Very

Economic			
51 ~~53~~. Use of distribution channels without intermediaries ~~Access to local markets~~ (*1.3,10.1, 10.7*)* *distribution channels without intermediaries= stand at a village/city market, shop on the farm, direct delivery to consumers*			
Do you have access to local farmers' markets?			
~~No access~~	~~Intermittent access 1-2 times a month~~	~~Sustained access 1-3 times a week~~	~~All the time (4+ times a week)~~

Please elaborate :						
	Most profitable products sold					
	***Crop/ Animal 1**	***Crop/Animal 2**	***Crop/Animal 3**	**Crop/Animal 4**	**Crop/Animal 5**	**Crop/Animal 6**
*Do you sell/trade some of those products directly to consumers?	**Yes/No**	**Yes/No**	**Yes/No**	**Yes/No**	**Yes/No**	**Yes/No**
*If yes, at which frequency? (Every week/every month/once per season/once a year/never)						
*Do you sell your products at a local farmer's markets? (No, 1-2 times a month, 1-3 times a week, Always (4+ times a week))						
*What % of your products is sold through direct selling?						

*To what extent does the use of distribution channels without intermediaries ~~access to the local markets~~ meet the needs of your farm system?	Not at all	A little	Average	A lot	Completely
*What is the importance of the use of distribution channels without intermediaries ~~access to a local market~~ for your farm system?	Not at all	A little	Average	A lot	Very

49 ~~40.~~ Market access – buying (*3.6,4.5,5.12,10.2*)*					
*~~Do you buy directly from producers?~~ Do you buy/trade most of your products directly from producers (e.g. inputs providers, other farmers)?	Yes	No		*If yes, for which products?	
*Do you have any inputs for the crop production ~~vegetal product,~~ that you can only access from one available seller?	Yes	No	Not applicable	*If yes, which crops?	
*~~Are there animal produces,~~ Do you have any inputs for the animal production that you can only access from one available seller?	Yes	No	Not applicable	*If yes, which product?	

* If you have binding contracts with the seller/provider, are you satisfied with their terms or do you feel that they limit your flexibility?	Satisfied, do not feel limited by the agreement	There are two sides to every coin (i.e. mixed feelings)	I feel that the agreements limit me in	Not applicable	~~*If yes, describe your contract or agreement with the buyer, e.g. the time the contract is made, how you are paid~~	

*Are the number and the quality of sellers sufficient to meet the needs of your farm system?	Not at all	A little	Average	A lot	Completely
*How important to your livelihood is it to have multiple sellers available?	Not at all	A little	Average	A lot	Very

48 ~~41~~. Market information ~~access~~ (*3.3*)*

*~~How often did you have access to information on market prices over the last season?~~ How often did you use information on market/market prices over the last season?	Often	Sometimes	Never/ very rarely	~~If yes, which type of information?~~	
~~If the information obtained was not satisfactory, for which reason?~~					

*To what extent is your use of ~~access to~~ market information meeting the needs of your farm system?	Not at all	A little	Average	A lot	Completely
*What is the importance of the use of ~~access to~~ market information for your farm system?	Not at all	A little	Average	A lot	Very

39 ~~42.~~ (*13.4*) *(mandatory for CH)

*~~Are your crops and livestock ensured against loss?~~
What did you insure:

Crop / livestock/income/main buildings of the farm (specify crop and/or animal/or income or farm)	~~Response~~ Against loss due to climate	~~What is insured?~~ Against loss due to pests /disease	Against fire	Against other loss (*specify*)	*Have you claimed on the insurance in the past 5 years? (tick if applies)
1_____					
2_____					
3_____					
4_____					
5_____					
6_____					
7_____					
8_____					
9_____					

10_____					
*~~Who is providing the insurance?~~					
*Is your access to insurance satisfactory?	Not at all	A little	Average	A lot	Completely
*How important is insurance to your farm system?	Not at all	A little	Average	A lot	Very

38 ~~43.~~ Major productive assets (*5.7, 13.5*) *(mandatory for CH)

*Rank by importance the major productive assets that you own (*by adding a number from 1=most important to 6=less important: next to the assets owned in the list*)

Land	Livestock	Seeds/ Seedlings	Buildings	Equipment (e.g. tractors)	Others (specify):

If needed, elaborate on the importance of the selected assets:					
*Is this combination of assets adequate to support your farm system?	Not at all	A little	Average	A lot	Completely
*To what extent is diversity of your productive assets important for your farm system?	Not at all	A little	Average	A lot	Very

46 ~~44.~~ Local farm inputs (*10.3)* *(mandatory for CH)

*~~Are you at a walking distance from the location of your source of inputs?~~ Are you less than 50 km from the location of your main source of inputs?

Seeds/ Seedlings	Yes,~~ easily~~	~~Yes, with some difficulty~~	No	Not applicable
Livestock/inseminator	Yes~~, easily~~	~~Yes, with some difficulty~~	No	Not applicable
Fertilizer	Yes, ~~easily~~	~~Yes, with some difficulty~~	No	Not applicable
Equipment	Yes, ~~easily~~	~~Yes, with some difficulty~~	No	Not applicable
Pesticides	Yes, ~~easily~~	~~Yes, with some difficulty~~	No	Not applicable
Knowledge/extension services	Yes~~, easily~~	~~Yes, with some difficulty~~	No	Not applicable
Labour (e.g. people employed for manual labour)	Yes, ~~easily~~	~~Yes, with some difficulty~~	No	Not applicable
Capital (e.g. bank ~~or microcredit intermediary~~)	Yes, ~~easily~~	~~Yes, with some difficulty~~	No	Not applicable
Other (*please specify)*:	Yes,~~ easily~~	~~Yes, with some difficulty~~	No	Not applicable
~~If applicable, please elaborate on why it is difficult to obtain some of these inputs~~				
*What part approximately (in %) of all your inputs is on-farm?				

*To what extent does access to local farm inputs meet the needs of your farm system?	Not at all	A little	Average	A lot	Completely
*How important is access to local farm inputs to your farm system?	Not at all	A little	Average	A lot	Very

43 ~~47~~. Sources of funding ~~Financial support~~ (*13.1*) (sensitive question) *(mandatory for CH)

~~*Have you needed financial support during the past 5 years?~~	~~Yes~~	~~No~~

~~*If yes, how many times have you received financial support for your agricultural activities in the past 5 years?~~	~~0~~	~~1~~	~~2~~	~~3~~	4	~~5~~

~~If applicable, what was the source of financial support?~~			~~Explain (especially problems)~~
~~Family~~	~~Yes~~	~~No~~	
~~Friends / neighbours~~	~~Yes~~	~~No~~	
~~Bank~~	~~Yes~~	~~No~~	
~~Cooperative~~	~~Yes~~	~~No~~	
~~Microfinance~~	~~Yes~~	~~No~~	
~~Loan company~~	~~Yes~~	~~No~~	
~~Government programme~~	~~Yes~~	~~No~~	
~~NGO programme~~	~~Yes~~	~~No~~	
~~Remittances~~	~~Yes~~	~~No~~	
~~Other (*specify*): _____~~	~~Yes~~	~~No~~	

* Which percentage represents your equity compared to the total assets?	Less than 45% of equity	45-55% of equity	More than 55% of equity
~~Current-account credits (for financing long term investments)~~			
~~Consumer credits (for financing long term investments)~~			

*Is the part of equity compared to the total assets ~~Was this support~~ sufficient for your farm?	Not at all	A little	Average	A lot	Completely
*How important is your equity for your farm? ~~financial support to your farm system?~~	Not at all	A little	Average	A lot	Very

50 ~~48.~~ Market access – selling (*3.6, 4.5, 5.2, 13.3*) (sensitive question) *(mandatory for CH)

~~*Last year, have you sold part of your crops/livestock/seeds?~~	~~Yes~~	~~No~~	~~*If yes, which ones? (e.g. chickens, sorghum, millet)~~	
~~*What % of your products is sold through direct selling?~~				

	*Most profitable products sold:					
	*Crop/Animal 1	*Crop/Animal 2	*Crop/Animal 3	Crop/Animal 4	Crop/Animal 5	Crop/Anima
~~*Do you sell/trade some of those products directly to consumers?~~	~~Yes~~ Yes/No	~~No~~ Yes/No	~~*If yes, for which~~ Yes/No ~~products?~~	Yes/No	Yes/No	~~Yes/No~~
~~*If yes, at which frequency? (Every week/every month/once per season/once a year/never)~~						

*Do you ~~have~~ sell any of those products with only one available buyer?	~~Yes~~ Yes/No	~~No~~ Yes/No	~~*If yes, which products?~~ Yes/No	Yes/No	Yes/No	Yes/No
* If you have binding contracts with the buyer, are you satisfied with their terms or do you feel that they limit your flexibility?	Satisfied, do not feel limited by the agreement /There are two sides to every coin (i.e. mixed feelings)/I feel that the agreements limit me in what I can do, what I can change/ Not applicable	Satisfied, do not feel limited by the agreement /There are two sides to every coin (i.e. mixed feelings)/I feel that the agreements limit me in what I can do, what I can change/ Not applicable	Satisfied, do not feel limited by the agreement /There are two sides to every coin (i.e. mixed feelings)/I feel that the agreements limit me in what I can do, what I can change/ Not applicable	Satisfied, do not feel limited by the agreement /There are two sides to every coin (i.e. mixed feelings)/I feel that the agreements limit me in what I can do, what I can change/ Not applicable	Satisfied, do not feel limited by the agreement /There are two sides to every coin (i.e. mixed feelings)/I feel that the agreements limit me in what I can do, what I can change/ Not applicable	Satisfied, do not feel limited by the agreement /There are two sides to every coin (i.e. mixed feelings)/I feel that
*How are you involved in the upgrading channels /processing of most of your products? (e.g For milk producers-> member of a cheese factory) (Often/Sometimes/very rarely/never)						
*For each, do you feel threatened by the low prices of the imported competing products? (Competing product = equivalent product that comes from an other country; e.g Tomatoes from Spain is a competing product for Swiss tomatoes) (Yes/No)						

*Is the number of buyers to which you have access enough to meet the needs of your farm system?	Not at all	A little	Average	A lot	Completely
*How important to your livelihood is having multiple buyers available?	Not at all	A little	Average	A lot	Very

47 ~~50~~. Information and Communication Technologies (ICTs) (*3.3*) (sensitive question) *(mandatory for CH)

	*Do you use?		~~*Do you own?~~		~~*What do you use it for?~~
A mobile phone?	Yes	No	~~Yes~~	~~No~~	
Internet connection?	Yes	No	~~Yes~~	~~No~~	

Home computer?	Yes	No			
Tablet (e.g. iPad)?	Yes	No			
Television?	Yes	No	~~Yes~~	~~No~~	
Radio?	Yes	No	~~Yes~~	~~No~~	
Machines guided/supported by GPS?	Yes	No			
Drone?	Yes	No			
Electronic field book?	Yes	No			
Others (specify)					

*To what extent does your access to ICTs satisfy the needs of your farm system?	Not at all	A little	Average	A lot	Compl etely
*How important are ICTs to your farm system?	Not at all	A little	Average	A lot	Very

45 ~~51.~~ Main Expenditures (*12.6, 13.3,13.7*) (sensitive question) *(mandatory for CH)

*Which have been your largest expenditures last year?

Ranking from 1 to 5 (1= the most important one, 5= the least important)	*Expenditure item (e.g. farm equipment, new buildings, interest of bank loans, energy for heating/lighting/machinery, pesticides, fertilizer, insurance, lease/rent, labor, education, other)	~~*Description (e.g. school fees)~~
*		
*		
*		

*Are you financially appropriately rewarded for what you do for the environment/ecology?	Yes	No	Not applicable

*Are your debts threatening your farm with imminent bankruptcy?	Yes		No		Not applicable
How manageable are your expenditures for your farm system?	Not at all	A little	Average	A lot	Completely
How important is it to your farm system to keep the expenditures manageable ?	Not at all	A little	Average	A lot	Very

40 ~~52.~~ Income ~~sources~~ (*4.3,13.7*) (sensitive question)*

* ~~How many different income sources did you have over the past year?~~ How many different income sources does your household have (crop production, animal production, agritourism, handicraft, income external to the farm,etc.,excluding governmental direct payments)?	1	*2*	*3*	*4*	*5*	*6+*

*Which are the ~~your~~ three main income sources of your household? *[Options include: ~~Agriculture production, labour/daily wages, livestock, petite trade/shop keeper, remittances, employed, handicraft, workmanship – mechanic, carpenter~~*, crop production, animal production, agritourism, handicraft, income external to the farm, other (excluding governmental direct payments)	*1st source	2nd source	3rd source

*How has the agricultural income of the farm evolved in the past 5 years?	Deficit increase	Stable deficit	No deficit and no profit	Stable profit	Profit increase
*What percentage is government financial support (direct payments) over the total agricultural turnover of the farm in question?					
*Do you think that your farm could survive without the government's financial support?	Yes		No		

*To what extent does this combination of income sources allow you to meet the needs of your farm system?	Not at all	A little	Average	A lot	Complete

*How important do you consider having a diverse set of income sources (without implying an increase in total revenues) for your farm system?	Not at all	A little	Average	A lot	Very

41 ~~53.~~ ~~Nonfarm~~ Income Generating Activities (IGA)s external to the farm (*13.2*) (sensitive question)*

Income external to the farm = Income external to your own farm

* Does a person of your household (other than yourself) have any Income Generating Activities external to the farm (e.g. employee in a firm, a salary on someone else's farm, etc.)?	Yes, all year	No
	Yes, seasonally	Yes, occasionally
*Could your farm subsist without your IGA external to the farm?	Yes	No

