Master thesis

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Monitoring resilience to climate change in northern Laos:

Methodological developments and contribution to a project baseline.

Internship period in Laos 22 January to 15 July 2015

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Cover page picture: Rural landscape in Houaphan province, Laos
Picture sources: Leonor Bonnin, Jean-Christophe Castella

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Abstract

This study was commissioned by the *Eco-Friendly Intensification and Climate resilient Agricultural Systems (EFICAS) Project* funded by the French Agency for Development and the European Commission supported Global Climate Change Alliance in northern Lao PDR. The project led by CIRAD and DALaM aims at improving livelihoods of rural populations by proposing innovative land use systems and agricultural practices. A resilience monitoring method was designed in order to assess the impacts of the project. It is based on an initial assessment villages' situation before the beginning of the project (baseline), then again after a few years of development intervention, and observe the changes in terms of resilience to climate change and economic fluctuations. The study sites include intervention villages and control villages in order to avoid attributing to the project changes due to other driving forces. We engaged local stakeholders in selecting indicators that best reflect the village context. We designed a method for data collection and analysis that is practical and well adapted to the capacity of the local enumerators and research staff. It was tested and validated in the field with the end-users. In this document, we describe the collective learning process that led to the resilience monitoring method. Preliminary results are provided based on household and village surveys used to develop the method. Further adaptations will be required once the complete dataset will become available.

Résumé

L'étude présentée dans ce document a été commandée par le projet EFICAS (*Eco-Friendly Intensification and Climate resilient Agricultural Systems*) financé par l'Agence Française de Développement et l'Union Européenne (GCCA) au nord du Laos. Ce projet mené par le CIRAD en partenariat avec le DALaM vise à accompagner le développement des zones de montagne, en proposant des innovations en matière de pratiques agricoles et de gestion des territoires. Nous avons élaboré une méthode d'évaluation de la résilience, afin de mesurer les impacts du projet. Une première phase de diagnostic local est proposée avant le démarrage des activités de développement (baseline), puis de nouveau quelques années après, afin d'observer les évolutions. Le dispositif d'étude comprend des villages d'intervention et des villages de contrôle, afin d'éviter d'attribuer au projet des changements qui seraient dus à d'autres facteurs que les actions du projet. Nous avons engagé les acteurs locaux dans la définition d'indicateurs capables de révéler la situation initiale d'un village. Nous avons élaboré une méthode qui permet aux enquêteurs locaux de collecter l'ensemble des données nécessaires au calcul de ces indicateurs. La méthode a été testée et validée sur le terrain avec les personnes qui seront amenées à la mettre en pratique. Nous présentons dans ce document l'ensemble du processus de conception de cette méthode de suivi-évaluation. Des résultats préliminaires sont présentés sur la base des enquêtes réalisées pour élaborer la méthode. De futures adaptations seront nécessaires lorsque le jeu complet de données sera disponible afin d'ajuster et améliorer cet outil encore à l'état d'ébauche.

Acronyms

AFD	Agence Française de Développement
CIRAD	Centre for International Cooperation in Agricultural Research for Development
DAFO	District Agriculture and Forestry Office under MAF
DALaM	Department of Agricultural Land Management under MAF
EU	European Union
GCCA	Global Climate Change Alliance funded by EU
GIZ	German International Cooperation Institute (*Gesellschaft für Internationale Zusammenarbeit*)
HH	Household
Lut	Land use type
MAF	Ministry of Agriculture and Forestry
M&E	Monitoring and evaluation
SAI	Sustainable Agricultural Intensification
ToC	Theory of change
VOC	Village Organization Committee
yo	years old

Acknowledgements

The study reported here was conducted from January to July 2015, in the framework of an internship hosted by the Eco-Friendly Intensification and Climate resilient Agricultural Systems (EFICAS) Project. The EFICAS project is implemented by CIRAD (French Agricultural Research Centre for International Development) and DALAM (Department of Agricultural Land Management under the Ministry of Agriculture and Forestry of Lao PDR) under the NUDP (Northern Upland Development Program), and is funded by the European Union initiative 'Global Climate Change Alliance' (EU-GCCA) and the French Agency for Development (AFD).

I would like to express my gratitude to everyone who contributed to make this internship possible and so pleasant.

I am very thankful to Jean-Christophe Castella, my supervisor during this training period and close collaborator all along the study. I thank him for his trust and support from the beginning; for providing advices, guidance and expertise all along the training period; and finally, for the successive revisions of this report.

The study was conducted in close collaboration with Marion Rivera, a MSc. student from AgroCampusOuest. I enjoyed sharing our mutual experiences, analysis and observations, and the lessons we drew from it. I thank her for her constant cheerfulness and for the field work we have done together.

All along the six-month period the study involved regular trips to various villages in two Northern provinces of Laos. Thisadee Chounlamountry and Khammeun Simaly accompanied us all the way to help with the Lao language and cultural barriers. But their contribution to the study went far beyond the participation as interpreters and translators. The whole field work (leading individual surveys and focus group discussions, performing field measurements, staying for weeks in the villages and sharing the everyday life with villagers) would not have been possible without their precious help and wise advices.

I also would like to thank all villagers from the communities we surveyed, for the support they provided to our activities, for their patience during long interviews and for their generous hospitality. The district staff from each district also provided precious contribution to these activities.

I thank Pascal Lienhard for his thoughtful advices and active contribution to the reflections all long the process, as well as other CIRAD researchers involved in the EFICAS project: Frank Enjalric and Guillaume Lestrelin. Sisavath Phimmasone, Soulikone Chaivanna, Chanthasone Khamxaykhay and other staff from DALaM also contributed to the study development by providing advices and sharing their own experience from the field.

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Content

Introduction: resilience analysis in the northern uplands of Laos

Why monitoring resilience?

The concept of resilience has gained momentum in the recent years in the research and development spheres. An increasing number of development projects have as their primary goal the increase of populations' resilience to climate change. International cooperation agencies, NGOs, and governments implement these projects. Considering the amount of resources invested in these projects, it is necessary to develop methods that can evaluate whether or not these projects do succeed in improving populations' resilience. Therefore methods are needed to measure, assess and monitor resilience. This requires to *'operationalize'* the abstract notion of resilience for actual monitoring on the ground.

Many scientific publications have explored the concept of resilience and its application to both ecological and socioeconomic systems, exploring the sources of resilience and potential leverage points to influence it (Lallau and Mbetid, 2010; Taddele, 2014; Gallopin, 2006; Ifejika Speranza, 2014; Tittonel, 2014). But few publications, so far, have explored the connections between theoretical research and practical development. Some publications have introduced indicators of resilience at the scale of a country (Guillaumont, 2007; Turvey, 2007), but these indicators cannot be used at village level. Moreover, these indicators do not cover all the dimensions of sustainability, focusing mainly on economic growth descriptors (Angeon and Bates, 2015).

The literature on adaptation to climate change also stresses the need to adjust interpretations of the concept of resilience and monitoring methods to the local contexts (Gallopin, 2006). With more than 70% of the Lao population living in rural areas and depending on natural resources for their livelihoods, farmers have long been in a situation of adaptation to natural hazards (e.g. climatic events, crop damages by wild animals), political turmoil and wars, economic turndowns, etc. But in a context of the agrarian transition (from subsistence farming to market oriented production), development aspirations have changed and adaptive capacities have been profoundly affected. Rural populations are now facing important challenges, such as increased economic and climatic instability. To maintain or improve their livelihoods in the face of increasing frequency of shocks and stresses these populations have to become more resilient: more capable of recovering from perturbations.

The EFICAS Project

In this context, the EFICAS Project – *Landscape management and Conservation Agriculture development for Eco-Friendly Intensification and Climate Resilient Agricultural Systems in Lao PDR* - aims at increasing the resilience of rural populations to the stresses, shocks and other perturbations they face. Using the theory of change approach, the project intends to enhance villages' resilience by proposing innovative agricultural practices based on conservation agriculture and by engaging village communities in sustainable landscape management. A landscape approach to agroecology is relevant to the local contexts of northern Lao PDR for ecological, socio-economic and agronomic reasons:

- Even though interactions between elements of ecological systems occur simultaneously at all levels – from micro-scale to global-scale –, changes in the agroecosystems can be influenced through interventions at the landscape level,

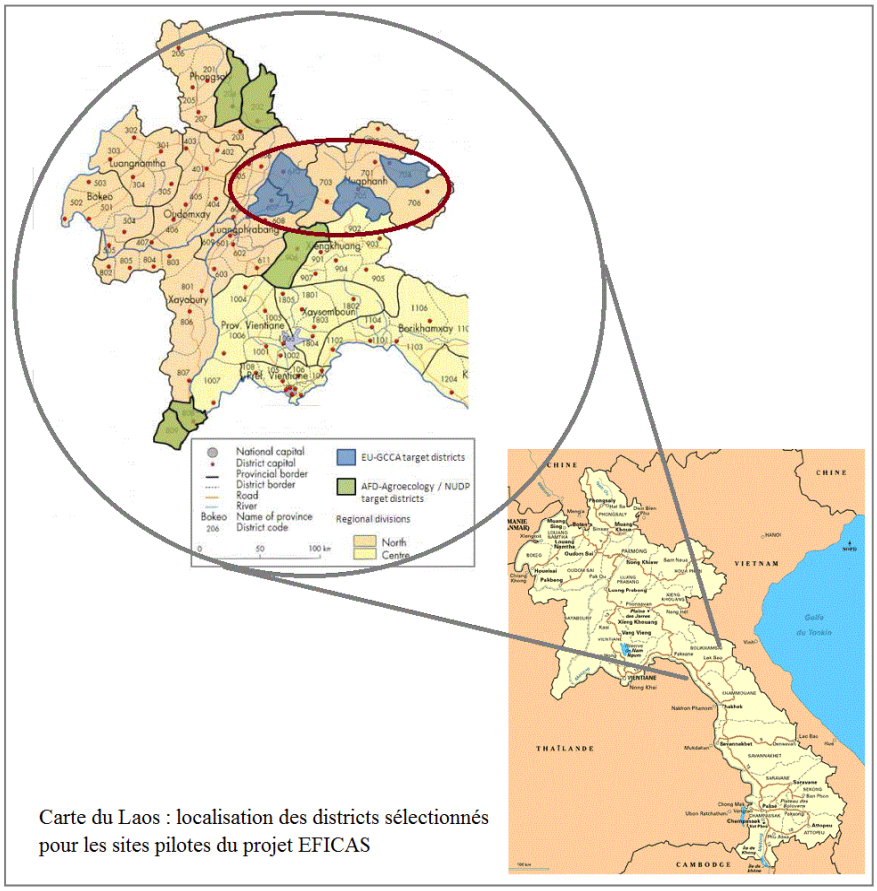
- In Laos, the village community manages the village territory and natural resources under the guidance of the district authorities through a decentralized management system; therefore the relevant scale to address landscape changes is the village,
- Whole village interventions are promoted in accordance with a land use plan. Indeed, some innovative practices, even though they are applied at field-level, are viable only if they engage the whole community in a concerted effort, e.g. avoiding roaming animals that prevent the dissemination of cover crops because they eat residues during the dry season.