*Please **rank** the ~~nonfarm~~ IGAs external to the farm based on their contribution to ~~you're~~ the total household's income.	Rank from 1 to 5 (1= most important activity, 5=least important one)	Specify Income generating activit

*Are your ~~nonfarm~~ IGAs external to the farm sufficient for your farm system needs?	Not at all	A little	Average	A lot	Comple y
*How important are your ~~nonfarm~~ IGAs external to the farm to your livelihood?	Not at all	A little	Average	A lot	Very

42 ~~54.~~ Savings (*13.5*) (sensitive question)*

*Do you have savings?	Yes	No
*Have you ever had savings?	Yes	No
*Do you have more savings than 5 years ago?	Yes	No

*How do you save money? (*Tick answers*)

Cash at home	Bank	Saving structure/group	Other (*Specify*):_____
Buying more physical assets (land, buildings etc.)	~~Food stocking~~ Investment on financial assets	Livestock purchase	

*Do your saving methods meet the needs of your farm system?	Not at all	A little	Average	A lot	Completel
*How important is access to saving facilities for your farm system?	Not at all	A little	Average	A lot	Very

44. Investment to adapt or transform the farm (*13.6*)*(mandatory for CH)

*If you want/need to adapt your farm, are your financial resources leaving you some room for manoeuvre (e.g. invest in infrastructural work, employ an additional worker)?	Yes, plenty of 'room to manoeuvre'	Some room for manoeuvre (i.e. there are limits to what I can do)	No room for manoeuvre (e very high debt load)
*Without borrowing any money, do you have currently the financial capacity to maintain a good state of operation of your machine equipment/ fixed installations?	Yes		No

Are your financial resources sufficient to adapt your farm in case of sudden need?	Not at all	A little	Average	A lot	Cor lete
How important do you consider having sufficient financial resources for sudden investment to adapt your farm system?	Not at all	A little	Average	A lot	Ve

52 . Interaction between stakeholders of the value chain (*3.6*)*(mandatory for CH)

Answer for each crop/animal separately	*Crop/Animal 1	*Crop/Animal 2	*Crop/ Animal 3	Crop/Animal 4	Crop/Animal 5	Crop/Animal 6
*How do you commercialize your most profitable products? (Agroindustry ;Agricultural cooperative (e.g Fenaco);**S**elling to retailer(s) without intermediary; Local cooperative society (e.g local dairy-cheese factory); Direct selling)						
*If you do contract farming, do you (or your professional organization or representatives) have a say in the negotiation of the content of the contract? (Yes;No;Not applicable)						
*Do you consider yourself as a stakeholder of a value chain or an individual productive entity? (Individual productive entity; Stakeholder of a value chain)						
*Who determines mainly what you produce? (You; You with other farmers; Stakeholders who are not farmers)						
*Do you participate in the determination of the local operational specifications (Code of Practices or Book of requirements)? (Not at all; A little; A lot)						
*Do you participate in the determination of the regional (e.g. cantonal) operational specifications? (Not at all; A little; A lot)						
*Do you participate in the determination of the federal operational specifications? (Not at all; A little; A lot)						
*According to you, are the citizen-consumers enough aware of the farmers' challenges?	Yes		Not enough		No	
How adequate are your interactions with the other stakeholders of the value chain to meet the needs of your farm system?	Not at all	A little	Average	A lot	Compl ly	

How important are interactions with the other stakeholders of the value chain to your farm system?	Not at all	A little	Average	A lot	Very

53 ~~49.~~ Market prices (*13.3)* (sensitive question) *(mandatory for CH)

~~**Do you sell any products?**~~	~~**Yes**~~	~~**No**~~

*Describe the most profitable (the ones that brings the largest total quantity of money)~~important~~ products you sell:	* Describe the price of this product (across the last 3 years)						
	~~High~~ Stable	~~Fluctuating~~ Increasing	Decreasing	Unpredictable	High enough	Too low	Othe
*Crop/Animal1_____							
Crop/Animal 2_____							
Crop/Animal 3_____							
Crop/Animal 4_____							
Crop/Animal 5_____							
Crop/Animal 6_____							
Other (specify)							

*Are the prices high enough (for selling), and constant enough for your livelihood?	Not at all	A little	Average	A lot	Cor lete
*To what extent do price fluctuations affect your livelihood?	Not at all	A little	Average	A lot	Ver

Appendix 6 : Questionnaire for farmers in French (derived from SHARP computerised application of FAO) (Choptiany et al., 2015) and adapted by the author)

In green = what has been added/changed; crossed out = what has been removed

Etape 4 Questions générales sur les agriculteurs/éleveurs

Merci de vous référer à l'application Androïd pour la version la plus récente de l'enquête.

Le projet d'enquête est actuellement conçu pour être utilisé comme questionnaire sur support papier. Une version pour tablette est en cours de développement pour augmenter la vitesse de l'évaluation rapide, aider au marquage géolocalisé, à la vérification des réponses (grâce aux photos) et à envoyer les résultats au personnel pour l'analyse transversale. L'ordre des questions est un axe majeur de la mission à venir et, donc, les questions qui suivent sont susceptibles de ne pas rester telles quelles.

SHARP

Schéma Holistique pour l'Autoévaluation Paysanne de la Résilience climatique

Version provisoire 3.0
Février 2014

Bienvenue sur le Schéma holistique pour l'autoévaluation paysanne de la résilience climatique (SHARP)

Question 1
ID #_____
***Pays:_____**
***Région: _____**
District: _____
Village: _____
~~**Nom du l'école pastorale de terrain/champ école des producteurs:_____**~~
Latitude: ____ Longitude: _____ (option pour avoir les coordonnées GPS)
Collecte des données commencée le:_____
Données collectées par:_____
***Nom du répondant (agriculteur/éleveur~~)~~ :_____**
Nom du chef de l'exploitation ménage (si différent du répondant): _____
***Relation du répondant avec le chef de l'exploitation ~~ménage~~ (cochez la bonne réponse): chef de l'exploitation ~~ménage~~, époux/se, parents/beaux-parents, enfant, frère/sœur, autre membre de la famille, autre personne vivant dans le ménage, collaborateur de l'exploitation,** autre

*Sexe

☐ Homme ☐ Femme

*Age_____

*Activité

☐ ~~Agriculteur~~ Production végétale ☐ ~~Eleveur~~ Bétail ☐ Mixte ~~Agro-éleveur~~

*Typologie de l'exploitation agricole

☐ Exploitation biologique certifiée ☐ Exploitation conventionnelle

*Taille de l'exploitation (hectares)

☐ Moins de 5 ha ☐ 5-10 ha ☐ 11-30 ha ☐ 31-50 ha
☐ 51-100 ha ☐ Plus de 100 ha

Ce processus sera mené par les agriculteurs / éleveurs en collaboration avec les animateurs de l'école de terrain. Merci de répondre à toutes les questions qui vous concernent. L'Enquête SHARP a été conçue à la façon d'un organigramme de sorte que certaines questions peuvent être ignorées si elles ne s'appliquent pas. Le plus souvent, vous trouverez des questions en «oui / non». Le « oui »ou le « non » doivent donc être cochés. Si la réponse est "non", le participant peut passer à la question suivante. Si la réponse est «oui», on vous invitera généralement à expliquer ou préciser plus avant.
SHARP n'est pas destiné à être complété en une seule session et il vous faudra plusieurs interactions avec les animateurs tels que décrits ci-dessous. Lorsqu'une réponse n'est pas connue, merci d'écrire "incertain" ou une réponse équivalente.

Systèmes de production et pratiques						
2. Types de production						
~~Normalement,~~ Dans votre système agricole pratiquez-vous…	Activité traditionnelle	Activité Principale (en terme financier)	~~Depuis combien d'années pratiquez-vous cette activité?~~		~~Merci d'élaborer le cas échéant~~	
~~La production de~~ Les grandes cultures (céréales, légumineuses, oléagineux ~~vivrières, maraichères, de rente~~) ?	Oui	Non				
L'élevage (production animale pour l'engraissement ~~production fourragère, conduite des animaux, parcage des animaux, pastoralisme etc.~~) ?	Oui	Non				
Production laitière ?	Oui	Non				
Culture maraîchère ?	Oui	Non				
Arboriculture ?	Oui	Non				
Viticulture ?	Oui	Non				
L'agroforesterie (production de plants, régénération naturelle assistée, plantation d'arbres)?	Oui	Non				
L'aquaculture (production d'alevins, élevage de poissons) ?	Oui	Non				
L'apiculture?	Oui	Non				
La pêche?	Oui	Non				
L'aviculture?	Oui	Non				
Autres activités (*précisez*): _____	Oui	Non				
Quel est le but de votre système agricole (*cochez*)?	~~Marché~~ Exploitation industrielle	~~Agro-alimentaire~~ Exploitation familiale	~~Autoconsommation~~	Autre (*précisez*) _____		

~~Pratiquez-vous des activités au-dehors de votre exploitation agricole ou des activités dépendant d'autres ressources naturelles?~~	~~Production de charbon~~ ~~Agritourisme~~	~~Confection de briques~~ ~~Bûcheron~~	~~Poterie~~ ~~Boulangerie~~	~~Artisanat~~
	~~Commerce~~ ~~Pension d'animaux (Par ex. chevaux)~~	~~Guide touristique~~	~~Envoi de fonds~~	~~Autre (*précisez*)~~ _____

Dans quelle mesure les activités pratiquées sont-elles suffisantes pour fournir un revenu qui réponde aux besoins de l'exploitation agricole ~~ménage~~ ?	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement
Dans quelle mesure la diversité des activités pratiquées est-elle importante pour votre système agricole?	Pas du tout	Un peu	Moyennement	Beaucoup	Très

3. Ménage

Question/ personne	Hommes (16-65)	Femmes (16-65)	Enfants (0-15)		Femmes (66+)	Hommes (66+)
			Garçons	Filles		
Pour chaque catégorie, combien de personnes ~~il~~ y a-t-il dans votre ménage?						
Qui est le chef de l'exploitation ~~du ménage~~ (*cocher la bonne catégorie)?*						
Pour les questions suivantes, indiquer pour chaque catégorie le nombre de personnes concernées:						
Combien participent aux activités liées à la production végétale ~~agricoles~~?						
Combien participent aux activités d'élevage?						
Combien sont impliqués dans d'autres activités génératrices de revenus?						
Combien sont inaptes au travail pour raisons de santé?						
Combien ont terminé leur formation agricole ~~études primaires~~?						
~~Combien ont terminé leurs études secondaires?~~						
Combien d'heures par semaine (sur l'exploitation et hors						

exploitation combinés) travaille le chef de l'exploitation ? (**Moins de 42h/42-50h/ 51-70h/ Plus de 70h)**							
Si vous avez des employés, est-ce qu'ils ont participé à des services de vulgarisation/formation agricole au cours des trois dernières années ?	Oui		Non		Non applicable		
Est-ce que le chef de l'exploitation a choisi sa profession librement ou est-ce qu'il a repris la ferme sous pression de la famille ?	Oui, il a pu choisir librement		Un mix des deux		Il n'a pas pu choisir mais il est heureux/satisfait de sa profession		Il n'a pas pu choisir, il a été forcé de faire une profession qu'il n'apprécie pas
~~Si vous pratiquez une activité supplémentaire, merci de la décrire ici.~~							
~~Décrivez d'autres activités dans lesquelles sont engagés d'autres membres du ménage.~~							
Les aînés/grands-parents jouent-ils un rôle au sein du ménage ~~de la communauté~~, par exemple prendre soin des enfants plus petits ~~aider le ménage ou aux décisions communautaires~~?	Femmes		Hommes				
	Oui/non		Oui/non				
Décrivez le rôle que les aînés jouent au sein du ménage ~~de la communauté~~, par exemple prendre soin des enfants plus petits, aider le ménage, etc. ~~ou aux décisions communautaires?~~							
Dans quelle mesure êtes-vous satisfait du rôle que vous jouez au sein du ménage?	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement		
Quelle importance donnez-vous à votre rôle au sein du ménage?	Pas du tout	Un peu	Moyennement	Beaucoup	Très		

4. Cultures (annuelles et vivaces)

Cultivez-vous des végétaux?	Oui		Non					
Si oui, quelles plantes cultivez-vous?	1.	2.	3.	4.	5.	6.	7.	8.

Pour chaque espèce mentionnée ci-dessus, combien de variété cultivez-vous (merci de les nommer si vous vous en souvenez)				
~~Quelle est la principale source de votre principale variété?~~				

Cultures des vivaces				
Est-ce que vous cultivez des plantes pérennes (plantes pouvant vivre plusieurs années)	Oui	Non	Si oui, lesquelles ?	

Le nombre et la variété de cultures que vous cultivez sont-ils suffisants pour votre système agricole ?	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement
Quelle est l'importance d'avoir un nombre diversifié de cultures ~~de cultiver un mélange de différentes cultures (y compris des vivaces)~~ pour votre système de production?	Pas du tout	Un peu	Moyennement	Beaucoup	Très

5. Pratiques d'élevage										
Possédez-vous des animaux au sein de votre exploitation agricole ?									Oui	Non
Pratique	Vache à viande	Vache laitière	Chèvre	Mouton	Buffle	Cochon	Volaille (poulet, dinde etc.)	Cheval	Ânes /mulets	Autre (*précisez*): _____
Combien d'animaux possédez-vous approximativement?										
Combien de variétés/races différentes possédez-vous pour chaque catégorie?										
~~Attachez-vous votre bétail~~ Appliquez-vous les normes/réglementations SST (Systèmes de stabulation particulièrement respectueux des animaux)?										

~~Pratiquez-vous la transhumance/ nomadisme du bétail~~ Appliquez-vous les normes SRPA (Sorties régulières en plein air) ?										

~~Utilisez-vous des enclos (par ex. porcherie, parcs) pour garder votre bétail (cocher si oui) ?~~									

~~Si vous avez d'autres espèces que celles mentionnées dans le tableau, veuillez les décrire ici~~	
~~Utilisez-vous d'autres pratiques (non-alimentaires) de gestion du bétail (si oui, préciser lesquelles et pour quels animaux)?~~	

Est-ce que le nombre et la variété de votre bétail suffisent-ils à pourvoir aux besoins de votre système de production?	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement
Quelle est l'importance d'avoir un ensemble de types de bétails différents pour votre système de production ?	Pas du tout	Un peu	Moyennement	Beaucoup	Très

~~6. Sélection du bétail/élevage (7.3, 10.4)~~ (pas pertinent pour CH)

~~Pratique/ animal~~	~~Vache~~	~~Chèvre~~	~~Mouton~~	~~Cochon~~	~~Volaille~~	~~Âne~~	~~Chien~~	~~Autre (*préciser*)~~
~~Avez-vous essayé de sélectionner pour obtenir des animaux d'élevage améliorés (*cocher si oui*)?~~								
~~Si oui, selon quels critères de performance (couleur, taille, poids, abiotiques (par ex. température) ou biotiques (par ex. résistance aux maladies), production de lait)?~~			~~Ent~~					
~~Si non, pourquoi?~~								

~~Dans quelle mesure êtes-vous capable d'améliorer vos animaux afin de répondre aux besoins de votre système agricole?~~	~~Pas du tout~~	~~Un peu~~	~~Moyennement~~	~~Beaucoup~~	~~Complètement~~
~~Quelle est l'importance de la sélection du bétail pour votre système agricole?~~	~~Pas du tout~~	~~Un peu~~	~~Moyennement~~	~~Beaucoup~~	~~Très~~

6 ~~7~~. Alimentation animale (pertinent pour CH)										
	Vache à viande	Vache laitière	Chèvre	Mouton	Buffle	Cochon	Volaille	Cheval	~~Chien~~ Ânes /mulets	Autre (*précisez*)
~~Donnez-vous des compléments alimentaires à vos animaux (par exemple des gousses)? (*Cocher si oui*)~~										
~~Si oui, quels aliments?~~										
~~Si oui, quand donnez-vous ces aliments? (périodes/circonstances spécifiques)~~										
Laissez-vous les animaux pâturer dans les champs herbeux ou des terres agricoles pendant une partie de (ou toute) l'année? *(Cocher si oui)*										
~~Si oui, quand sont-ils sur les pâturages?~~										
Combien d'autres sources nutritives que les herbages donnez-vous à vos bovins ? (par ex. maïs (plante entière ou épis), concentré du commerce, pommes de terre, sous-produits de boulangerie, petit lait, paille, etc.)										
Combien d'autres sources nutritives que les concentrés du commerce et/ou les céréales produites sur l'exploitation donnez-vous à vos porcs ? (par ex. petit-lait, sous-produits de boulangerie, fromage, etc.)										
Donnez-vous à votre volaille d'autres sources nutritives que les concentrés du commerce et/ou les céréales produites sur l exploitation ?										Oui/Non/Non applicable
Quel pourcentage de votre nourriture principale pour animaux (en apport énergétique, pas en kg) est importé d'un autre pays ? (0%,1-10% ; 11-20% ;21-40% ;41-80% ;more than 80 ; je ne sais pas)										

Est-ce que vous stockez de la nourriture pour animaux au cas où il y aurait une pénurie ?	Oui		Non		
Est-ce que la combinaison entre les compléments dont vous nourrissez vos animaux et leur nourriture principale ~~accès aux pâturages~~ est suffisante pour répondre à leurs besoins?	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement
Quelle est l'importance de l'alimentation du bétail pour votre système agricole?	Pas du tout	Un peu	Moyennement	Beaucoup	Très

7 ~~8~~. Aquaculture

Pratiquez-vous l'aquaculture? *L'aquaculture est l'élevage d'organismes aquatiques, y compris les poissons, les mollusques, les crustacés et les plantes aquatiques. L'élevage implique une forme d'intervention pour améliorer la production: par ex. l'ensemencement, l'alimentation, la protection contre les prédateurs, etc. L'élevage implique également la propriété individuelle ou collective du stock en élevage.*				Oui	Non
Si oui, quelles espèces cultivez-vous? Par ex. crevette, tilapia, etc.	1.	2.	3.	4.	
Pour chaque espèce mentionnée ci-dessus, combien de races gérez-vous?					
Pour chaque espèce mentionnée ci-dessus, fournissez-vous des compléments alimentaires?					
Si oui, lesquels?					
Si oui, dans quelles circonstances fournissez-vous ces compléments alimentaires?					

L'alimentation répond-elle aux besoins des espèces que vous élevez?	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement
Quelle est l'importance de l'alimentation des poissons pour votre système agricole?	Pas du tout	Un peu	Moyennement	Beaucoup	Très

8 ~~9~~. Sources de semences et d'élevage

~~En général à quelles sources avez-vous accès?~~ En général, quelles sources utilisez-vous ?	Sources de semences/matériel végétale (graines, plants,~~vignes, branches~~, etc.)	Sources de bétail (mâle améliorateur, insémination artificielle, etc.)	
~~Aide semencière~~	~~Oui~~	~~Non~~	
Magasins locaux/ marché	Oui	Non	Non applicable
Amis/ voisins/famille/ autre exploitant	Oui	Non	Non applicable
Propre production (stock/réserves)	Oui	Non	Non applicable
Concessionnaires (commerçants d'intrants agricoles – fournisseurs/ distributeur)	Oui	Non	Non applicable
~~Banque de semences~~	~~Oui~~	~~Non~~	
Groupes de producteurs ou entreprises de semences	Oui	Non	Non applicable
~~Gouvernement~~	~~Oui~~	~~Non~~	

Autre *(précisez)* _____	Oui		Non		Non applicable
Dans quelle mesure cette combinaison spécifique de sources de semences végétales répond-elle aux besoins de votre système agricole?	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement
Quelle est l'importance d'avoir accès à plusieurs sources de semences végétales pour votre système agricole?	Pas du tout	Un peu	Moyennement	Beaucoup	Très
Dans quelle mesure cette combinaison de sources de bétail répond-elle aux besoins de votre système agricole?	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement
Quelle est l'importance d'avoir accès à plusieurs sources de bétail pour votre système agricole?	Pas du tout	Un peu	Moyennement	Beaucoup	Très

9 ~~10~~. Utilisation de variétés adaptées au contexte

Utilisez-vous des variétés non indigènes nouvellement introduites (*variétés~~/espèces~~ qui sont utilisées dans la région ~~communauté~~ depuis moins de 15 ans*) comme des cultivars modernes, des cultivars importés, des variétés à haut rendement, des semences du secteur privé, etc.?	Oui	Non	Je ne sais pas	Si oui, lesquelles (*donnez le nom de la variété pour chaque culture et précisez les espèces de cultures*)?			
Utilisez-vous des races non locales nouvellement introduites (*variétés~~/espèces~~ qui sont utilisées dans la région ~~communauté~~ depuis moins de 30 ans*), comme des races importées, des races à rendement élevé, etc. ?	Oui	Non	Je ne sais pas	Si oui, lesquelles (*donnez le nom de la race pour chaque animal et précisez les espèces d'animaux*)?			
Si vous utilisez des variétés/races nouvellement introduites, pourquoi?Si non, pourquoi ?				Certaines de ces races ou variétés nouvellement introduites se sont-elles bien adaptées aux conditions environnementales de l'exploitation? ~~étaient-elles faiblement résistantes aux stress biotiques et abiotiques locaux?~~	Oui	Non	
				Est-ce que certaines de ces races ou variétés nouvellement introduites étaient faiblement résistantes aux stress biotiques et abiotiques locaux ?	Oui	Non	Je ne sais pas
				Si oui, décrivez comment.			
Approximativement, quel pourcentage de vos cultures est une variété nouvellement introduite?				Approximativement, quel pourcentage de vos races animales est nouvellement introduit?			

Est-ce que certaines plantes indigènes (locales) sont devenues inadaptés à cause du changements climatique?	Oui	Non	Je ne sais pas	Si oui, lesquels?	Si oui, de quelle manière?
Est-ce que certaines races locales sont devenues inadaptées à cause de changements du climat?	Oui	Non		Si oui, lesquelles?	Si oui, de quelle manière?

Dans quelle mesure la combinaison des variétés ~~espèces~~ locales/indigènes et nouvellement introduites que vous utilisez répond-elle aux besoins de votre système agricole?	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement
Quelle est l'importance de cette combinaison ~~d'espèces/~~ de variétés indigènes et nouvellement introduites (améliorées) pour votre système agricole?	Pas du tout	Un peu	Moyennement	Beaucoup	Très

10 ~~11.~~ Arbres et agroforesterie

Arbres plantés (Agroforesterie)

~~Avez-vous planté des arbres sur vos terres?~~ Pratiquez-vous l'agroforesterie ?	Oui			Non		
~~Approximativement, combien d'arbres avez-vous plantés dans votre système agricole au cours des 10 dernières années?~~ Approximativement, combien d'espèces d'arbre avez-vous plantées dans votre ferme ?		~~De quelles espèces?~~				
Avez-vous planté plusieurs variétés différentes d'une même espèce d'arbre ~~au cours des 10 dernières années~~?	Oui		Non		~~Pour quelles raisons?~~	
Pour quels usages avez-vous planté ces arbres (***cochez*** *les utilisations faites*)?	Bois pour charbon/ bois	Arbres pour l'ombre	Produits alimentaires (animaux)	Produits alimentaires (personnes)	Fertilisants	Matériel de construction
	Remèdes naturels (animaux)		Remèdes naturels (personnes)		Produits pour la protection des cultures ~~(par ex. extrait de neem)~~	Autres (*préciser*): _____

Arbres naturels (non plantés)

En général, quel est le pourcentage global de vos terres agricoles couvertes par des arbres – en incluant les naturels et les plantés?	0% 1-10% 11-20% 21-40% 41-60% 61+%	Quelles espèces sont naturelles?

Dans quel but utilisez-vous les produits de ces arbres naturels/spontanés? *(**cochez** les produits utilisés)*	~~Je ne les utilise pas~~	Bois pour charbon/ bois	Produits alimentaires (animaux)	Produits alimentaires (personnes)	Fertilisants	Matériel de construction
	Arbres pour l'ombre	Remèdes naturels (animaux)	Remèdes naturels (personnes)	Produits pour la protection des cultures ~~(par ex. neem)~~	Autres (*précisez*): _____	

Dans quelle mesure votre accès aux arbres (plantés et spontanés) répond-il aux besoins de votre système agricole?	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement
Quelle est l'importance des arbres pour votre système agricole?	Pas du tout	Un peu	Moyennement	Beaucoup	Très

11 ~~12.~~ Pertes de cultures et de bétail (obligatoire pour CH)

Au cours des 10 dernières années, avez-vous perdu une part importante ~~plus de 50%~~ de vos cultures (pertes avant récolte)?	Oui	Non	Comment *(cochez)*?	Prédateur / Animaux nuisibles	Maladies (bactéries, virus, champignons, etc.)	Sécheresse	Gel	Inondations	Forte pluie	~~Animaux errants/non clôturés~~ Vent violent	Semences de mauvaise qualité	Grêle	Autres (*précisez*) ___
Au cours des 10 dernières années, avez-vous perdu une part importante ~~plus de 50%~~ de votre bétail?	Oui	Non	Comment *(cochez)*?	Maladie	Sécheresse	Inondations		Animaux non clôturés	Vol d'animaux	Autres (*précisez*) _____			

Comment avez-vous fait face à cette perte?	Cultures			Bétail		
	Capacités/stratégies d'adaptation internes	Appui externe	Capacités/stratégies d'adaptation internes	Appui externe		
(*Merci de décrire comment)*						
Dans quelle mesure avez-vous pu atténuer les effets négatifs de ces pertes?	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement	

Dans quelle mesure ces événements ont-ils affecté votre système agricole?			Pas du tout	Un peu	Moyennement	Beaucoup	Très
12 ~~13.~~ Tenue de registres							
Tenez-vous des registres pour ce qui suit:			~~Si oui, comment? – Si non, pourquoi?~~				
Rendement agricole?	Oui	Non	Pas applicable				
Régimes des pluies?	Oui	Non	Pas applicable				
Espèces envahissantes?	Oui	Non	Pas applicable				
Désherbage (lutte contre les adventices)?	Oui	Non	Pas applicable				
Analyse de sol ?	Oui	Non	Pas applicable				
Eau utilisée pour l'irrigation ?	Oui	Non	Pas applicable				
Engrais ?	Oui	Non	Pas applicable				
Produits phytosanitaires ?	Oui	Non	Pas applicable				
Carburants ?	Oui	Non	Pas applicable				
Recensement des animaux ?	Oui	Non	Pas applicable				
Autres (*précisez*)? _____	Oui	Non	Pas applicable				
Connaissez-vous des histoires, des contes, des légendes qui sensibilisent les agriculteurs à la problématique du changement climatique ?	Oui	Non	~~Si oui, comment vous ont-ils été transmis?~~				
La tenue de vos registres est-elle adaptée pour comprendre et observer les tendances au fil du			Pas du tout	Un peu	Moyennement	Beaucoup	Complètement

temps?					
Quelle est l'importance de la tenue des registres pour votre système agricole?	Pas du tout	Un peu	Moyennement	Beaucoup	Très