For all these reasons the EFICAS Project operates at the village level. Other projects may also support increased village resilience using *other* intervention mechanisms such as education programs, health-care, or alternative livelihood options. As for the EFICAS Project, this impact is pursued by improving farming systems: increasing the diversity, performances, intensity of the cropping and livestock systems while preserving the natural resource base.

Further explanations and descriptions about the context are provided in a complementary report closely linked to this one: *Livelihood changes and landscapes dynamics in the northern uplands of Laos* (Rivera 2015). These two documents were drawn up in parallel over the same period, presenting complementary approaches of the study presented here.

After a preliminary phase of village selection based on district and village level diagnosis, the project activities started in May 2015 in the 24 villages (12 intervention villages and 12 control villages) selected in the three provinces of Louang Prabang, Houaphan and Phongsaly (figure 1).

Figure 1: Location of EFICAS Project research-development sites in northern Lao PDR



Carte du Laos : localisation des districts sélectionnés pour les sites pilotes du projet EFICAS

Government staffs from the Department of Agricultural Land Management (DALaM) under the Ministry of Agriculture and Forestry (MAF) are officially implementing the project activities and the monitoring system with the technical and operational support from CIRAD scientists. A key aspect of the project sustainability is related to capacity building of government staffs from national to provincial and district level at the same time as the local stakeholders (i.e., village community, local leaders). It is important for all stakeholders to fully participate so that they own the process. This way they might be able, at some point, to implement similar development activities in other villages – in *more* villages - as part of an out-scaling process.

Objectives of the study

The study presented in this document was conducted during a six-month internship in Lao PDR, from January to July 2015, as part of the EFICAS project. Our mission during the internship was to develop a method to assess the impacts of the project on local livelihoods and resilience to climate change and economic fluctuations. The method is specific to the context and to the project. But the main interest of this paper lies in the co-designing process of the monitoring method through regular interactions with local populations and project partners, more than in the final product per se. We present here the learning process that took place during the methodology development.

Theoretical and conceptual framework

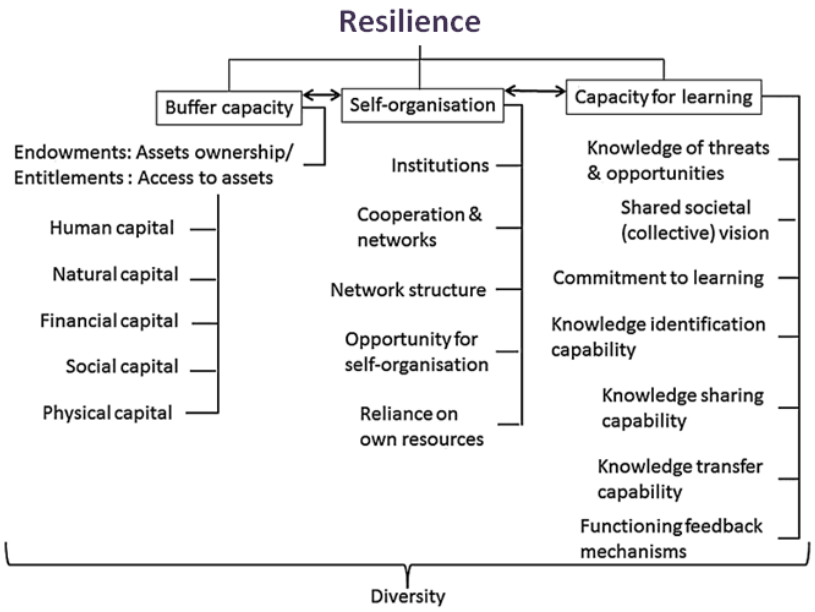
The three dimensions of resilience

We present in this section the conceptual framework used to address village level resilience. Based on a review of the literature on the topic we introduce the three dimensions of resilience of a socio-ecological system.

Holling (1973) defines resilience as *"a measure of systems persistence and their capacity to absorb changes and disturbances while maintaining unchanged relationships / connections between populations or state variables"*. This general definition originated from the domain of ecology can be applied to any kind of system, i.e. ecosystems, social groups, or economical structures.

In our case we use the concept of resilience in the context of village communities so we adopted a human-centered definition. According to Ifejika Speranza et al. (2014), livelihood resilience refers to *"the capacity of individuals, social groups or social economical systems to accommodate stresses and disturbances, to self-organize, and to learn in order to maintain or improve essential basic structures and ways of functioning"*. Ifejika Speranza et al. (2014) propose a representation of resilience encompassing three main categories: buffer capacity, self-organization and capacity for learning (figure 2).

Figure 2: Resilience axes according to Ifejika Speranza et al. (2014)



Buffer capacity is composed of the 5 **livelihood assets** of the livelihood framework (DFID, 2007). Self-organization addresses autonomous aspects of the system: the institutions, networks, rules and values, either spontaneously emerged or consciously set up, out of **self-management behaviors**. Capacity for learning characterizes the ability of a social system to draw lessons from experiences, and thus **adapt** its functioning in order to lower its **vulnerability** or increase its stability in the face of shocks. This representation constitutes an interesting framework, richer than the classical livelihood approach in that it "*draws attention to the factors and processes that keep livelihoods functioning despite change*" (Ifejika Speranza et al., 2014).

A complementary approach to resilience is proposed by Lallau and Mbetid (2010), who first focus on individuals before scaling up to the community level. They address strategies of individuals in the face of shocks, assessing their vulnerabilities and their capacity for action – which integrates adaptive capacity and capabilities. In their perspective, resilience refers to the capacity to anticipate (protect oneself against shocks), the capacity to react in the face of unpredictable events (take advantage of changes in the environment), and to aspire to a realistic improvement of their situation. Therefore, a low resilience will result in ex-post strategies (i.e. after the shocks): defensive strategies, emergency management; whereas a high resilience will lead to ex-ante strategies: adaptive practices, capital accumulation, changes that lower the exposure to risks – or that suppress the risk itself. Indeed, Lallau and Mbetid (2010) point out that resilience is not only a result; it is also a process.

The operational framework we developed is based on these complementary approaches of the resilience of socio-ecological systems (Figure). It is made of three main dimensions:

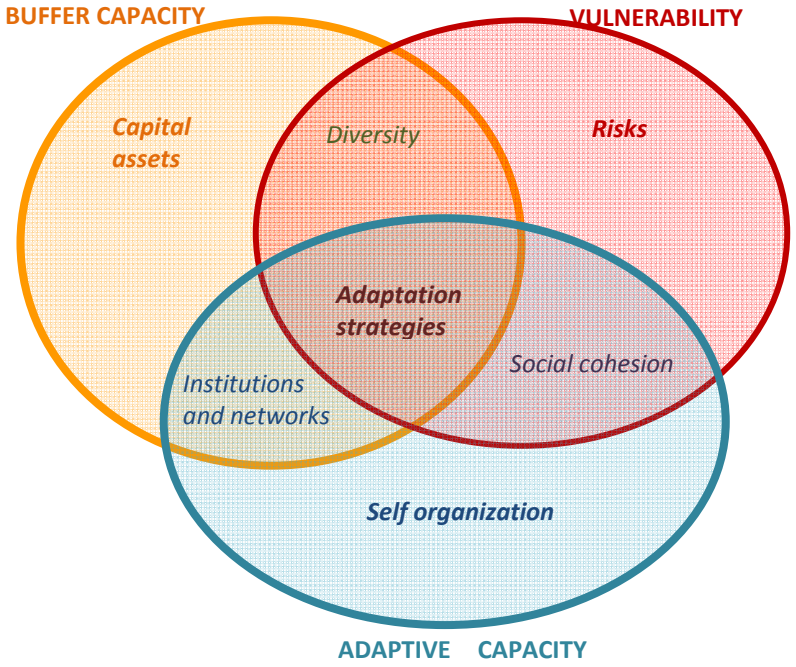
- **Buffer capacities** of the system: the assets of the system that allow it to absorb shocks without generating major structural or functional changes in the system. In the case of a social-ecological system, it is mainly composed of the livelihood assets.

- **Vulnerabilities** of the system: the risks it is exposed to and the way it is exposed to them, the way it is affected by these risks when they occur, and the responses that can be developed in order to lower the exposure and/or sensitivity to these risks.

- **Adaptive capacity** of the system: its self-organization and capacity to self-reorganize, capacity for learning of the people and institutions, capacity to set up relevant strategies and make the most of any opportunities to increase buffer capacities and lower vulnerabilities.

These three dimensions are not independent from one another, they overlap to a large extend: e.g. elements of buffer capacity contribute to shape vulnerability.

Figure 3: The three dimensions of resilience



As a consequence, monitoring resilience means tracking changes in these three dimensions. Note that the first two dimensions mainly include state variables, while the third dimension is highly dynamic, referring to processes, e.g. adaptive response, learning processes. Therefore, we need distinct methods to address the first two dimensions of resilience and the third one.

The theory of change

The design of the monitoring-evaluation (M&E) component of a project is directly shaped by the nature of the project, the activities implemented, and the intervention mechanisms. The EFICAS Project engages local communities in exploring complex pathways towards sustainable agricultural intensification by using the theory of change (Figure). A theory of change (ToC) is a tool that can be used for developing solutions to diverse social, economic or environmental issues. It *"explains how a group of early and intermediate accomplishments sets the stage for producing long-range results"*, providing a comprehensive picture of the early- and intermediate-term changes expected (Anderson, 2005). The figure 4 presents the theory of

change (left column) and its concretization in the case of the EFICAS project (right column): means, resources, activities, and their expected results.

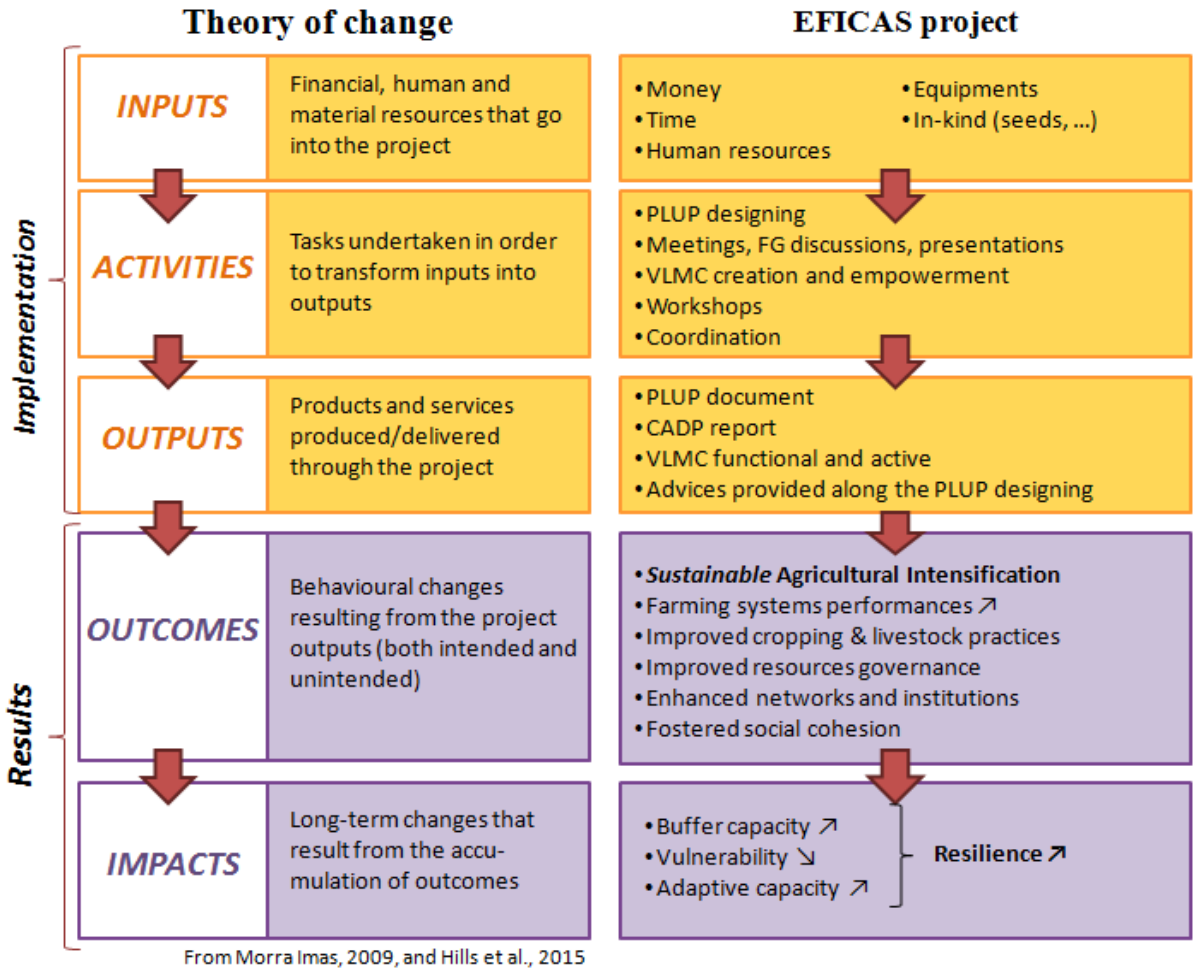
Using Participatory Land Use Planning (PLUP), the EFICAS Project designs landscape management strategies targeting low-carbon emissions, soils conservation, fertility improvement, water management, sustainable incomes for all households. The spatial distribution of land use types is analyzed with the villagers, priority issues to be addressed are identified and a strategic plan for the management of the village resources is negotiated. All these activities result in a Community Agricultural Development Plan: CADP. A Village Land Management Committee (VLMC) is in charge the CADP coordination and implementation.

Sustainable agricultural intensification

The innovative practices proposed in the framework of the project are based on the principles of agroecology, aiming for a sustainable intensification of agriculture. One of the requirements of M&E component of the project is to assess the level of agricultural intensification enabled by the project, but also to explore the *sustainability* of it.

Intensification practices aim at increasing land productivity and labor productivity. But the productivity of a village being increased does not necessarily leads to its vulnerability being lowered: "*agricultural intensity and vulnerability should be understood as distinct characteristics, not as the opposite ends of a single continuum* " (Robinson et al., 2015). Cases have been frequently observed, in which the agricultural intensification of an area, while providing momentarily higher incomes to the population, actually increased their vulnerability over the long term by stressing the ecosystems (DeFries and Foley, 2004; Downing and Lüdeke, 2002). So we consider that intensification is sustainable only if it goes along with lowering vulnerability. Therefore, vulnerability provides an interesting framework for exploring the *sustainability* of intensification.
As stated by Robinson et al. (2015), *"the multi-dimensional nature of both vulnerability and intensification potential suggests that intensification is not likely to result merely from the identification of appropriate technical packages. Social, economic and ecological dimensions must be considered, and promoting sustainable intensification will require interventions aimed at these dimensions as well as at the technical aspects of agricultural practice"*. This is why the activities of the EFICAS project do not only consist in proposing innovative agricultural practices; the project also addresses governance and gender issues, focuses on farmers' empowerment, explores market opportunities, etc.

Figure 4: Theory of change approach and its application in the case of the EFICAS Project



From Morra Imas, 2009, and Hills et al., 2015

When applied to sustainable agricultural intensification the theory of change is implemented as follows: inputs invested by the project (i.e. money, time, equipment) generate outputs (i.e. direct products or services) through the activities co-designed by the Village Land Management Committee (VLMC) and district staff during the Participatory Land Use Planning (PLUP) process, and more specifically the Community-based Agricultural Management Planning (CADP). Once a common goal is set, both parties engage in negotiations towards a commonly agreed landscape plan that would support sustainable agricultural intensification. The long term implementation pathway as defined in the CADP documents is expected to result in outcomes, such as increased agrobiodiversity, crop yields, or sustainable practices. The long-term changes resulting from these outcomes are the actual impacts of the project, i.e. increased resilience of the villages' populations. It seems a very linear formulation of complex processes happening simultaneously between all components of the socio-ecological system; here, the village. But this mode of representation facilitates comprehension and thus ensures there is a clear and common understanding of both the goals of the project (intermediate and long-term expected results), and the terminology used to describe them.

The theory of change therefore covers a much longer timeframe than the project itself; and outcomes may not be visible nor measurable by the end of the four-year project. A practical approach to tackle this issue is to first measure the project outputs while developing a framework for long term monitoring of the outcomes and impacts, i.e. through the three dimensions of resilience: buffer capacity, vulnerability and adaptive capacity.

Monitoring the expected outcomes of the EFICAS project mostly consists in analyzing changes in farming practices and performances, intensity and diversity of land uses, etc. Such monitoring provides precious information to re-adjust/adapt the activities all along the project implementation phase. In other words: all what we will learn by assessing the outcomes of the project (which activities are useful, which plans are implemented and which ones are not) will help us better design the next steps through a reflexive process. So, we do not only monitor impacts such as resilience, i.e. changes in vulnerability, buffer capacity and adaptive capacity of the villages, but also outcomes, i.e. changes in farming systems.

Methodological approach to resilience monitoring

Emerging research questions

The overall research question addressed in this document is:

How to assess the changes in villages' resilience which are attributable to the EFICAS Project?

As resilience is a multi-dimensional concept, responding to such question requires addressing all its dimensions. Therefore we decomposed the general question into three specific questions:

How to monitor villages' buffer capacity?
How to measure changes in villages' vulnerability?
How to assess changes in the adaptive capacity of the villages?

In this document we will address only the two former specific questions as the project activities were only beginning at the time of the study and it was not possible to address self-organization and learning capacity in the absence of concrete intervention of the project.

As presented in the previous section, the impacts are long-term expected results. Intermediary results are the outcomes, and they are also very important to monitor. Furthermore, this question corresponds to a major challenge in the development sphere. So we formulate a second general research question:

How to assess the outcomes of the EFICAS project on villages' resilience?

In the case of the EFICAS Project, this question becomes:

How to monitor the changes in farming systems?

In the following sections we present the conceptual frameworks that we developed to answer each one of these questions.