13 ~~14~~. Infrastructures

	Avez-vous les infrastructures suivantes dans un rayon de 10km autour de votre exploitation ? ~~bâtiments suivants dans votre municipalité/commune communauté~~?		~~Avez-vous accès~~ Utilisez-vous ces infrastructures ~~aux bâtiments suivants dans votre municipalité/commune communauté~~?	
Lieux de culte (église, mosquée,etc.)	Oui	Non	Oui	Non
Centre communautaire (culturel etc.)	Oui	Non	Oui	Non
Pompier	Oui	Non	Oui	Non
Bureau de poste	Oui	Non	Oui	Non
École	Oui	Non	Oui	Non
Centre médical	Oui	Non	Oui	Non
Clinique vétérinaire	Oui	Non	Oui	Non
Magasins d'intrants	Oui	Non	Oui	Non
~~Banque de céréales~~	~~Oui~~	~~Non~~	~~Oui~~	~~Non~~
Installations de stockage~~/grenier~~	Oui	Non	Oui	Non
Autres (*précisez*)	Oui	Non	Oui	Non

Dans quelle mesure ces bâtiments remplissent-ils leur fonction?	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement
Quelle est l'importance de ces bâtiments pour votre système agricole?	Pas du tout	Un peu	Moyennement	Beaucoup	Très

14 ~~15~~. ~~Accès aux~~ Informations sur le changement climatique, les pratiques culturales et les prévisions météorologiques

Changement climatique

Avez-vous connaissance du changement climatique?	Oui	Non

Au cours des 10 dernières années, avez-vous observé des changements concernant la météo?	Si oui, quels changements avez-vous notés?											
	Infestation inhabituelle d'animaux nuisibles	Hausse des précipitations	Baisse des précipitations	Pluies tardives	Sécheresse inhabituelle	Hausse de la variabilité des précipitations	Hausse des températures	Baisse des températures	Inondation	~~Début tardif de la saison des pluies~~ Arrivée du printemps tardive	~~Saison des pluies plus courte~~ Arrivée du printemps précoc	Autres (*précisez*)

											e	

Oui	Non	Si oui, comment cela a-t-il affecté votre système agricole?

Informations climatiques

~~Avez-vous les moyens de prédire les variations climatiques?~~	~~Oui~~	~~Non~~	~~Si oui, comment? Si non, pourquoi?~~	

~~Avez-vous accès aux services de prévisions météorologiques~~ Utilisez-vous les services de prévisions météorologiques (notamment les informations préventives sur les menaces climatiques potentielles, par ex. inondations, sécheresses, pluies tardives, par ex. Agrométéo)?	Oui	Non
Si oui, veuillez préciser la qualité de ces services. Si non, pourquoi ?		

Dans quelle mesure votre accès aux informations météorologiques est-il suffisant pour votre système agricole?	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement
Quelle est l'importance de ces informations météorologiques pour gérer votre système agricole?	Pas du tout	Un peu	Moyennement	Beaucoup	Très

Pratiques agricoles

~~Avez-vous accès aux informations sur les pratiques culturales et d'élevage?~~ Utilisez-vous des informations/services de vulgarisation sur les pratiques agricoles et d'élevage?	Oui	Non

~~Si oui, comment obtenez-vous cette information?~~Si oui, comment obtenez-vous généralement ces informations ?	Radio	Journal	Revue spécialisée/ professionnelle	Télévision	Agent de vulgarisation	~~EPT/CEP~~ Groupe/organisation/association agricole	Autres agriculteurs /éleveurs	Ressources internet	Autres *(précisez)* _____

Veuillez préciser si votre accès aux informations concernant les pratiques agricoles/élevage est limité	

Avez-vous suffisamment de connaissances pour diversifier votre système de	Oui	Non

production ?					
Avez-vous déjà entendu parler de l'agriculture de conservation ? (pratique basée sur les 4 principes suivants : Assurer la couverture des sols ; Pratique de la rotation des cultures et culture de couverture ; Réduction (élimination) de perturbations mécaniques du sol ; Limitation du passage des machines sur les parcelles)	Oui			Non	
De combien de sources différentes obtenez-vous des informations sur l'utilisation de pesticides?	Une seule source		Deux sources		Trois sources ou +
Avez-vous déjà entendu parler de la crise du phosphore ?	Oui			Non	
À quel point ces informations ont-elles été utiles pour votre système agricole?	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement
Quelle est l'importance de ces informations en termes d'adaptation au changement climatique?	Pas du tout	Un peu	Moyennement	Beaucoup	Très
15 ~~16.~~ Pratiques de lutte contre les maladies animales					
Utilisez-vous des pratiques de contrôle des maladies pour vos animaux/bétail?		Oui		Non	
~~Combien de Quels types de lutte contre les maladies utilisez-vous *(notez le nombre pour chaque méthode cochez ceux que vous utilisez)*~~?					
		~~Nombre de types différents par méthode :~~			
~~Antibiotiques~~		~~Si oui, quel type d'antibiotiques?~~			

	~~Quelle dose utilisez-vous? (ml/animal)~~	
~~Vaccins~~	~~Si oui, lesquels?~~	
~~Remèdes naturels~~	~~Si oui, lesquels?~~	
~~Traitements contre les parasites internes et externes~~	~~Si oui, lesquels?~~	
~~Pratique de gestion intégrée de la santé animale (par ex. hygiène, espacement, alimentation et abattage)~~	~~Si oui, lesquelles?~~	
~~Autres (merci de préciser) - _____~~	~~Lesquels?~~	
Combien de méthodes de lutte contre les maladies utilisez-vous pour vos animaux/bétail ? (par ex. antibiotiques, vaccins, remèdes naturels, traitements contre les parasites internes et externes, pratique de gestion intégrée de la santé animale (par ex. hygiène, espacement, alimentation et abattage))		

Dans quelle mesure êtes-vous capable de contrôler les maladies de vos animaux?	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement
Quelle est l'importance du contrôle des maladies pour votre système agricole?	Pas du tout	Un peu	Moyennement	Beaucoup	Très

16 ~~17.~~ Pratiques de gestion des déprédateurs (pertinent pour CH)

Utilisez-vous des pratiques de gestion des déprédateurs (= ravageurs) /maladies sur vos cultures?	Oui	Non

Quelles pratiques de gestion des déprédateurs avez-vous utilisées au cours de la dernière saison de culture (***cochez*** *celles utilisées*)?

Pesticides naturels ~~(par ex. extrait de neem) *Si oui, lesquels?*~~	Variétés ou semences résistantes aux déprédateurs ~~*Si oui, lesquelles?*~~	Méthodes de lutte biologiques (par ex. parasitoïdes, coccinelles) ~~*Si oui, lesquelles?*~~
Pesticides de synthèse	Éclaircissement des plants	Traitement en pépinière
Rotation des cultures afin de réduire la croissance des adventices et des déprédateurs	Capture manuelle des déprédateurs trouvés sur les cultures	Utilisation de pièges ou de pièges végétaux
		Lutte mécanique
		Autres (*précisez*)_____

Pourquoi avez-vous choisi d'employer les pratiques de gestion des déprédateurs ci-dessus ?					
~~Quelles contraintes avez-vous rencontrées en appliquant les pratiques de gestion des déprédateurs/maladies?~~					
Dans quelle mesure les pratiques que vous utilisez permettent-elles une lutte suffisante contre les déprédateurs/maladies?	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement
Quelle est l'importance du contrôle des les maladies/déprédateurs pour votre système agricole?	Pas du tout	Un peu	Moyennement	Beaucoup	Très

17 ~~18~~. Utilisation de pesticides de synthèse

Au cours de la dernière saison de culture…

Pesticides	Insecticides	Herbicides	Fongicides

Avez-vous utilisé des pesticides de synthèse?	Oui	Non	Oui	Non	Oui	Non
~~Quelles marques avez-vous utilisées?~~						
~~Quelle quantité de pesticide avez-vous utilisée? (L/ha/pesticide utilisé)~~						
Avez-vous vérifié la présence de déprédateurs/maladies sur vos cultures avant de pulvériser?	Oui/Non		Oui/Non		Oui/Non	

Au cours de la saison passée, à quelle fréquence avez-vous utilisé un équipement de protection?			Si oui, quelle sorte de protection utilisez-vous? (par ex. lunettes de protection, gants, masque).				
Toujours	Quelques fois	Jamais	Lunettes de protection	Gants	Masque	Veste	Autres

Que faites-vous des conteneurs après avoir utilisé les produits? *(**cochez** les pratiques que vous utilisez)*					
Donner à des collecteurs (comme des installations de recyclage)	Jetés à la poubelle	Brûlés	Réutilisés	Jetés par terre Jetés près d'un cours d'eau	Autres (*précisez*)___

Dans quelle mesure les pesticides de synthèse vous permettent-ils de contrôler efficacement les déprédateurs?	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement
Quelle est l'importance des pesticides de synthèse pour votre système agricole?	Pas du tout	Un peu	Moyennement	Beaucoup	Très

18 ~~19.~~ Cultures associées (pertinent pour CH)

Pratiquez-vous la culture associée? (croissance simultanée de deux cultures ou plus sur le même champ)	Oui	Non
Complétez si besoin: _____		

Quel pourcentage de vos cultures est cultivé en culture associée?		
Cultivez-vous des plantes en association avec l'aquaculture (~~rizipisciculture~~)?	Oui	Non
Expliquez comment les différents éléments sont intégrés sur votre exploitation (par ex. bétail, cultures, arbres): _____		

À quel point la culture associée a-t-elle amélioré votre système agricole?	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement
Quelle est l'importance de cultiver des plantes en association pour votre système agricole?	Pas du tout	Un peu	Moyennement	Beaucoup	Très

Gouvernance (cadre institutionnel)					
19 ~~20~~. Politiques et programmes gouvernementaux sur le changement climatique et l'agriculture durable *					
* Connaissez-vous les politiques ou programmes gouvernementaux sur le changement climatique et l'agriculture durable qui vous concernent ?	Oui		Non	Je ne sais pas	
Si oui, veuillez décrire leur impact sur vous:	Aucun	Paiements directs	Education/ formation	Autre	
Si vous souhaitez/avez besoin d'adapter votre exploitation, est-ce que les normes/règles/politiques gouvernementales actuelles vous permettent d'entreprendre des travaux d'infrastructure nécessaires (par ex. travaux de construction)?	Oui, elles sont suffisamment flexibles	Pas d'influence	Non, elles ne sont pas flexibles		
Si non, veuillez décrire quelles contraintes vous gênent					
Est-ce que les contraintes administratives freinent la capacité d'adaptation de votre exploitation (par ex. capacité d'adaptation à une perturbation climatique) ?	Oui		Non		
*A quel point le soutien gouvernemental est utile/nécessaire à votre subsistance ?	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement
*Quelle est l'importance du soutien gouvernemental pour votre subsistance ?	Pas du tout	Un peu	Moyennement	Beaucoup	Très

Environnement				
20. ~~Accès à l'eau~~ Source d'eau				
Pour chaque source d'eau que vous pouvez utiliser pour l'irrigation/ eau pour animaux ~~à laquelle vous avez accès~~, merci de préciser:				
Sources d'eau:	Type de source d'eau utilisée: (*choisir entre: puits, barrage (retenue d'eau), Rivière/cours d'eau/lac, réseau d'irrigation, forage, bassin de récupération d'eau de pluie , autre (mais excepté la pluie) ;pas d'accès à l'irrigation*)	~~Distance entre la source d'eau la plus proche et votre domicile (en kilomètres):~~	~~Temps nécessaire pour marcher et collecter l'eau au point de collecte le plus proche (*en minutes*) (*comprend le temps nécessaire pour marcher et collecter l'eau*)~~	Avez-vous vu des changements ~~dans la qualité ou la~~ de quantité d'eau avec ces sources au cours des 5 dernières années? Si oui, veuillez décrire.
1				Changement négatif/Pas de changement /Amélioration/ Non applicable
2				Changement négatif/Pas de changement /Amélioration/ Non applicable
3				Changement négatif/Pas de changement /Amélioration/ Non applicable
4				Changement négatif/Pas de changement /Amélioration/ Non applicable
5				Changement négatif/Pas de changement /Amélioration/ Non applicable

Votre accès à l'eau est-il suffisant pour les besoins quantitatifs de votre système agricole ~~et la consommation du ménage~~?	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement
Dans quelle mesure est-il important d'avoir accès aux sources d'eau pour votre système agricole ~~et la consommation du ménage?~~	Pas du tout	Un peu	Moyennement	Beaucoup	Très

21. Techniques et pratiques de conservation de l'eau (pertinent pour CH)			
Dans votre système agricole ~~et la consommation du ménage~~, utilisez-vous des techniques et pratiques de conservation de l'eau (***cochez*** *les réponses appropriées*)?			
Citernes (réservoirs de collecte d'eau)	Irrigation – canaliser l'eau	Fosses de plantation et diguettes en pierre	Fossés de rétention d'eau, murets en pierre, bandes de végétation, lignes de contours et fossés (sillons)
Arrosage tôt le matin ou en soirée (lorsque la température descend)	Terrassement	Paillage (disposition sur le sol d'une mince couche d'origine végétale)	Cultures de couverture
Irrigation au goutte à goutte	Fossé d'écoulement/canaux (pour drainer)	Barrages	~~Non~~
Autres *(précisez)*:			

Dans quelle mesure les pratiques de conservation de l'eau que vous utilisez vous permettent-elles d'économiser de l'eau dans votre système agricole?	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement
Quelle est l'importance de la conservation de l'eau pour votre système agricole ~~et la consommation du ménage~~?	Pas du tout	Un peu	Moyennement	Beaucoup	Très