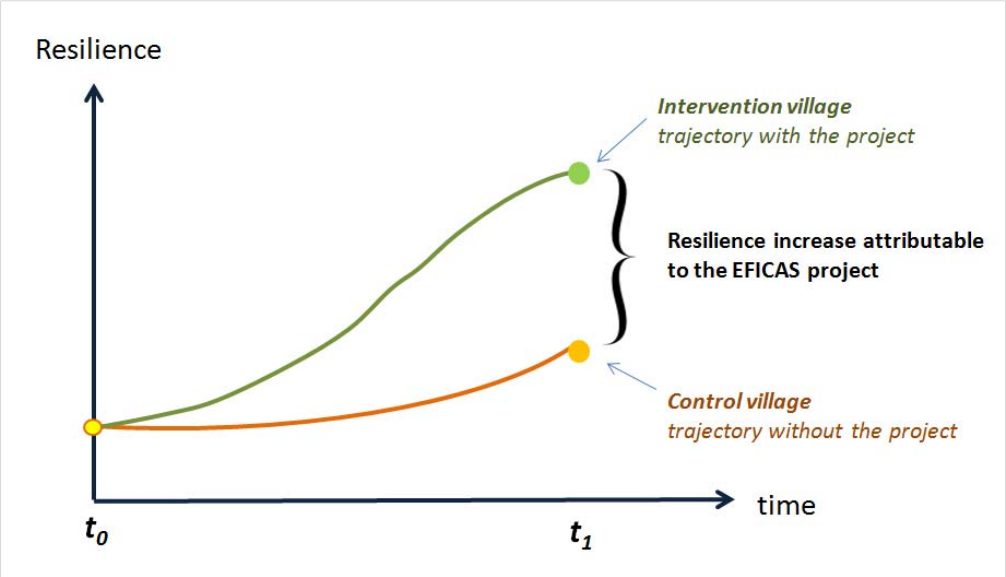
Framing a resilience monitoring method at village level

In the light of the foregoing considerations, we cannot consider that all the changes that will occur in the intervention villages are due to the project. Yet what we look for, precisely, is to assess the changes *attributable to the project* as pointed in the previous section. To address this question we selected twelve pairs of villages, distributed through six districts of northern Lao PDR. In each pair, one is an intervention

village, in which the project activities are implemented, and the other is a control village with no activities of the EFICAS project besides monitoring. The pairs were established in such a way that within a pair, both villages' situation be similar at t0 (January 2015, before the beginning of the project): size (surface, population), intensification and diversification, remoteness, economic activities, etc. (EFICAS 2014).

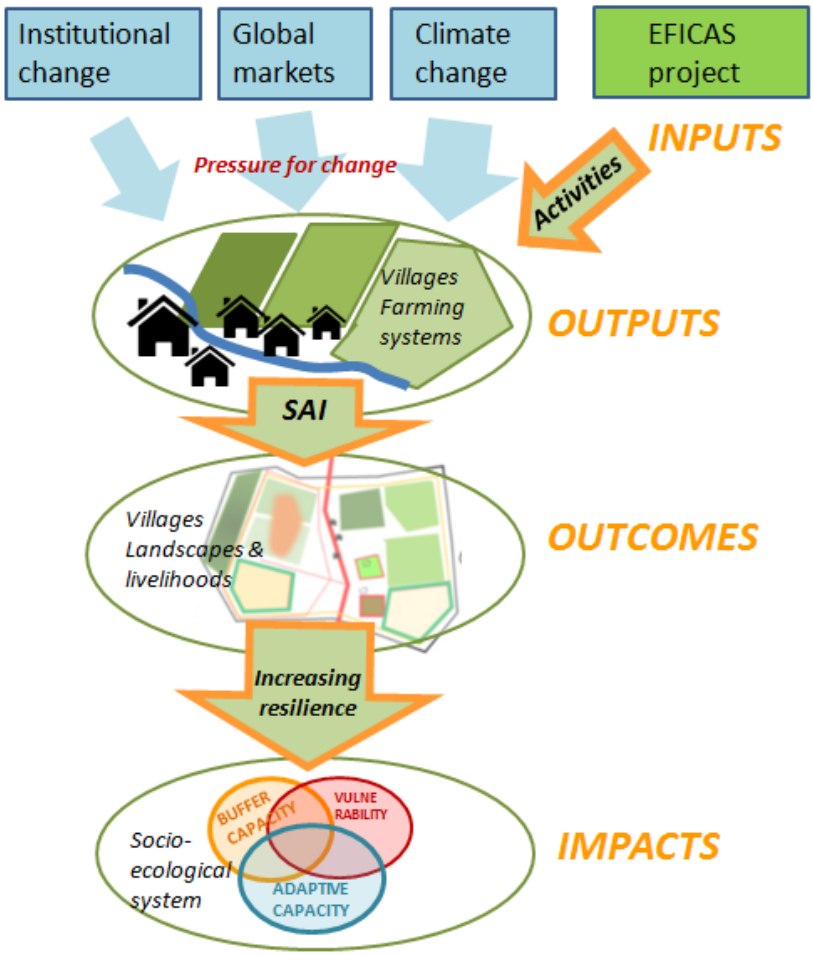
It is therefore hypothesized that the difference that will be measured at t_1 (in 2017 or 2018) between intervention and control villages will be attributable to the implementation of the ToC by the village community with the support of the project (Figure).

Figure 5: Experimental design to measure changes in resilience attributable to the project



All villages in the northern uplands of Lao PDR are exposed to the same driving forces of change such as climate change, global markets, or institutional reforms. Therefore, all villages are constantly changing – whether project activities are implemented or not – and so is their resilience. Therefore, all villages – both intervention *and* control villages, are observed through the same M&E approach as indicated in Figure . The only difference is that intervention villages are exposed to one more driving force, in relation with the interventions of the EFICAS Project. Inputs are invested, activities are led and specific outputs are produced. But from there, the changes in farming systems and in resilience (i.e. what we call the outcomes and impacts of the project in the theory of change terminology) can be monitored exactly the same way in all villages.

Figure 6: The EFICAS Project as an additional driving force operating on the intervention villages



Another important aspect of the method is the fact that we engage in a learning process with local stakeholders, including farming households, all along the study. This reflexive approach led us to constantly adjust the study based on the feedback received by participants. This aspect is addressed in the second part of this document.

Establishing the project baseline

The first step of the M&E method is to establish a baseline: the situation of the village at the beginning of the project that will serve as a reference to appraise the changes in the subsequent years. The baseline should address all dimensions of resilience: buffer capacity, vulnerability and adaptive capacity. Yet these dimensions call for distinct monitoring systems. The first two dimensions of resilience (buffer capacity and vulnerability) mainly refer to state variables, e.g. assets, structures, practices, performances, exposure. In addition, a biophysical baseline was developed to assess the status of natural resources and environmental services at the beginning of the project. Village characteristics can be appraised by asking directly to the villagers, completing the data collection with field measurements and collecting secondary data such as official statistics or previous land use plans.

We gathered the information collected from both studies into one single baseline, addressing the two dimensions of resilience mentioned above: buffer capacity and vulnerability. As mentioned above, the third dimension of village resilience, i.e. adaptive capacity, will be addressed at a later stage, once project activities will have been implemented over one cropping season so that learning processes can be assessed.

The buffer capacity can be addressed through the analysis of all the assets that make it able to absorb external shocks without suffering major structural changes and that facilitate its recovery, e.g. large livestock are usually used as 'living savings' that are sold in case of bad harvest of to pay for medical care when a family member is sick. This buffer capacity encompasses the five capitals from the classical livelihood framework: human capital, physical, financial, natural, and social capital (Ellis, 2000). We use this decomposition of the dimension into components to frame our approach of the buffer capacity (Belcher et al., 2013).

In this study we use the terminology of vulnerable situations proposed by Füssel (2005) and the definition of vulnerability proposed by Turner et al. (2003): *"the degree to which human and environmental systems are likely to experience harm from a perturbation or stress. It is comprised of risks that people confront, the sensitivity of their livelihoods to these risks, responses and options that people have for coping with and adapting to these risks, and outcomes in terms of loss of well-being"*. As suggested by the definition, vulnerability of a system can be assessed only by reference to a specific risk/threat. Many studies about vulnerability at large scale address vulnerability of a country as its vulnerability to economic stresses (e.g. market prices fluctuations), without specifying it. Other studies focus on vulnerability to climate change; it is usually specified then, to which aspect of climate change: droughts, floods, disruptions of the hydrological regime, etc. Brooks (2003) argue that *"one can only talk meaningfully about the vulnerability of a specified system to a specified hazard or range of hazards"*.

As we aim at appraising the overall vulnerability of villages we do not limit ourselves to one hazard. We consider that the overall vulnerability of a village is a combination of its vulnerabilities to the different risks the village is exposed to. This idea framed our work on the vulnerability dimension of villages' resilience. Hence, characterizing vulnerability of a village requires listing the risks/potential stresses and shocks it is exposed to. Based on literature review and field surveys, we identified the main risks that threaten villagers (either directly or indirectly) in our study area, e.g. economic, sanitary and climatic risks; in other contexts, other risks would have been addressed, e.g. geo-political tensions, land tenure issues, human pandemics (Lallau and Mbétid, 2010). Following IPCC Fourth Assessment Report (2007), our approach to vulnerability of a socio-ecological system to a risk is decomposed into three components:

- Its exposure to the risk (E)
- Its sensitivity to the risk (S)
- The coping and/or adaptive responses to the problem: both ex-post and ex-ante strategies adopted, to lower the exposure or the sensitivity. (R)

Exposure and sensitivity both contribute to increased vulnerability. Adaptive responses tend to reduce it. We use the following formula to reflect the way these factors combine to shape vulnerability: $\boldsymbol{V = E \times S / R}$

This conception is consistent with the IPCC vulnerability framework (cf *IPCC Fourth Assessment Report, Chapter 19: Assessing Key Vulnerabilities and the Risk from Climate Change*). As mentioned by Hills et al. (2015), the lack of agreed metrics is an issue when it comes to assess and compare vulnerability in different

contexts. Indeed, vulnerability being a latent characteristic (i.e. it only manifests itself when a shock or a stress occurs), it can be assessed only by assessing the factors influencing it. And these factors being highly context-specific, a method to assess vulnerability will necessarily result in being context-specific.

The main intended outcome of the EFICAS project is to improve villages' farming systems by proposing new practices based on agro-ecology. The objective of the farming system analysis is to assess changes in the farming systems of all villages over time. Doing so, we will be able in the subsequent years to assess the outcomes of the project, by comparing intervention and control villages. The improvements pursued by the project are: increasing the diversity of the system (e.g. number of crop species grown, animal species raised, types of NTFPs collected), increasing the performances and the intensity of the cropping and livestock system while preserving natural resources.

We consider that the elements above-mentioned, i.e. diversity, performances, intensity, cropping and livestock practices, summarize the main characteristics of a farming system. Therefore, a reliable farming system analysis requires addressing all these elements; and measuring *changes over time* in these characteristics to assess the outcomes of the project.

Designing an operational baseline

The conceptual frameworks introduced here above were mobilized and integrated into an operational framework specific to the context of the northern uplands of Lao PDR and to the landscape approach of the EFICAS Project.

The first phase of baseline building was a mostly top-down process that led to a tentative list of components, indicators then variables, based on literature review, particularly field reports from previous projects. Then, from January to July 2015, we worked in the villages to test the feasibility of the tentative baseline as well as the methods for data collection. Data were collected in 12 villages from a total of 560 households. Many changes were operated in the tentative baseline during this second phase: adjusting, completing, modifying. The succession of field surveys and office work fed reflexive loops; this learning process is presented in the below section entitled "Reflexive loops: when conceptual frameworks and real-world meet".

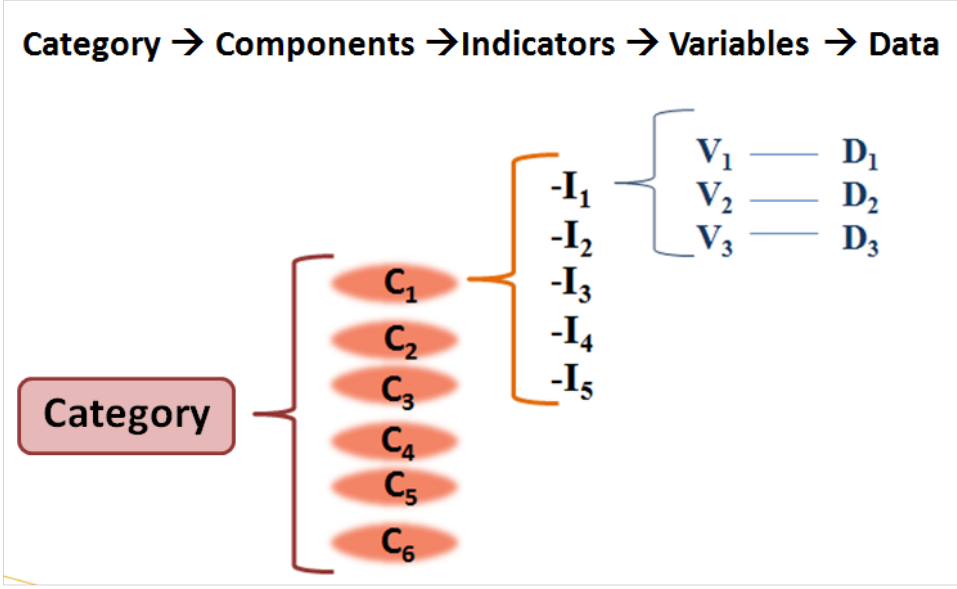
In the next sections, we first present the final structure of the baseline – i.e. the result of the learning process. Then we present the process we went through, illustrating some of the reflexive loops with relevant examples.

From dimensions to components

Five to six components were identified for each of the three dimensions studied, i.e. buffer capacity, vulnerability and farming systems. Buffer capacity encompasses the five capital assets of the livelihood framework; vulnerability is a combination of the vulnerability to each risk threatening the system; farming system elements comprise practices, performances, diversity, etc. Each component is made of one or several indicators, which in turn result from one or several combined variables. For each variable, the value

measured/collected/observed in the field is called the data. Figure 7 illustrates these elements in the context of the EFICAS Project.

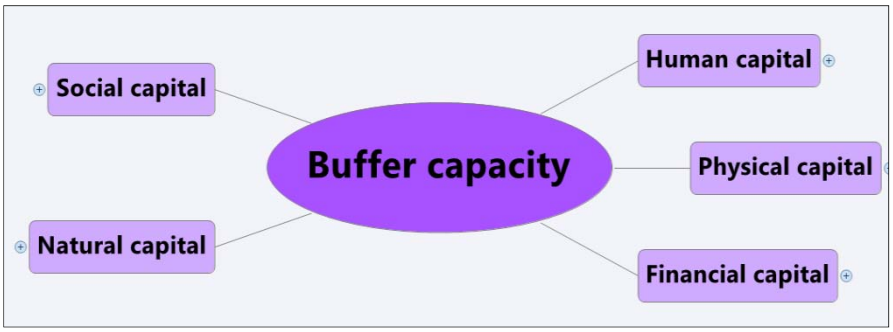
Figure 7: From components and indicators to variables and data



Buffer capacity

The components of the buffer capacity are the five capital assets of the livelihood framework, namely, human capital, physical capital, financial capital, natural capital and social capital (Figure 8).

Figure 8: The five capital assets as components of the buffer capacity dimension



Vulnerability

The components of village vulnerability are the vulnerabilities to each main risk threatening the village, external shocks likely to affect the village.

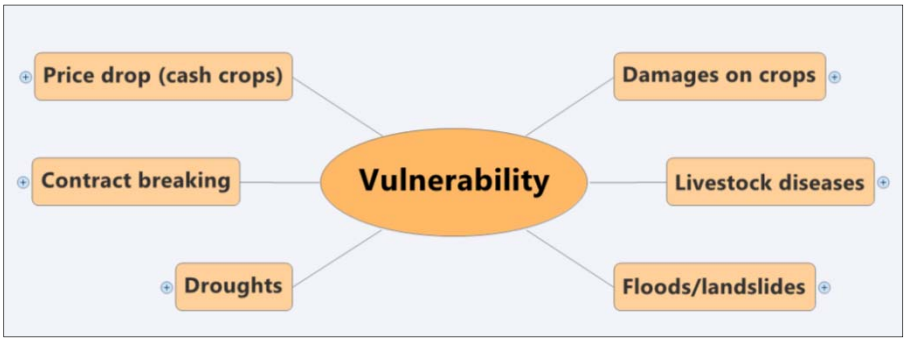
In the context of the EFICAS project, i.e. small villages located in remote upland areas, we identified six kinds of shocks that regularly affect the villagers:

- **Damages on crops**. Every year part of villagers' harvest is lost, due to various pests damaging the crops: rats, birds, plant diseases, insects, wild pigs or domestic roaming animals.
- **Livestock diseases**. Disease outbreaks strongly affect these villages, regularly turning into dramatic losses on the herds.
- Extreme rain events can have dramatic consequences such as **floods** and **landslides**, especially for villages located in lowlands or with highly mountainous relief with steep slopes.
- **Droughts**. Some dry seasons are worse than others in term of the lack-of-water and may turns into a serious drought episode. This is another cause of damages on crops that we distinguished from the others because it is a direct consequence of the climate while pest damages may be an indirect consequence.
- **Contract breakings**. Contract farming is developing since a few years, providing remote upland households with opportunities to earn cash income. However, both sides: villagers and traders, may break the contract without prior notice creating a lot of economic stress for villagers who cannot sell their product at an agreed price and conditions.
- **Drops in cash crops price**. Price fluctuations are very high from year to year making cash crop cultivation a very risky business economically as production costs are often high and villagers get indebted.

  Rmq: these last two risks are both "trade disappointments". They could be included in one single "kind of risks". But we considered them separately because of the very distinct driving factors behind a village's vulnerability to each of them.

  The six components of the vulnerability dimension are presented in Figure 9.

Figure 9: Components of the vulnerability dimension



NB: The components of vulnerability of a village are vulnerabilities to each risk threatening the village. Thus for each component to be properly named, each box should actually say "village vulnerability to…". In order to keep the figure light, only the names of the risks appear here.

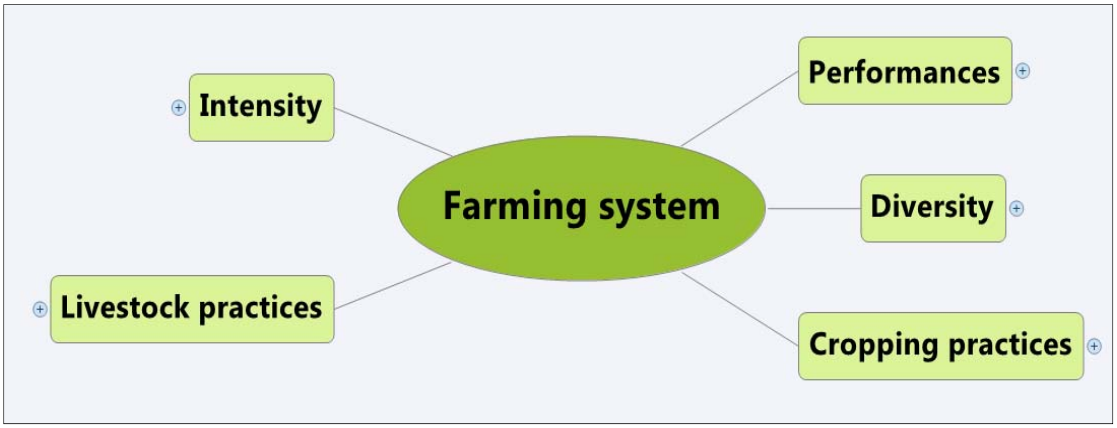
Farming system

Changes in farming systems generated by the project can be tracked through five main components, or categories of indicators (Figure):

- **Performances**: labor and land productivity, input use efficiency, etc.
- **Diversity** of income sources, of animal species raised, of crop species grown, etc.
- **Cropping practices**: shifting cultivation, use of pesticides, mechanization, etc.
- **Livestock practices**: feeding system, caring practices, reproductive management, etc.

- **Land use intensity**: population density, pressure on paddy land, land tenure, management rules, etc.