22. Qualité de l'eau	
Avez-vous rencontré certains des problèmes de qualité de l'eau suivants:	*Si oui, expliquez la nature du problème:*

Pollution par des pesticides ou d'autres produits chimiques (essence, sous-produits industriels)?	Oui	Non	Non applicable
Écoulement des nutriments (~~fumier ou~~ engrais)?	Oui	Non	Non applicable
Augmentation de l'envasement (pollution par la boue)?	Oui	Non	Non applicable
Déversement de déchets organiques (par ex. fumier, matières fécales)?	Oui	Non	Non applicable
Pollution des eaux souterraines	Oui	Non	Non applicable
Autres (*précisez*) ____	Oui	Non	Non applicable

L'eau à laquelle vous avez accès est-elle propre à la consommation humaine?	Pas du tout	Un peu	Moyenne ment	Beaucoup	Complètement
L'eau à laquelle vous avez accès est-elle propre à la consommation animale?	Pas du tout	Un peu	Moyenne ment	Beaucoup	Complètement
L'eau à laquelle vous avez accès est-elle propre à l'utilisation agricole?	Pas du tout	Un peu	Moyenne ment	Beaucoup	Complètement
Quelle est l'importance de la qualité de l'eau pour votre système agricole?	Pas du tout	Un peu	Moyenne ment	Beaucoup	Très

23. ~~Accès à la terre~~ Propriété foncière

Type	Parcelle(s) en propriété ~~privées~~ (ha.)	Parcelles prise(s) en location fixe avec bail (ha.)	Parcelle(s) prise(s) en location verbale sans bail (ha.)	~~Terrain communautaire (ha.)~~	~~Terre appartenant au gouvernement (ha.)~~ Autre
Surface agricole utile (SAU) ~~totale des terres agricoles accessibles, le cas échéant~~ (hectares):					
Surface d'estivage (hectares):					
Autres surfaces ne rentrant ni dans la SAU ni dans les surfaces d'estivage (hectares)					
Surface totale (hectares) :					
~~Surface totale des terres possédées, le cas échéant~~ ~~Nombre total de champs auxquels vous avez accès~~ Combien de regroupements de parcelles (parcelles avec même type de gestion) avez-vous ?					

~~Pour chaque type de terre, quelle utilisation en faites-vous (cultures, arboriculture fruitière, pâturage)?~~					
~~Quelle surface (hectare) des terres que vous exploitez est sous votre propriété?~~					
Est-ce que la part des parcelles sous votre propriété ~~Votre accès à la terre~~ est adéquate pour la subsistance de votre exploitation?	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement
Quelle est l'importance pour votre exploitation d'être propriétaire de vos parcelles ~~ménage d'avoir accès au terrain communautaire?~~	Pas du tout	Un peu	Moyennement	Beaucoup	Très

24. Qualité du sol et dégradation des terres (pertinent pour CH)

Combien de types différents de sols pouvez-vous observer ~~dans~~ sur votre exploitation ~~votre champ~~ (approximativement)?						
Les sols sur votre exploitation ~~sur votre terrain~~ sont-ils (***cochez** la réponse appropriée*):						
Sablonneux?	Limoneux?		Argileux?		Pierreux?	~~Je ne sais pas~~
Selon vous, en moyenne, quelle est la richesse de votre sol en matières organiques ~~du sol~~?	Pas du tout	Très peu	Moyennement	Plutôt riche	Beaucoup/très	Je ne sais pas
Est-ce que vous faites un bilan de votre matière organique ?	Oui		Non			

En général, votre sol est-il fertile?	Non	Un peu	Moyennement	Beaucoup	Complètement
Dans quelle mesure l'état de fertilité de votre sol affecte-t-il votre système agricole?	Pas du tout	Un peu	Moyennement	Beaucoup	Très

Avez-vous observé un ou plusieurs des types suivants de dégradation du sol/terre ces cinq dernières années ?

Érosion (par le vent) Perte de la couche arable	Érosion (par l'eau) Perte de la couche arable	Salinisation de la terre (empêchant les cultures de pousser)	Compaction (terre très dure)	
Déclin de la diversité dans la composition des espèces (changement dans la flore et espèces invasives)	Concurrence accrue des déprédateurs et des adventices	Déforestation (réduction du nombre d'arbres et de buissons)	Pollution du sol (sol empoisonné)	
Diminution de la fertilité et réduction du contenu en matière organique	Dégradation de la qualité des pâturages	Autres: _____	~~Pas de dégradation du sol observée~~	
Érosion des ravins	Glissement de terrain	Érosion sur les berges d'une rivière	Érosion du littoral	Réduction de la couverture végétale
Acidification	Saturation en eau/engorgement des terres		~~Affaissement des sols organiques~~	Perte d'habitats
Aridification (diminution de l'humidité du	Imperméabilisation et encroûtement			

sol)				
Pour chacune des réponses sélectionnées, veuillez noter l'ampleur (% du terrain total de l'exploitation)				
Pour chacune des réponses sélectionnées, veuillez sélectionner le degré :	Léger	Modéré	Fort	Extrême
Pour chacune des réponses sélectionnées, veuillez sélectionner la tendance:	En hausse		En baisse	Pas de changement
Dans votre choix variétal/d'espèces des cultures, prenez-vous en considération le climat local et les conditions environnementales locales (sol, disponibilité en eau, géographie) ?	Oui		Non	Non applicable
Dans votre choix variétal/d'espèces des animaux, prenez-vous en considération le climat local et les conditions environnementales locales (sol, disponibilité en eau, géographie) ?	Oui		Non	Non applicable

Est-ce que la terre à laquelle vous avez accès convient à vos activités agricoles?	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement
Quel impact la dégradation des terres a-t-elle sur votre système agricole?	Pas du tout	Un peu	Moyennement	Beaucoup	Très

25. Pratiques de gestion des terres

Utilisez-vous des pratiques d'amélioration de la qualité des sols?	Oui	Non	Non applicable

Quelles pratiques d'amélioration de la qualité des sols ~~de gestion des terres~~ utilisez-vous?	Réponse		Merci de compléter si nécessaire
Chaulage (à savoir l'application de matériels riches en magnésium et calcium pour neutraliser l'acidité du sol)	Oui	Non	
Jachère/culture itinérante	Oui	Non	
~~Labour zéro/minimum semis direct~~	Oui	Non	
Semis direct	Oui	Non	
~~Labour minimum~~ Travail superficiel (Techniques culturales simplifiée)	Oui	Non	
~~Labour~~	~~Oui~~	~~Non~~	
Pâturage en rotation	Oui	Non	
Rotation des cultures	Oui	Non	
Coupe vent/haie	Oui	Non	
Culture associée ~~intercalaire (~~ croissance simultanée de deux cultures ou plus sur le même champ~~)~~	Oui	Non	
Paillage	Oui	Non	
Culture de couverture (culture intermédiaire ; culture qui couvre le sol entre deux cultures principales)	Oui	Non	
Fumure/compostage	Oui	Non	
Bandes végétales	Oui	Non	

Agroforesterie, reboisement, protection des forêts	Oui	Non	
Contrôle/réhabilitation des ravins	Oui	Non	
Terrassement	Oui	Non	
Autres pratiques d'amélioration de la qualité des sols ~~pratiques de gestion~~	Oui	Non	

~~Quels types de gestion des terres pratiquez-vous ?~~	~~Intégration Bétail-agroforesterie~~	~~Gestion intégrée des bassins hydrologiques versants~~	~~Forte intensité de travail~~
	~~Ligne de contour~~	~~Autre (Veuillez préciser)~~	

Avez-vous des pratiques favorisant le développement des mycorrhizes ? (par ex. semis direct)	Oui	Non	Non applicable
Recyclez-vous vos résidus de cultures sur votre propre champ ?	Oui	Non	Non applicable
Quel pourcentage de la surface totale de vos terres sont couvertes (résidus de cultures, cultures de couverture, repousses ou adventices) entre 2 cultures ?			

Dans quelle mesure les pratiques de gestion (du sol) utilisées améliorent-elles la qualité de vos sols?	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement
Quelle est l'importance des pratiques de gestion des terres pour votre système agricole?	Pas du tout	Un peu	Moyennement	Beaucoup	Très

Quelles sont, selon vous, les principales causes de dégradation du sol/de la terre?		
Culture sur des sols vulnérables	Absence de mesures de lutte contre l'érosion	Machinerie lourde
Labourage	Brûlage	Utilisation inappropriée d'engrais et de produits agrochimiques
Période de jachère trop courte	Surirrigation	Drainage insuffisant
Embroussaillement	Propagation des adventices et des espèces envahissantes	Foresterie commerciale
Expansion des établissements	Conversion en terres agricoles	Récolte de bois excessive
Nombre excessif de bétail	Surpâturage	Changement dans la composition de l'élevage
Activités industrielles	Surextraction de la nappe phréatique	Autres (merci de préciser)

26. Plantes légumineuses

~~Avez-vous des plantes légumineuses qui poussent sur votre terrain?~~ Intégrez-vous (cultivez-vous) chaque année une/des légumineuse(s) (ou mélange graminées-légumineuses) dans votre plan de rotation des cultures ?	Oui chaque année	~~Non~~ Oui mais pas chaque année	Jamais	Non applicable	Quelle espèce/ quel type?

~~Cultivez-vous chaque année un mélange graminées-légumineuses?~~	~~Oui~~	~~Non~~	~~Quelle espèce/type ?~~
~~Si oui, les avez-vous plantées?~~	~~Oui~~	~~No~~	~~Si oui, pour quelle raison?~~

Dans quelle mesure les légumineuses plantées favorisent-elles ~~affectent-elles~~ le rendement de votre exploitation?	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement
Quelle est l'importance des plantes légumineuses pour votre système agricole?	Pas du tout	Un peu	Moyennement	Beaucoup	Très

27. Zones écologiques tampons (zones non-aménagées limitrophes aux terres cultivées)

Votre terrain est-il bordé par des terres sauvages/zones protégées/non aménagées?	15% ou + ~~Entièrement~~	7% ou + mais moins de 15% ~~En grande partie~~	Moins de 7% ~~En partie~~	Pas du tout	Non applicable

Si oui, avez-vous observé de nombreux végétaux et insectes sur ces terres?	Oui	Non	Merci de donner des faits concrets sur la façon dont vous pouvez l'observer:

La présence de zones de végétation sauvage réduit-elle les pertes de récoltes dues aux déprédateurs?	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement
La présence de terrain en friche non-aménagé/sauvage est-elle importante pour votre système agricole?	Pas du tout	Un peu	Moyennement	Beaucoup	Très

28. Sources d'énergie (pertinent pour CH)

Quelles sources d'énergie sont utilisées dans votre système agricole (*cochez*)?

Type d'énergie	~~Cuisine~~	Chauffage	Éclairage	Machines
Solaire (y compris séchoirs solaires, cuiseurs solaires, pompes solaires, frigos solaires, refroidisseurs solaires, machines à glace solaires)				
Vent				
Eau				
Bois de chauffage				
Charbon				
Déchets ménagers				
Résidus agricoles				
Résidus de bois				
Fumier				
Essence				
Paraffine (pétrole)				
Diesel				
Gaz naturel (sous-terrain)				
Biogaz (à partir de composte ou fumier)				
Electricité (source publique)				
Autres (précisez)				

A quel point votre énergie dépend d'acteurs externes ?	Tout ou la plupart de l'énergie dépend d'acteurs externes (0-20% viennent de notre propre exploitation)	Environ la moitié de notre énergie dépend d'acteurs externes (21-50% viennent de notre propre exploitation)	Plus de la moitié de notre énergie vient de notre propre exploitation (51-80%)	Tout ou la plupart (81-100%) de l'énergie vient de notre propre exploitation	
Les sources d'énergie utilisées sont-elles suffisantes pour répondre aux besoins de votre système agricole?	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement
Quelle est l'importance d'avoir accès à l'énergie pour votre système agricole (en considérant ~~cuisine~~, chauffage, éclairage et machines)?	Pas du tout	Un peu	Moyennement	Beaucoup	Très

29. Conservation de l'énergie

Utilisez-vous des pratiques de conservation de l'énergie pour réduire les coûts de l'énergie sur l'exploitation ~~dans le ménage~~?	Oui	Non

Quelles méthodes utilisez-vous?