Figure 10: Components of the farming system



From components to indicators

As stated by Belcher et al. (2013), "*an indicator provides information about some characteristic of the village we study*". It is important to be clear about what it measures, and thus about what it reveals.

We aim at selecting **SMART indicators**:

Simple and Specific, allowing wide coverage at relatively low cost. The indicators need to be quick and easy to assess/measure.

Measurable, as indicators can be assessed with little effort and they should allow for ranking or quantification.

Adapted to local conditions: they must be **locally meaningful** and appealing to users.

Relevant and Reliable: there should be a direct link between the indicators and the village characteristic they refer to.

Time-scale appropriate: the indicators must indicate changes on the appropriate time scale.

A relevant choice for indicators necessarily requires prior knowledge and understanding of the village and the processes it is involved in (Box 1).

Box 1. Example of crop diversity indicator

For example, when assessing crop diversity in order to address elements of adaptive responses to the damages on crops, our initial idea was: the more crop species and varieties they grow, the less sensitive they become to each crop-specific threat. In other words: spreading the risk by multiplying the crop species and varieties.
How do we assess the level of crops diversity in a village? We need an indicator that reflects the strategy of diversification, and the level of risks distribution. Is the number of distinct crop species grown in the village a good indicator?

In order to answer this question let us consider the following case. In a village A, 90% of the households cultivate big areas of rice and maize for sale, and nothing else. The remaining 10% households are not in this cash-crop production strategy but rather in a self-sufficiency strategy: they cultivate dozens of crops, in very small quantities. In village B, all households cultivate some cash crops, and they also grow diverse self-consumption crops, vegetables etc.
If we assess the level of crop diversity by simply considering the number of distinct crop species, we might end up with the same value for village A and village B, when they actually are in very distinct situations and have distinct adaptive strategies. So this indicator is not relevant to assess the diversity of crops.
In order to take into account the relative importance of each crop in the village, we integrate in the indicator the number of farmers growing it. Therefore, the relevant indicator for "crop diversity" is an adaptation of the diversity Shannon equitability index, that increases both when the number of crops increases and when the evenness of their distribution among villagers increases.
Further explanations are provided in section "scoring exercise" about the concrete building and calculation of this indicator.

One indicator taken individually does not have much meaning though. It is the combination of several indicators into one final **composite index** that will provide relevant information about the village situation. For instance, comparing the vulnerability of villages to a stress by comparing only their *exposure* to it does not mean much; the sensitivity and adaptive responses must be taken into account, otherwise the comparison is inaccurate. So the data that will allow a meaningful comparison of villages' vulnerability (to a given hazard) is the final composite index that combines indicators of exposure, sensitivity and adaptive responses.

For each component we build *composite* indexes. According to Angeon and Bates (2015) definition, a composite index is "*an aggregation of a set of individual indicators that gives evidence for a multi-faceted problem*". *"The justification for a composite index lies in its fitness for the phenomenon to be measured, and its simplicity"*

For example, when addressing village vulnerability to a given stress, we consider elements of exposure and sensitivity of the village to this stress, and the responses of the villagers or coping mechanisms. Therefore, for each component of the vulnerability (i.e for each risk villages are exposed to) we need indicators reflecting:
- the **exposure** of the village to the shock or stress
- its **sensitivity** to it
- the **potential** and effective adaptive responses from villagers

The **exposure** of the village to the stress (i.e. damages on crops, livestock diseases, drought, etc.) may be reflected by indicators such as the frequency and intensity of the event (for droughts, diseases…), prices volatility (for prices drop), or a combination of several indicators: e.g for landslides, the frequency of extreme rain episodes *and* the percentage area under steep slopes in the village.
The **sensitivity** of the village to the shock or stress, also called *susceptibility to harm,* is the potential effect of a shock/stress on the village. In other words, it is the level of harm the village is likely to suffer if the shock occurs. Which characteristics of a village contribute to shape its sensitivity to damages on crops? It may be the money invested for the production of the crop concerned by the stress (prices drop, damages on crops),

the share of this product in the village total incomes, the total number of domestic animals (livestock diseases)…
The **adaptive responses** of the villagers to the shock encompass the reactions and/or strategies they adopt to cope with and/or adapt to the shock once it occurs. These are very diverse and highly "shock-specific". They were identified all along the study, through a participatory approach involving individual interviews and focus group discussions.

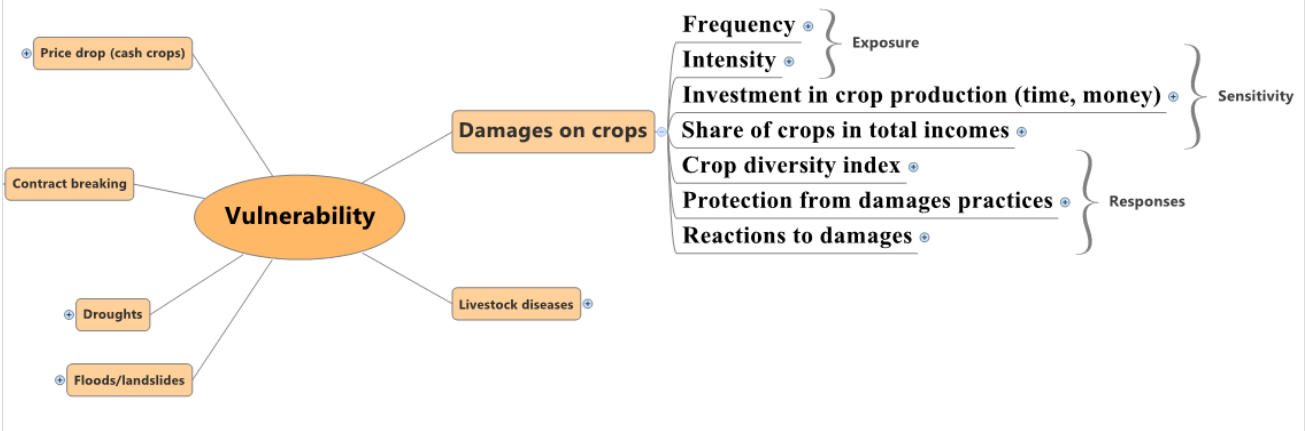
Figure 11 illustrates the indicator selection process in the case of **vulnerability to crop damages**.

Exposure. Six main causes of crop damages were identified in the villages of northern Lao PDR: rats invasions, birds, plant diseases, insects attacks, and wild pigs or domestic animals entering the fields and destroying/eating the harvest. This is not an exhaustive list of the causes of crop damages, but the most serious ones. For each of these causes, the *frequency* is combined to the *intensity* of the damages to generate the *severity* of the risk. It reflects the exposure but also comprises elements of sensitivity of the village to this particular cause of damage. Now, the overall exposure of the village to all causes of crop damages is the aggregated exposure to all of these six causes.

Sensitivity. Which characteristics of a village contribute to shape its sensitivity to damages on crops? Apart from the elements of sensitivity integrated in the "severity" of the risk, the final indicators selected for sensitivity are:
- the investment in crops production, both in time and cash: the more farmers spend time and/or money to produce a harvest (i.e. buying inputs, hiring labor force) , the more they lose if the crop or the harvest gets damaged. Whether opportunity cost or real debt, in both cases the higher the investment is, the higher the sensitivity.
- the percentage of village income generated from crop sales in the total village incomes. This indicator reflects how much the village economy relies on cash crops.

Adaptive responses. Some adaptive responses are crop-specific and cause-specific; others are specific to the village. For each crop and each cause of damages to this crop, we listed the practices developed by villagers to cope with the damages. Therefore the indicators for crop-specific and cause-specific responses comprise all reactions – potential or effective – of the villagers to the different causes of damages threatening the crops in the village. Another adaptive response to damages on crops consists in diversifying the crops and varieties grown in the village: spreading the risk by multiplying the number of crop species and varieties (Box 1). The 'crop diversity' indicator is a characteristic of the whole village, because a diversity index is calculated at village level.

Figure 11: Indicators and variables selected for the 'vulnerability to crop damages' component.



Finally, the combination of all these indicators into a final composite index provides relevant information about the village vulnerability to crop damages (see the section "scoring exercise" for further explanations). The decomposition pattern that has been illustrated above with the example of one vulnerability component is the same for each category of information addressed in this study. The full decomposition until indicator level is presented in annex 1 to 3 for each category.

From indicators to variables

An indicator can be a variable or a combination of variables, i.e. composite index. Several sources of information and collecting methods are available to collect data used to calculate the values of the indicators:

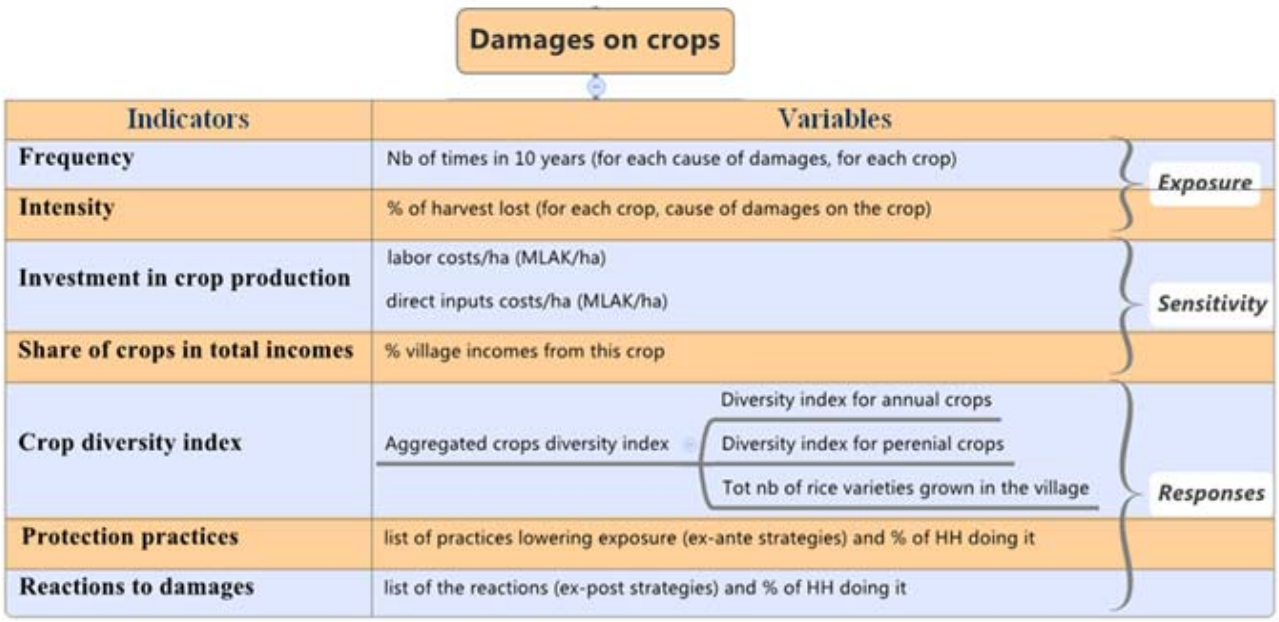
- Individual interviews with villagers (individual household surveys)
- Focus groups discussions
- Interviews of resource persons: village-head, village-committee members, teacher…
- Use of secondary data from government agencies (provincial, district)
- Field measurements and direct observations