Ampoules à faible consommation d'énergie	Installation de Biogaz	~~Recyclage (par ex. du bois de chauffage pour faire du charbon)~~	~~Cuisinières à économie d'énergie (pour la cuisine)~~ Isolation efficace

Autres (*précisez*) _____

Est-ce que vous stockez le lisier dans un récipient ouvert ou fermé ?	Ouvert	Fermé	Non applicable
Est-ce que vous stockez le fumier dans un récipient ouvert ou fermé ?	Ouvert	Fermé	Non applicable
Si un des récipients est fermé, utilisez-vous une centrale à biogaz pour récupérer l'énergie pour votre exploitation ?	Oui	Non	
Si oui, est-ce que la centrale à biogaz est sur votre exploitation ?	Oui	Non	

Dans quelle mesure ces méthodes vous permettent-elles de faire des économies d'énergie?	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement
Quelle est l'importance d' économiser l'énergie pour votre système agricole?	Pas du tout	Un peu	Moyennement	Beaucoup	Très

30. Engrais

Avez-vous utilisé des engrais de synthèse inorganiques cette saison?	Oui	Non
Si vous utilisez de l'engrais de synthèse, vérifiez-vous (avant l'application) le sol et les plantes pour voir s'ils en ont besoin?	Oui	Non

Si vous n'en utilisez pas, pourquoi? (***cochez** les options*)

Je ne veux pas (*expliquez pourquoi*) _____	Trop cher
~~Trop loin/difficile d'accès~~	~~Manque de connaissances sur la façon de les utiliser~~
~~Pas disponible~~	Autres (*précisez*):_____

Votre accès aux engrais de synthèse ~~inorganiques~~ est-il suffisant pour les besoins de	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement

votre système agricole?					
Quelle est l'importance de l'accès aux engrais de synthèse ~~synthétiques~~ pour votre système agricole?	Pas du tout	Un peu	Moyennement	Beaucoup	Très

Avez-vous utilisé des engrais naturels organiques (fumier/composte) cette saison?	Oui	Non

Lesquels?	Réponse		Si non, pourquoi?	Si oui, les préparez-vous vous-même?
Composte~~/fumier végétal~~	Oui	Non		Oui/Non
Purin/Fumier animal	Oui	Non		Oui/Non
Autre (précisez)				

Si vous utilisez de l'engrais naturel organique, vérifiez-vous (avant l'application) le sol et les plantes pour voir s'ils en ont besoin?	Oui	Non
Combinez-vous l'engrais synthétique et naturel ?	Oui	Non
Si oui, vérifiez-vous (avant l'application) le sol et les plantes pour voir s'ils en ont besoin?	Oui	Non

Mettez-vous en place des cultures de couverture?	Oui	Non	Si oui, utilisez-vous les cultures de couverture pour autre chose (fourrage, bois, alimentation etc.)?
Si vous utilisez des cultures de couverture, lesquelles?			
~~Autres (*précisez*)~~			

En général, où vous approvisionnez-vous pour votre engrais?		
~~Système de production~~ Auprès de l'exploitation	Oui	Non
~~Magasin~~ Coopérative agricole	Oui	Non
~~Aide~~ Autre distributeur	Oui	Non
~~Amis/voisins/~~ Autre exploitation	Oui	Non
Agent de vulgarisation	Oui	Non
~~Directement auprès du vendeur (par ex. rendez-vous avec quelqu'un sur l'exploitation)~~	~~Oui~~	~~Non~~
Autres	Oui	Non

En général, votre accès aux engrais naturels est-il suffisant pour votre système agricole?	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement
Quelle est l'importance de l'accès aux sources d'engrais naturels pour votre système agricole?	Pas du tout	Un peu	Moyennement	Beaucoup	Très

31. Gestion et espèces d'adventices (pertinent pour CH)	
Approximativement, quel pourcentage de vos terres cultivées ~~votre champ~~ est couvert d'adventices?	

Dans votre champ, quelles pratiques de gestion des adventices utilisez-vous? *(cocher si utilisée)*	Cultures de couverture	Paillis	Désherbage manuel	Mécanique	Faux semis	Herbicides	~~Autres cultures~~ Rotation de cultures	Pâturage du bétail	Mesures préventives (par ex. travail avec machines/ roues propres pour éviter la diffusion de graines d'adventices)	Autres

Combien de types d'espèces envahissantes (*espèces locales ou étrangères ~~allogènes très courantes~~ qui affectent négativement une région de façon économique, environnementale et/ou écologique*), ~~telles que le *Striga*,~~ avez-vous observés sur votre exploitation ~~dans votre champs~~ ces 10 dernières années?	

Ces espèces d'adventices affectent-elles négativement votre système agricole?	Oui	Non	Si oui, comment (toxicité, réduit la croissance des plantes utiles, empêche la croissance des cultures, réduit la croissance des cultures, attire les ravageurs, autre)?	
Quelles espèces?				

Dans quelle mesure les méthodes que vous utilisez sont-elles efficaces pour réduire les effets négatifs des adventices sur votre système agricole?	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement
Dans quelle mesure les espèces d'adventices envahissantes sont-elles préjudiciables à votre système agricole?	Pas du tout	Un peu	Moyennement	Beaucoup	Très

Social			
~~Questions~~			
32. Appartenance ~~Rattachement~~ à un groupe			
Êtes-vous membre d'un groupe, d'une organisation ou d'une association?	Oui	Non	
*Si oui, **cochez** les groupes dont vous êtes membre:*			
~~Banque de semence~~	Groupe de paysans/pêcheurs	Club d'écoute	Coopératives/ organisation de producteurs
Organisations de commerçants/groupe d'entreprise	~~CE/EPT~~ Groupe de vulgarisation	Groupe pour l'eau ou les déchets	Comité sur la santé
Association professionnelle / Autre association locale/régionale	Groupe société civile	Groupe de femmes	Syndicat
Groupe sportif	Groupe de crédit/de finances	Groupe de jeunes	Groupe politique
Association culturelle	Groupe religieux	Comité scolaire/Groupe de parents	Autre: _____
Pour ces groupes dont vous êtes membres, décrivez:			

~~Nom de l'organisation~~	Type de groupe	Degré de participation (Leader, Très actif, Assez actif, Pas actif)	Fréquence des rencontres avec les divers groupes (une fois par semaine,une fois toutes les deux semaines,une fois par mois, deux fois par année ou moins, jamais)

Avec qui est-ce que vous échangez directement vos connaissances ?							
Ingénieur agronome	Représentant du gouvernement	Distributeur	Acheteur direct de mes produits	Autres agriculteurs/ éleveurs	Membre de la famille travaillant sur l'exploitation	Citoyen-consommateur	Autre

~~Certains de ces groupes ont-ils été initiés/démarrés par la communauté?~~	~~Oui~~			~~Non~~	
Pensez-vous que le(s) groupe(s) auxquel(s) vous appartenez, peut/peuvent influencer les politiques gouvernementales ?	Oui			Non	
Veuillez donner des précisions si nécessaire					
En règle générale, dans quelle mesure est-ce que ces groupes vous apportent-ils des avantages ?	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement
Au niveau de votre système agricole considérez-vous important d'être membre d'un groupe ?	Pas du tout	Un peu	Moyennement	Beaucoup	Très
Dans quelle mesure, faire partie de ces groupes vous a donné des connaissances pour améliorer votre système agricole ?	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement
Quelle est l'importance des informations reçues de ces	Pas du tout	Un peu	Moyennement	Beaucoup	Très

groupes pour votre système agricole ?					

33. Repas

Est-ce que chaque individu du ménage a accès à une alimentation diversifiée ? (~~c.-à-d. qui n'a pas accès à des repas variés, par ex. qui mange 5-7 fois par semaine des patates~~)	Oui	Non

~~Maintenant j'aimerais vous interroger sur les~~ **~~types d'aliments que vous ou d'autres personnes dans votre ménage avez mangé hier au cours de la journée et de la nuit.~~** *~~[Le facilitateur demande au répondant de se souvenir de tous les aliments qui ont été mangés la veille dans le ménage et d'en faire la liste. Après cela, il parcourt la liste avec le répondant et la remplit avec ces information.]~~*

~~Type d'aliment~~	~~Quelqu'un dans le ménage a-t-il mangé l'aliment en question dans la journée ou la nuit précédentes?~~		~~Pouvez-vous préciser la principale source alimentaire pour ce type d'aliment au cours des 7 derniers jours:~~ *~~(choisir parmi: production propre, chasse/pêche, cueillette, emprunt, achat, échange de travail contre de la nourriture, échange d'articles contre de la nourriture, cadeau (alimentaire) de membres de la famille, aide alimentaire (ONG, etc.), autres (préciser)~~*
~~Du [INSÉRER TOUT ALIMENT LOCAL], pain, nouilles de riz, biscuits, ou tout autre aliment fait à partir de millet, maïs, riz, blé, sorgho ou [INSÉRER TOUTE AUTRE CÉRÉALE DISPONIBLE LOCALEMENT]?~~	~~Oui~~	~~Non~~	
~~Pommes de terre, patates douces, igname, manioc, ou tout autre aliment fait à partir de racines ou de tubercules?~~	~~Oui~~	~~Non~~	
~~Des légumes~~	~~Oui~~	~~Non~~	
~~Des fruits?~~	~~Oui~~	~~Non~~	
~~Bœuf, porc, agneau, chèvre, lapin, gibier, poulet canard ou autres oiseaux, foie, rein, cœur ou autres organes?~~	~~Oui~~	~~Non~~	
~~Des œufs?~~	~~Oui~~	~~Non~~	
~~Du poisson frais ou séché ou des crustacés?~~	~~Oui~~	~~Non~~	

~~Des aliments faits à partir d'haricots, de pos, de lentilles ou de noix?~~	~~Oui~~	~~Non~~	
~~Du fromage, yaourt, lait ou autre produits laitiers?~~	~~Oui~~	~~Non~~	
~~Des aliments faits avec de l'huile, de la graisse (d'origine animale ou végétale) ou du beurre?~~	~~Oui~~	~~Non~~	
~~Du sucre ou du miel?~~	~~Oui~~	~~Non~~	
~~D'autres aliments comme des condiments, du café, du thé, such as condiments?~~	~~Oui~~	~~Non~~	

~~Pour le moment, quels sont vos stocks alimentaires? (*préciser la quantité en kg*)~~			
~~Céréales:~~		~~Tubercules:~~	
~~Merci d'ajouter toute autre information sur le régime alimentaire du ménage.~~			

L'alimentation que vous avez eue hier était-elle suffisante pour répondre aux besoins du ménage?	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement
Quelle est l'importance de la diversité de la nourriture consommée pour l'alimentation de votre ménage?	Pas du tout	Un peu	Moyennement	Beaucoup	Très

34.-Perturbations (pertinent pour CH)

Quelles perturbations avez-vous subies ces 10 dernières années (choisir les options applicables)?	Invasion de ~~criquets/~~déprédateurs	Incendie	Pluies au mauvais moment			
	Inondations	Sécheresses	Maladies (végétales, animales et humaines)	~~Vol de bétail~~ Neige	Grêle	Temp ête de vent
	Conflit (précisez)	~~Aucune~~	Autres (précisez)			

~~Avez-vous changé votre comportement en réponse à ces perturbations?~~	~~Oui~~	~~Non~~	~~Comment ?~~	
Avez-vous changé vos habitudes en réponse au changement climatique?	Oui	Non	Comment ?	

En cas de choc/perturbation, vous sentez-vous capable de faire face à une telle situation ? (c.-à-d. adopter une nouvelle stratégie de management, changer/adapter ses habitudes etc.)	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement
En cas de choc/perturbation, auriez-vous suffisamment de soutien affectif de votre entourage ou seriez-vous laissé à vous-même ?	Mon entourage me soutient suffisamment			Je suis laissé à moi-même	
Dans quelle mesure vos réponses ont permis de régler ces perturbations?	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement
Dans quelle mesure ces perturbations ont-elles affecté votre système agricole?	Pas du tout	Un peu	Moyennement	Beaucoup	Très

35. Accès à un vétérinaire

~~Avez-vous accès aux services vétérinaires?~~ Utilisez-vous les services vétérinaires ?	Oui et ils sont de bonne qualité	Oui mais ils sont problématiques (personnel non qualifié, cher, distant, etc.)	Non
~~Veuillez décrire les services auxquels vous avez accès?~~			

Votre accès aux services vétérinaires répond-il aux besoins de votre système agricole?	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement
Quelle est l'importance de l'accès à un vétérinaire pour votre système agricole?	Pas du tout	Un peu	Moyennement	Beaucoup	Très

36 ~~43~~. Confiance et coopération (question sensible)

De façon générale, diriez-vous que l'on peut faire confiance à la plupart des personnes de votre village/voisinage ou que l'on ne peut jamais être trop prudent en traitant avec les gens?	On peut faire confiance aux personnes	On ne peut pas être trop prudent
Dans votre village/voisinage ~~communauté~~, faites-vous généralement confiance aux autres pour prêter et emprunter?	Oui	Non
Veuillez expliquer pourquoi:		

Si un projet communautaire ne vous profite pas directement	Temps	Argent	Aucun	Autre (*précisez*)

mais profite à beaucoup d'autres dans le village/voisinage, consacrerez-vous du temps ou de l'argent au projet ? (***cochez*** les contributions que vous feriez)				

Est-ce que vous avez du soutien pour remplir les tâches ménagères (cuisine, lessive, nettoyage, garde des enfants) ?				
Cuisine	Besoin de soutien, mais je n'en reçois pas	Besoin de soutien : je reçois du soutien mais pas suffisamment	Besoin de soutien et reçois tout le soutien dont j'ai besoin	Je ne reçois pas de soutien mais je n'ai pas besoin de soutien
Lessive	Besoin de soutien, mais je n'en reçois pas	Besoin de soutien : je reçois du soutien mais pas suffisamment	Besoin de soutien et reçois tout le soutien dont j'ai besoin	Je ne reçois pas de soutien mais je n'ai pas besoin de soutien
Nettoyage de la maison	Besoin de soutien, mais je n'en reçois pas	Besoin de soutien : je reçois du soutien mais pas suffisamment	Besoin de soutien et reçois tout le soutien dont j'ai besoin	Je ne reçois pas de soutien mais je n'ai pas besoin de soutien
Garde des enfants	Besoin de soutien, mais je n'en reçois pas	Besoin de soutien : je reçois du soutien mais pas suffisamment	Besoin de soutien et reçois tout le soutien dont j'ai besoin	Je ne reçois pas de soutien mais je n'ai pas besoin de soutien
Autre (Veuillez préciser)	Besoin de soutien, mais je n'en reçois pas	Besoin de soutien : je reçois du soutien mais pas suffisamment	Besoin de soutien et reçois tout le soutien dont j'ai besoin	Je ne reçois pas de soutien mais je n'ai pas besoin de soutien