After defining clearly the variables needed to build each indicator of the whole baseline, we identified the most relevant data collection method for each variable. Then we organized the variables by sources of information and built several lists of variables, i.e. one per sources of information (individual interview, focus group, secondary data…). Using these lists, we wrote questionnaires and measurement protocols. Some questionnaires ended being very long, so we divided them into several questionnaires. For example the focus group guideline was very long; so we split it into several guidelines, one per topic, e.g. cropping practices, livestock practices, sales and contracts.

As a result of the practical organization for data collection the questionnaires are not organized per component, not even per dimension of resilience; but per source of data, and to some extent, per topic. Priority was given to build coherent questionnaires, so that we do not jump from one topic to another without any links, which would be confusing for both the interviewers and the interviewees. Besides, it saves time, which is important as it is a recurrent limiting factor in this kind of project.

The selected variables are presented in Figure in the case of *"vulnerability of the village to crop damages"*. Full explanations are provided in the section "Scoring exercise", as we illustrate our scoring method with this example.

Figure 12: Variables corresponding to the 'crop damages' component of the vulnerability dimension



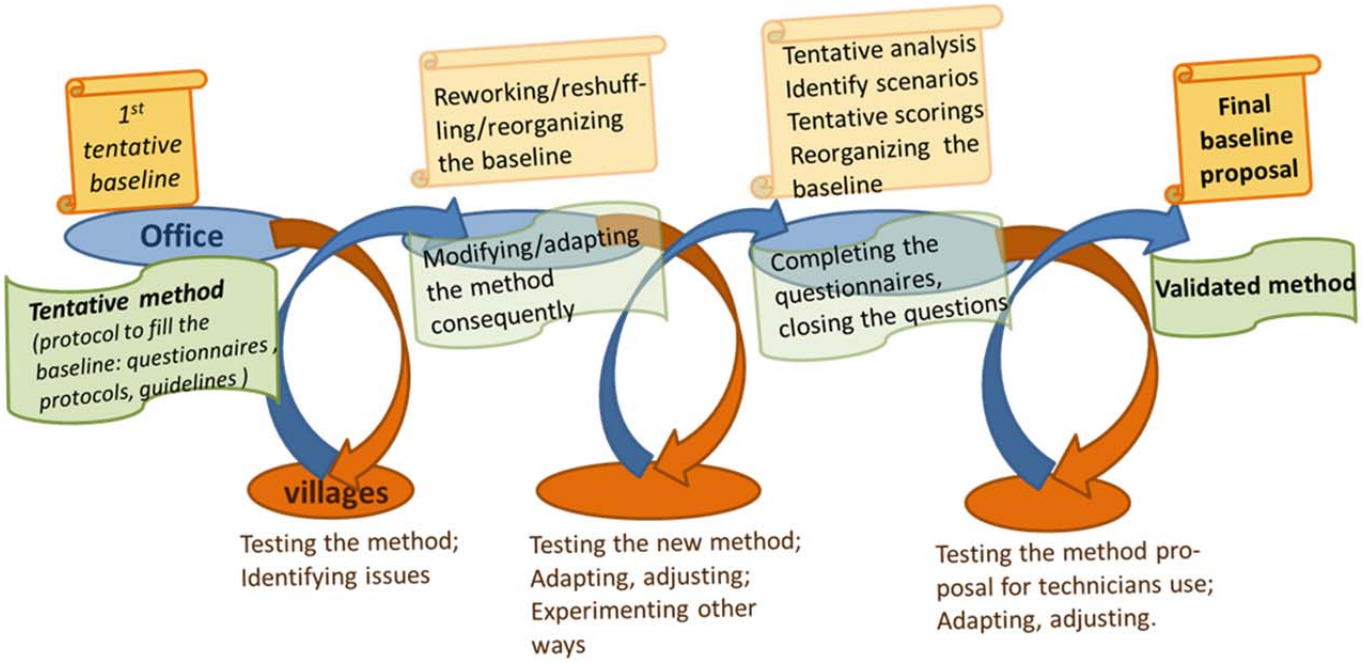
The detailed list of all variables in the baseline (i.e. variables describing all components of vulnerability, buffer capacity and farming systems characteristics) is provided in annex. The hierarchical presentation from components to variables is used here for the sake of clarity in the presentation. But it does not reflect the process used to build this structure that was basically a learning process made of trials and errors, participatory testing of data collection method/protocol organized through successive reflexive loops.

Reflexive learning loops: when conceptual framework and field reality meet

Successive adjustments through reflexive loops

All along the learning process our understanding of the village contexts increased and both the baseline structure and the data collection method were adjusted to better fit the local realities. Elements of the baseline were suppressed, others were shifted or replaced, and new ones were added. The questionnaires and the protocols for data collection were modified, re-shuffled, adapted to the changes in the baseline or to the field reality. This series of modifications followed a sort of a pattern, from "office-work" to "field-work" and from the baseline structure to the data collection until a final baseline and method were eventually validated. These **reflexive loops** are presented in Figure 13.

Figure 13: Reflexive loops for the building of an operational baseline and data collection method



The purpose of the successive learning loops was to co-design with local partners a baseline structure and data collection method that they actually own and would be able to implement by themselves, i.e. with very limited external support from a project of central government agencies. While keeping in mind the conceptual and scientific value of the baseline we also had to take into account practical considerations. With too long or too complex questionnaires, the need for qualified staff quickly becomes a constraint to the generalization of the M&E tool beyond the project scope.

Examples of situations that led to modify the baseline or the method:

- Some data turned out not to be collectable: villagers did not know, e.g. the exact upland area they cultivate. In this case we could:
  - Get the data with another method, e.g., by measuring fields surfaces with a GPS,

- Compute the value from other data, e.g., field area can be obtained from the quantity of seeds sown and the sowing density, land productivity is calculated by multiplying the seed productivity (kg harvested/kg sown) by the sowing density (kg/ha),
- Replace the variable by a proxy (i.e. another one revealing the same information), e.g., farmers who use herbicide do not know the exact quantity of product they spray on their field – moreover it depends on the form they buy it, powder, liquid, diluted or not, etc. –, however, they do know how much they spend a year to buy herbicides. As both variables reveal the intensity of use of herbicide, we were able to replace the variable 'quantity of herbicide product' by the data 'average expenses for herbicides' in the indicator "herbicide use".

- Some variables turned out to be inconsistent: the answers we got from the villagers were not realistic/credible (e.g., the reimbursement mechanisms for the loans they make). In this case, we could:
  - Multiply the number of interviewed people and consider the average value for all the data collected,
  - Obtain the information from another respondent (e.g., the bank, or district officers),
  - Replace the variable by a proxy providing the same information

- In some cases, after spending a few days in the villages and getting a better grasp on the local context, we realized that an indicator – or what we had considered a potential indicator – actually did not reflect what we thought it did. Then we had to remove this indicator from the baseline and figure out another one addressing similar characteristic of the village. For example, the calculation of the 'labor productivity' indicator required to assess labor force availability at the household level. We collected the data "number of labor units" through individual household survey. But all respondents systematically gave the same number: 2 labor units. Most households declared the husband and wife, but not the grown-up children who also work in the fields, or brothers/sisters also members of the household, or old parents who are still actively involved in the farm activities. As the land under shifting cultivation is taxed according to the labor force of each household, villagers systematically underestimate their labor force to reduce the taxes they have to pay. As a result, the labor productivity calculated with these data was not reliable (overestimated), and thus could not be used as an indicator. So we assessed labor productivity differently. We collect precise data about the production and number of man-days of work from a small household sample. Then we extend the average values obtained to the whole village.

- In other cases it was the other way around: after spending a while in the villages we identified potential interesting proxies. Therefore we added them to the questionnaires, in order to collect the data and later on assess statistical correlations that would confirm/infirm the possibility of using this data as a proxy. For example, the use of 'the number of water points in the villages' as an indicator of water accessibility. We realized after surveying a few villages that this data did not accurately reflect the accessibility of villagers to water. Indeed, some villages are equipped with water points, but there is no running water during most of the year. Other villages do not have any water point, but the houses are settled right along the bank of a river so the access to water is easy and unlimited. Finally the access to water was appraised by asking directly to villagers "how limiting is the access to water in the everyday life". The responses were ranked into a limited number of situations actually found in the study villages.

- Some variables turned out to be too long to collect accurately. For instance, we first thought of assessing the NTFPs collection effort – in order to build an indicator of the "level of reliance of the village on NTFPs", and another indicator for "status of natural resources". But this information was definitely too long to collect. So it was eventually replaced in the baseline by elements collected in the biophysical baseline.