Dans quelle mesure la confiance et la coopération sont-elles suffisantes dans votre village/voisinage ~~votre communauté~~?	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement
Quelle est l'importance de la confiance et de la coopération dans votre village/voisinage pour votre système agricole?	Pas du tout	Un peu	Moyennement	Beaucoup	Très

37 ~~36~~. Actions collectives passées (pertinent pour CH)

Si ~~Quand~~ il y a eu des problèmes communs dans votre village ou dans le voisinage qui ont nécessité de l'attention au cours de l'année passée, à quelle fréquence vous êtes-vous joint aux autres exploitants pour les régler ? ~~*Par*~~ *Exemples de problèmes communs : nuisances dues à la détention de bétail proche d'habitations, travaux saisonniers durant le week-end, etc.* ~~*pour décider ensemble d'éviter de rejeter des déjections animales*~~	Jamais	Rarement	Quelques fois	Fréquemment	Pas applicable

~~*dans l'eau pour en assurer la qualité, signer des pétitions pour signaler des problèmes au gouvernement local, former une communauté pour épargner ensemble.*~~					
Merci de compléter si nécessaire					
Partagez-vous des machines avec d'autres agriculteurs ?	Oui		Non		
Echangez-vous des parcelles avec d'autres agriculteurs ?	Oui		Non		

Dans quelle mesure, ces actions collectives ont-elles contribué à la résolution du problème?	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement
Dans quelle mesure ces actions collectives sont-elles importantes pour votre système agricole ?	Pas du tout	Un peu	Moyennement	Beaucoup	Très

**~~46 44. Prise de décision dans le ménage (12.4) (question sensible) (~~not relevant for CH)

~~Qui dans votre famille a généralement le dernier mot sur les décisions suivantes:~~

~~Qui prend généralement les décisions sur les soins de santé pour vous-même?~~	~~Vous~~	~~Votre partenaire~~	~~Votre partenaire et vous conjointement~~	~~Quelqu'un d'autre~~
~~Qui prend généralement les décisions en matière d'achats importants pour le ménage?~~	~~Vous~~	~~Votre partenaire~~	~~Vous et votre partenaire conjointement~~	~~Quelqu'un d'autre~~
~~Qui prend généralement an matières d'achats pour les besoins quotidiens du ménage?~~	~~Vous~~	~~Votre partenaire~~	~~Vous et votre partenaire conjointement~~	~~Quelqu'un d'autre~~
~~Qui prend généralement la décision de rendre visite à votre famille ou vos proches?~~	~~Vous~~	~~Votre partenaire~~	~~Vous et votre partenaire conjointement~~	~~Quelqu'un d'autre~~

~~Concernant les décisions financières au sein du ménage, qui dans votre famille a généralement le dernier mot pour les décisions suivantes:~~

~~Qui décide généralement de la façon dont les gains de votre partenaire seront utilisés?~~	~~Vous~~	~~Votre partenaire~~	~~Votre partenaire et vous conjointement~~	~~Quelqu'un d'autre~~	~~Non applicable~~
~~Qui décide généralement de la façon dont l'argent que vous gagnez sera utilisée?~~	~~Vous~~	~~Votre partenaire~~	~~Vous et votre partenaire conjointement~~	~~Quelqu'un d'autre~~	~~Non applicable~~
~~Dans quelle mesure êtes-vous satisfait du processus décisionnel dans le ménage?~~	~~Pas du tout~~	~~Un peu~~	~~Moyennement~~	~~Beaucoup~~	~~Complètement~~
~~Quelle est l'importance de la prise de décision pour votre système agricole?~~	~~Pas du tout~~	~~Un peu~~	~~Moyennement~~	~~Beaucoup~~	~~Très~~

Economie ~~Volet économique~~			
51~~. Accès aux~~ Utilisation de circuits de distribution sans intermédiaire *circuits de distribution sans intermédiaire = stand au marché local du village/ville, magasin sur l'exploitation, livraison directe chez le consommateur*			
~~**Avez-vous accès aux marchés des producteurs locaux?**~~ ~~Vendez-vous vos produits aux sur les marchés locaux?~~			
~~**Pas d'accès**~~	~~**1-2 fois par mois Accès intermittent**~~	~~**Accès durable 1-3 fois par semaine**~~	~~**Tout le temps (4+ fois par semaine)**~~
~~**Merci d'élaborer de compléter si besoin**~~			

	Produits vendus qui vous rapportent le plus :					
	Culture/Animal 1*	**Culture/Animal 2*** ……	**Culture/Animal 3*** ……	**Culture/Animal 4** ……	**Culture/Animal 5** ……	**Culture/Animal 6** ……
Vendez/négociez-vous ces produits directement auprès des consommateurs?	Oui/Non	Oui/Non	Oui/Non	Oui/Non	Oui/Non	Oui/Non
Si oui, à quelle fréquence ? (chaque semaine, chaque mois, une fois par saison, une fois par an, jamais)						

Vendez-vous vos produits ~~aux~~ sur les marchés locaux? (Non ; 1-2 fois par mois ; 1-3 fois par semaine ; Tout le temps (4+ fois par semaine))							
Quel pourcentage de vos produits sont vendus par la vente directe ?							
Dans quelle mesure l'utilisation de circuits de distribution sans intermédiaire répond-il aux besoins de votre système agricole ?	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement		

Quelle est l'importance de l'utilisation de circuits de distribution sans intermédiaire pour votre système agricole ?	Pas du tout	Un peu	Moyennement	Beaucoup	Très

43 ~~46.~~ Sources de financement ~~externes Support Financier~~			
~~Avez-vous reçu un appui financier ces 5 dernières années?~~	~~Oui~~	~~Non~~	
~~Combien de fois avez-vous reçu un appui financier pour vos activités agricoles ces 5 dernières années ?~~			
~~Le cas échéant, quelle était la source de l'appui financier?~~	~~Expliquer (en particulier les problèmes)~~		
~~Famille~~	~~Oui~~	~~Non~~	
~~Amis/Voisins~~	~~Oui~~	~~Non~~	
~~Banque~~	~~Oui~~	~~Non~~	
~~Coopérative~~	~~Oui~~	~~Non~~	
~~Microfinance~~	~~Oui~~	~~Non~~	
~~Entreprise spécialisée dans le prêt~~	~~Oui~~	~~Non~~	
~~Programme gouvernemental~~	~~Oui~~	~~Non~~	
~~Programme d'ONG~~	~~Oui~~	~~Non~~	
~~Émigrées (rentrées d'argent provenant de connaissances à~~	~~Oui~~	~~Non~~	
~~Autres: _____~~	~~Oui~~	~~Non~~	

~~Quel pourcentage de vos capitaux étrangers est à court terme? (Capitaux empruntés sur une durée de moins de douze mois. Par ex.; Compte courant, dettes fournisseurs, passif transitoire, provisions à court terme, et autres capitaux étrangers à court terme.)~~ Quel pourcentage représente vos fonds propres par rapport au total des actifs?			Moins de 45% de fonds propres	45-55% de fonds propres	Plus de 55% de fonds propres
~~Était-ce~~ Est-ce que la part de vos fonds propres par rapport au total de vos actifs ~~ces sources de financement externes~~ est suffisante pour votre exploitation?	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement
Quelle est l'importance de vos fonds propres ~~ces sources de financement externes~~ pour votre exploitation ~~vos activités agricoles~~?	Pas du tout	Un peu	Moyennement	Beaucoup	Très

49 ~~51.~~ Accès au marché - Achat					
Achetez-vous la plupart de vos produits directement auprès des producteurs (par ex. producteurs d'intrants, autres agriculteurs)?	Oui	Non	Si oui, pour quels produits?		
Est-ce qu'un de vos intrants pour la production végétale n'est disponible qu'auprès d'un seul vendeur/fourniss eur ? ~~Avez-vous des produits végétaux auxquels vous pouvez avoir accès auprès d'un seul vendeur disponible?~~	Oui	Non	Non applicabl e	Si oui, pour quelles cultures?	

Est-ce qu'un de vos intrants pour la production animale n'est disponible qu'auprès d'un seul vendeur/fourniss eur ? ~~Y a-t-il des produits animaux auxquels vous pouvez avoir accès auprès d'un seul vendeur disponible?~~	Oui	Non	Non applicable	Si oui, quels produits?	
Si vous avez un accord ou bien des documents contraignants (par ex. contrat) avec un vendeur/fournisseur, êtes-vous satisfait des conditions ou est-ce que ça limite votre flexibilité ?	Je suis satisfait	Un mixte des deux	Ça limite la flexibilité de mon exploitatio n	Non applicable	~~*Si oui, décrire le type d'accord, par ex. à quel moment le contrat est établi, comment vous payez, etc.*~~

Le nombre et la qualité des vendeurs suffisent-ils à satisfaire les besoins de votre système agricole ?	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement
Quelle est l'importance pour votre subsistance d'avoir plusieurs vendeurs disponibles?	Pas du tou	Un peu	Moyennement	Beaucoup	Très

50 ~~52~~. Accès au marché – Vente (question sensible) (pertinent pour CH)

~~L'année dernière, avez-vous vendu une partie de votre production/ animaux/semences ?~~	~~Oui~~	~~Non~~	~~*Si oui, lesquels? (par exemple poules, sorgho, mil)*~~	

~~Quel pourcentage de vos produits sont vendus par la vente directe ?~~						
	Produits vendus qui vous rapportent le plus :					
	Culture/Animal 1* ……	**Culture/ Animal 2*** ……	**Culture/Animal 3*** ……	**Culture/Animal 4** ……	**Culture/Animal 5** ……	**Culture/Animal 6*** ……
~~Vendez/négociez-vous ces produits directement auprès des consommateurs? (Oui ;Non)~~	~~Oui~~ Oui/Non	~~Non~~ Oui/Non	~~*Si oui, pour quels produits?*~~ Oui/Non	~~Oui/Non~~	~~Oui/Non~~	~~Oui/Non~~
~~Si oui, à quelle fréquence ? (toutes les semaines, tous les mois, une fois par saison, une fois par an, jamais)~~						
Avez-vous des produits pour lesquels vous n'avez qu'un acheteur disponible?	~~Oui~~ Oui/Non	~~Non~~ Oui/Non	~~*Si oui, quels produits?*~~ Oui/Non	Oui/Non	Oui/Non	Oui/Non
Si vous avez un accord ou bien des documents contraignants (par ex. contrat) avec un acheteur, êtes-vous satisfait des conditions ou est-ce que ça limite votre flexibilité ?	Je suis satisfait/ Un mixte des deux/ Ça limite la flexibilité de mon exploitation /Non applicable	Je suis satisfait/ Un mixte des deux/ Ça limite la flexibilité de mon exploitation/Non applicable	Je suis satisfait/ Un mixte des deux/ Ça limite la flexibilité de mon exploitation /Non applicable	Je suis satisfait/ Un mixte des deux/ Ça limite la flexibilité de mon exploitation/ Non applicable	Je suis satisfait/ Un mixte des deux/ Ça limite la flexibilité de mon exploitation /Non applicable	Je suis satisfait/ Un mixte des deux/ Ça limite la flexibilité de mon exploitation/Non applicable

A quel point êtes-vous impliqué dans la chaîne de valorisation/transformation de vos produits ? (par ex. pour les producteurs de lait-> membre d'une fromagerie) (Souvent/ De temps en temps/Très rarement/Jamais)						
Pour chacun des produits du tableau, vous sentez-vous menacé par les bas prix des produits concurrents importés ? (Par ex. des tomates importées d'Espagne sont des produits concurrents pour les tomates suisses) (Oui/Non)						

Le nombre d'acheteurs auxquels vous avez accès est-il suffisant pour répondre aux besoins de votre système agricole?	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement
Quelle est l'importance pour votre subsistance d'avoir plusieurs acheteurs disponibles?	Pas du tout	Un peu	Moyennement	Beaucoup	Très

53. Prix de marché (pertient pour CH)

Décrivez les produits vendus qui vous rapportent le plus d'argent ~~les plus importants que vous vendez:~~	Décrivez le prix de ce produit (au cours des 3 dernières années)						
	~~Élevé~~ Stable	~~Fluctuant~~ Croissant	Décroissant	Imprévisible	Suffisamment élevé	Trop bas	Autres (précisez)
Culture/Animal 1_____							
Culture/Animal 2_____							
Culture/Animal 3_____							
Culture/Animal 4_____							
Culture/Animal 5_____							

Culture/Animal 6_____							
Autres produits agricoles que vous vendez (élaborer)? _____							

Les prix (concernant la vente) sont-ils suffisamment élevés et constants pour vos moyens de subsistance?	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement

Dans quelle mesure les fluctuations des prix influencent-elles votre subsistance ?	Pas du tout	Un peu	Moyennement	Beaucoup	Très

48 ~~50.~~ ~~Accès aux~~ Informations sur le marché

À quelle fréquence utilisez-vous les ~~avez-vous eu accès aux~~ informations sur les prix du marché ~~au cours de la dernière saison dernière~~?	Souvent	Quelques fois	Jamais/très rarement
~~Si les informations obtenues n'étaient pas satisfaisantes, pour quelle raison?~~			

Dans quelle mesure votre utilisation des ~~accès aux~~ informations sur le marché répond-elle aux besoins de votre système agricole ?	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement
Quelle est l'importance de l'utilisation des ~~l'accès aux~~ informations sur le marché pour votre système agricole?	Pas du tout	Un peu	Moyennement	Beaucoup	Très

47 ~~49.~~ Technologies de l'information et de la communication (TIC) (question sensible)

Est-ce que vous utilisez ~~avez accès à:~~	~~Est-ce que vous possédez:~~	~~Quelle(s) utilisation(s) en faites-vous ?~~
Téléphone mobile?	Oui	Non
Internet ?	Oui	Non

Ordinateur chez soi ?	Oui			Non	
Tablette informatique (par ex. Ipad) ?	Oui			Non	
Télévision ?	Oui			Non	
Radio ?	Oui			Non	
Guidage ou assistance par GPS?	Oui			Non	
Drone ?	Oui			Non	
Cahier de champ électronique ?	Oui			Non	
Autre (*Veuillez préciser*)	Oui			Non	
Dans quelle mesure votre accès aux TIC répond-il aux besoins de votre système agricole?	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement
Quelle est l'importance des TIC pour votre système agricole?	Pas du tout	Un peu	Moyennement	Beaucoup	Très

39 ~~41~~. Assurance (pertinent pour CH)

~~Est-ce que vos cultures ou animaux principaux sont assurés contre la perte?~~	~~Oui~~	~~Non~~

Qu'avez-vous assuré :

Cultures/bétail/revenu/ principaux bâtiments de l'exploitation(précisez la culture et/ou l'animal/ou le revenu ou les bâtiments)	~~Qu'est-ce qui est assuré?~~ Contre une perte due au climat :	Contre une perte due aux déprédateurs/ maladie végétale ou animale :	Contre le feu/incendie :	Contre d'autres pertes (*Veuillez préciser*) :	Avez-vous déjà fait une déclaration à votre assurance au cours des 5 dernières années ? (cochez si applicable)
1……	Oui/Non/Non applicable	Oui/Non/Non applicable	Oui/Non/Non applicable	Oui/Non/Non applicable	Oui/Non/Non applicable
2……	Oui/Non/Non applicable	Oui/Non/Non applicable	Oui/Non/Non applicable	Oui/Non/Non applicable	Oui/Non/Non applicable
3……	Oui/Non/Non applicable	Oui/Non/Non applicable	Oui/Non/Non applicable	Oui/Non/Non applicable	Oui/Non/Non applicable
4……	Oui/Non/Non applicable	Oui/Non/Non applicable	Oui/Non/Non applicable	Oui/Non/Non applicable	Oui/Non/Non applicable
5……	Oui/Non/Non applicable	Oui/Non/Non applicable	Oui/Non/Non applicable	Oui/Non/Non applicable	Oui/Non/Non applicable

6……	Oui/Non/Non applicable	Oui/Non/Non applicable	Oui/Non/Non applicable	Oui/Non/Non applicable	Oui/Non/Non applicable
7……	Oui/Non/Non applicable	Oui/Non/Non applicable	Oui/Non/Non applicable	Oui/Non/Non applicable	Oui/Non/Non applicable
8……	Oui/Non/Non applicable	Oui/Non/Non applicable	Oui/Non/Non applicable	Oui/Non/Non applicable	Oui/Non/Non applicable
9……	Oui/Non/Non applicable	Oui/Non/Non applicable	Oui/Non/Non applicable	Oui/Non/Non applicable	Oui/Non/Non applicable
10……	Oui/Non/Non applicable	Oui/Non/Non applicable	Oui/Non/Non applicable	Oui/Non/Non applicable	Oui/Non/Non applicable
~~Qui est-ce qui fournit~~					
Est-ce que votre assurance vous satisfait ?	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement
Quelle est l'importance d'avoir une assurance pour votre système agricole ?	Pas du tout	Un peu	Moyennement	Beaucoup	Très

38 ~~40~~. Principaux avoirs productifs

Classez par ordre d'importance les principaux avoirs productifs que vous possédez: (*en ajoutant un chiffre de 1 à 6 dans la liste à côté des avoirs possédés)*

	Terre	Bétail	Semences	Bâtiments	Équipement (tracteur, charrue).	Autres (*précisez*) _____
Si nécessaire, veuillez compléter sur l'importance de certains avoirs productifs :						
Est-ce que cette combinaison de capitaux est adéquate pour ~~supporter~~ soutenir votre système agricole ?	Pas du tout		Un peu	Moyennement	Beaucoup	Complètement

Dans quelle mesure la diversité de vos capitaux productifs est-elle importante pour votre système agricole?	Pas du tout	Un peu	Moyennement	Beaucoup	Très

45 ~~47~~. Dépenses principales (question sensible) (pertinent pour CH)

Quelles ont été vos plus grosses dépenses l'année dernière?

Classement de 1 à 5 (*1= la dépense la plus importante et 5= celle moins importante*)	Elément de dépense : matériel agricole, nouveau bâtiment, intérêts d'emprunts bancaires, énergie pour chauffage/éclairage/machines, pesticides, engrais, assurances,bail/loyer,main-d'œuvre, autre, éducation)	~~Description (par ex. frais de scolarisation)~~
1		
2		
3		
4		
5		

Etes-vous dûment rémunéré pour vos efforts écologiques ?	Oui	Non	Non applicable
Est-ce que vos dettes actuelles menacent votre exploitation de faire faillite prochainement ?	Oui	Non	Non applicable

Dans quelle mesure vos dépenses sont-elles gérables pour l'exploitation ?	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement
Dans quelle mesure le maintien d'un niveau de dépenses gérable est-il important pour votre exploitation ?	Pas du tout	Un peu	Moyennement	Beaucoup	Très

40 ~~42.~~ Revenu au sein du ménage ~~Sources de revenus~~ (question sensible)						
Combien de sources différentes de revenus y a-t-il au sein de votre ménage (production animale, production végétale, agritourisme, artisanat, revenu externe à l'exploitation, etc. ; excluant les paiements directs)?	1	*2*	*3*	*4*	*5*	*6+*
Quelles sont les trois principales sources de revenus de votre ménage*?* *[Parmi les options figurent:* production animale, production végétale, agritourisme, artisanat, revenu externe à l'exploitation, autre (excepté les paiements directs) ~~*production agricole, travail/salaire journalier, bétail, petit négociant/commerce, envois de fonds, employé, artisanat, fabrication – mécanicien, charpentier*~~*, etc.; autres (veuillez préciser)]*			1re source	2e source	3e source	
Comment est-ce que le revenu agricole de l'exploitation a évolué au cours des 5 dernières années ?	Déficit croissant	Déficit stable	Pas de déficit et pas de profit	Profit stable	Profit croissant	
Quel pourcentage représente le soutien financier gouvernemental (paiements directs) par rapport au chiffre d'affaire agricole total de l'exploitation en question ?						
Pensez-vous que votre exploitation pourrait subsister sans le soutien financier gouvernemental ?			Oui		Non	
Dans quelle mesure la combinaison de ces sources de revenus répond-elle aux besoins de votre système agricole?	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement	
Quelle est l'importance d'avoir une diversification de vos sources de	Pas du tout	Un peu	Moyennement	Beaucoup	Très	

revenus (sans nécessairement impliquer une augmentation de ces revenus) pour votre système agricole ?					

41 ~~43~~. Activités génératrices de revenus externes à l'exploitation agricole ~~non-agricoles~~ (AGR)

Revenu externe à l'exploitation agricole = revenu externe à votre propre exploitation

Est-ce qu'une personne de votre ménage (autre que vous-même) a une activité génératrice de revenus externe à l'exploitation agricole (par ex. employé dans une entreprise, employé chez un autre exploitant/agriculteur, etc.)?	Oui, toute l'année	Oui, saisonnièrement	Oui, occasionnellement	Non

Pensez-vous que votre exploitation pourrait subsister sans ces activités génératrices de revenus externes à l'exploitation agricole ?	Oui	Non

Classez ces AGR externes à l'exploitation agricole ~~non agricoles~~ sur la base de leur participation au revenu total de votre ménage	Classement de 1 à 5 (*1= activité la plus importante, 5 = la moins importante*)	Précisez l'activité génératrice de revenus:
	1	
	2	
	3	
	4	
	5	

Est-ce que vos AGR externes à l'exploitation agricole ~~non-agricoles~~ sont suffisantes pour votre système agricole ?	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement
Quelle est l'importance de vos AGR externes à l'exploitation agricole ~~non-agricoles~~ pour votre subsistance ?	Pas du tout	Un peu	Moyennement	Beaucoup	Très

46 ~~48.~~ Intrants agricoles locaux

~~Pouvez-vous vous rendre à pied au lieu d'approvisionnement en intrants agricoles ?~~ Etes-vous à moins de 50 km du lieu d'approvisionnement de la plupart de vos intrants ?				
Semences agricoles/jeunes plants	Oui, ~~facilement~~	~~Oui, avec difficulté~~	Non	Pas applicable
Mâle améliorateur/béta il	Oui, ~~facilement~~	~~Oui, avec difficulté~~	Non	Pas applicable
Engrais	Oui, ~~facilement~~	~~Oui, avec difficulté~~	Non	Pas applicable
Equipement	Oui, ~~facilement~~	~~Oui, avec difficulté~~	Non	Pas applicable
Pesticides	Oui, ~~facilement~~	~~Oui, avec difficulté~~	Non	Pas applicable
~~Produits vétérinaires~~	~~Oui, facilement~~	~~Oui, avec difficulté~~	~~Non~~	~~Non applicable~~
Connaissances/ services de vulgarisation	Oui, ~~facilement~~	~~Oui, avec difficulté~~	Non	Pas applicable
Main d'œuvre	Oui, ~~facilement~~	~~Oui, avec difficulté~~	Non	Pas applicable
Capital (par ex. banque)	Oui, ~~facilement~~	~~Oui, avec difficulté~~	Non	Pas applicable
Autre (*précisez*): _____	Oui, ~~facilement~~	~~Oui, avec difficulté~~	Non	Pas applicable
Quel pourcentage (approximativement) de vos intrants provient de votre propre exploitation ?				

Dans quelle mesure l'accès aux intrants agricoles locaux répond-il aux besoins de votre système agricole?	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement
Quelle est l'importance de l'accès aux intrants agricoles locaux pour votre système agricole?	Pas du tout	Un peu	Moyennement	Beaucoup	Très

42-44. Épargne (question sensible)

Avez-vous des économies ?	Oui	Non
Avez-vous déjà ~~jamais~~ eu des économies?	Oui	Non
Avez-vous plus d'économies qu'il y a 5 ans ?	Oui	Non

Comment économisez-vous de l'argent? (*Cochez la/les réponse(s)*

Argent à la maison	Banque	Structure/groupe d'épargne	Autre (*précisez*) _____

Achat de biens d'investissement (terrain, immobilier, etc.)	Investissements/placements financiers	Achat de bétail			
Est-ce que votre façon d'épargner répond aux besoins de votre système agricole ?	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement
Quelle est l'importance d'avoir accès à des structures d'épargne pour votre système agricole?	Pas du tout	Un peu	Moyennement	Beaucoup	Très
44 ~~45.~~ Investissement pour adapter/transformer l'exploitation					
Si vous avez besoin/envie d'adapter votre exploitation, est-ce que vos ressources financières vous permettent une certaine marge de manœuvre (par ex. investissement dans des travaux d'infrastructure, engager un employé supplémentaire)?	Oui, j'ai une grande « marge de manœuvre »	J'ai un peu de « marge de manœuvre » (c.-à-d. ce que je peux faire/entreprendre est limité)	Non, je n'ai pas de « marge de manœuvre » (par ex. dû à de grosses dettes)		
Sans faire d'emprunts d'argent, est-ce que vous avez actuellement la capacité financière de maintenir un bon état de fonctionnement de votre parc machine/ installations fixes?	Oui		Non		

Est-ce que vos ressources financières sont suffisantes pour adapter votre exploitation en cas de nécessité soudaine?	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement
Quelle est l'importance pour votre exploitation d'avoir suffisamment de ressources financières pour adapter votre exploitation en cas de nécessité soudaine?	Pas du tout	Un peu	Moyennement	Beaucoup	Très

52. Interaction entre acteurs de la chaîne agroalimentaire

Répondez pour chaque culture/animal séparément	Culture /animal1	Culture/animal 2	Culture/animal 3	Culture/animal 4	Culture/animal 5	Culture/animal 6
Comment commercialisez-vous vos produits les plus rentables ? (Agro-industrie ; Coopérative agricole (par ex. Fenaco) ; Vente au(x) détaillant(s) sans passer par un/des intermédiaire(s) ; Société coopérative locale (par ex. fromagerie locale) ; Vente directe)						
Si vous faites de l'agriculture contractuelle, avez-vous (ou votre organisation professionnelle ou vos représentants) un mot à dire lors des négociations du contenu du contrat ? (Oui ; Non ; Non applicable)						

Vous considérez-vous comme un acteur de la chaîne agroalimentaire ou comme entité productive individuelle ? (Entité productive individuelle ; Acteur de la chaîne agroalimentaire)						
Qui détermine principalement ce que vous produisez ? (Vous ; Vous et d'autres agriculteurs ; Acteurs qui ne sont pas agriculteurs)						
Participez-vous dans la détermination du cahier des charges local ? (Pas du tout ; Un peu ; Beaucoup)						
Participez-vous dans la détermination du cahier des charges régional (par ex. cantonal) ? (Pas du tout ; Un peu ; Beaucoup)						
Participez-vous dans la détermination du cahier des charges fédéral ? (Pas du tout ; Un peu ; Beaucoup)						

Selon vous, est-ce que les citoyens-consommateurs sont suffisamment informés des challenges des agriculteurs ?	Oui	Pas suffisamment	Non

Dans quelle mesure vos interactions avec les autres acteurs de la chaîne agroalimentaire répond-il aux besoins de votre système agricole?	Pas du tout	Un peu	Moyennement	Beaucoup	Complètement

Quelle est l'importance des interactions avec les autres acteurs de la chaîne agroalimentaire pour votre système agricole?	Pas du tout	Un peu	Moyennement	Beaucoup	Très