- Initially we would voluntarily double the information we collected: either collecting some data twice from two distinct sources, or collecting data about two distinct variables revealing the same information. This allowed us, in the first case to check on the consistency/accuracy of the data (by comparing the two values obtained), and in the second case, to check on the precision/relevance of each data collection method and therefore identify the best one for a given data.

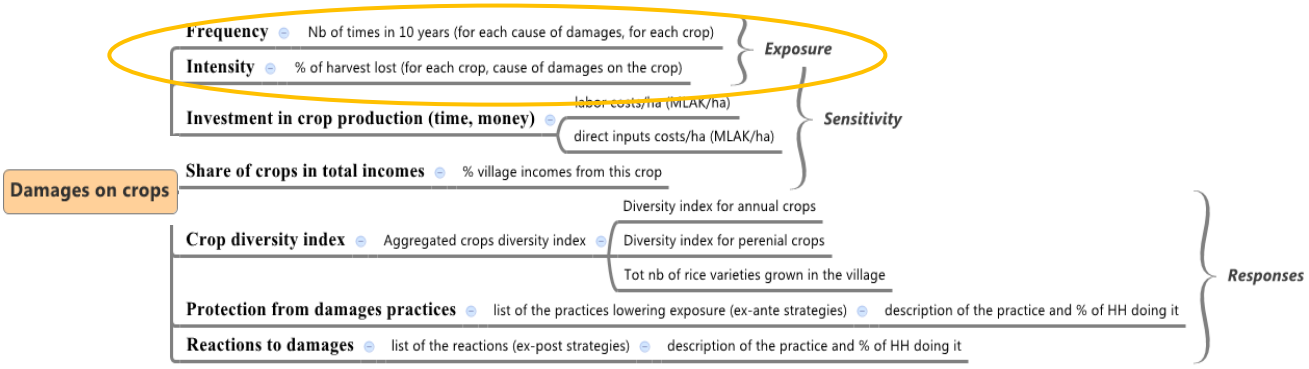
Through these successive adjustments, each indicator, each variable and the corresponding collecting method were validated, step by step. It was a constant back-and-forth movement from "office" to "field" (cf. figure 13**Erreur ! Source du renvoi introuvable.**). These reflexive loops that lasted five months and took place in ten villages led to **operationalize** both **the conceptual framework,** and **the data collection method**. In total, 560 households were interviewed, 60 focus group discussions and 40 field measurements were implemented.

Participatory design of monitoring indicators

We favored a participatory approach for the identification and validation of the indicators. For instance, for the adaptive responses to vulnerability (coping reactions and adaptive strategies), the final list appearing in the questionnaires is the result of a co-designing process conducted in several villages. At an initial stage, we were asking very open questions through semi-directive interviews. After a series of such interviews (around 25 households), we had identified the problems/stresses that seem to occur in most villages. As a second step, we conducted scenario analyses: i.e. referring to the list of stresses, we targeted the questions in order to understand the various reactions of the villagers to these stresses. This was done both in focus group discussions and in individual interviews. This process led to a list of adaptive responses, practices, and strategies adopted by villagers. Finally as a third step, we closed the questions in the questionnaires and we let the government staff lead the interviews. The main reason for closing down the questions was to facilitate the use of the questionnaires for district staff. It was also a way to systematize data collection so that the same data would be collected in all villages for the sake of comparison between villages and in time between rounds of data collection.

The participatory design process is illustrated here using the same component of vulnerability as above: ‘vulnerability to crop damages’. This component includes six main causes of crop damages found in our study area: rats, birds, plant diseases, insects, wild pigs, and domestic animals when they enter the fields. The indicators referring to exposure are the frequency and the intensity of the damages on crops (Figure 14).

Figure 14: Indicators and variables for the crop damage component of vulnerability assessment



In the first round of field-testing our method (***1st loop***), we tried to ask villagers directly the « severity » of each cause of damages. The severity would be a combination of the frequency and intensity. For each crop, the villagers would rank the causes (rats, birds etc.) from the most damageable to this crop to the least damageable. Then they would score the "severity" of each cause by answering the question: “how severe is it for you, from 0 to 10?”. However, after a few focus groups discussions we realized that we were not asking the correct question for the information we needed, moreover the question was too subjective for the data to be reliable. (*For instance, the birds were always scored very low, as if this cause of damages was “no big deal”. The reason is not that birds do not cause damages on the crops… it is rather because people got used to it: this is such a constant problem that farmers count with it, with fatalism. They consider that "part of the harvest is for the birds".*

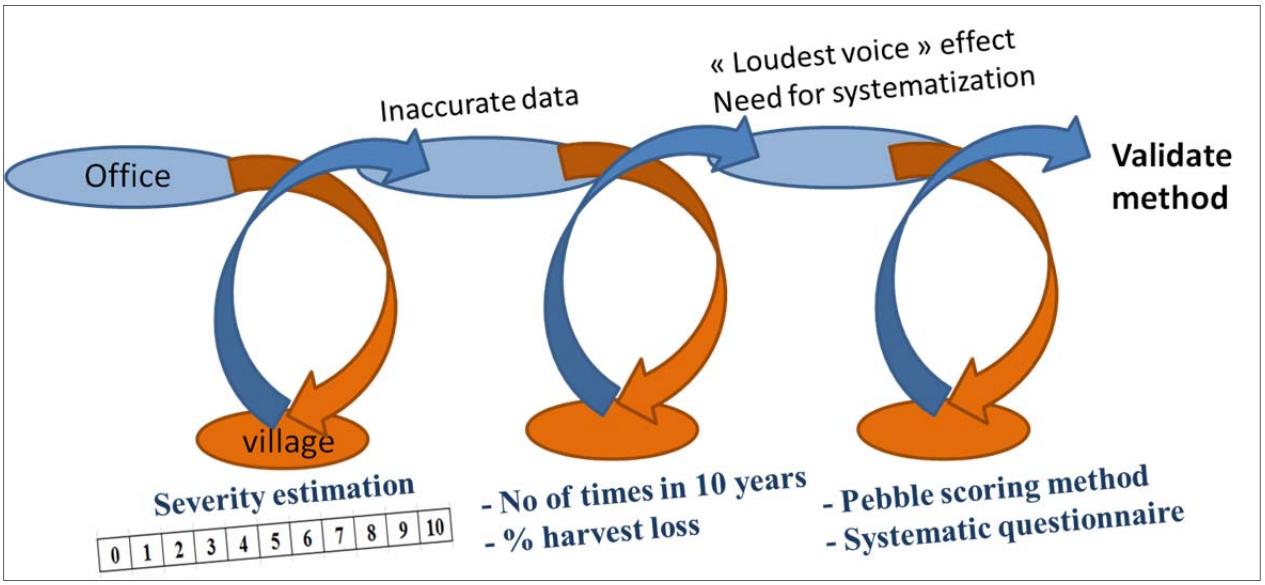
So we proceeded another way. In a second round of field-tests (***2nd loop***), we asked in focus group, for each crop and each cause of damage: ***1)*** the number of times damages occurred over the last decade, and ***2)*** the percentage of harvest loss last time it occurred. But there again, after a few focus groups a bias was identified that we call the "loudest voice" effect. It turned out that during focus groups discussions, if someone is actively participating and speaking loudly, the others tend to remain quiet and renounce to express their opinion. Therefore, the figure we get as an answer to our question does not correspond to an average loss in village; it is rather the percentage of loss of *the* one person speaking louder.

In a 3rd round (***3rd loop***), we needed to both avoid the loudest voice effect and to systematize data collection, since it had to be implemented by government staff. We figured out another way of proceeding to obtain the frequency and intensity of damages on crops using a pebble scoring method. Each villager participant was given a maize seed and asked to put it on the case corresponding to his/her situation on a poster with the different causes of damages and a severity scale from 0 to 10. This way all voices were recorded and the results quickly and systematically reported on a special form.

The last step for final validation of this data collection method was to test it in real situation with the district staff in the “pilot seat”. This test was passed successfully, so the method was validated.

The learning approach allowed us to identify in a relatively short time the most relevant data and the most practical way of collecting it (Figure).

Figure 15: Examples of reflexive loops leading to operational indicators and data collection method



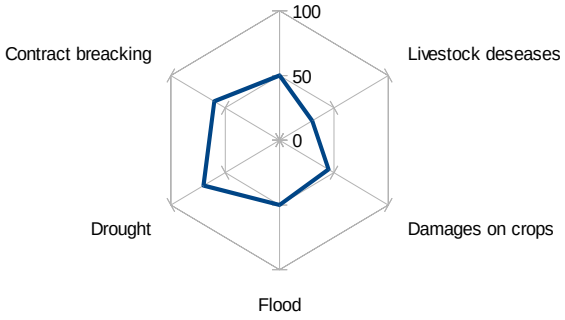
Once we have the data for each variable, scoring exercises are used to go backwards the decomposition pattern: from variables to indicators, then to composite indexes.

Scoring exercises

The final representation of the village status will be a spidergram for each category of information (buffer capacity, vulnerability and farming systems), in which each axis corresponds to one component.

The spidergram in Figure features the vulnerability of a given village at a given time: each axis corresponds to the vulnerability of the village to one of the six main threats identified.

Figure 16: Example of vulnerability spidergram for one village at time t_0



Therefore, the scoring process for each indicators and composite index was organized as follows:

- For vulnerability components, an improvement of the situation must be reflected by a *lower* vulnerability note. Which means, the note for "vulnerability to a given stress" has to be built/scored in such a way that when the exposure to the stress decreases, or the sensitivity is lowered, or the adaptive responses are more efficient, the score decreases.
- For buffer capacity on the other hand, an improvement of the situation will be translated into a *higher* score: when the quantity of assets increases the score consequently increases.

- For the farming system characteristics, the scoring was shaped this way: when performances, intensity or diversity increase, the corresponding score for this component increases. As for 'cropping practices' and 'livestock practices', intensification/improvement leads to higher notes.

Vulnerability, as adaptive capacity and resilience, is a latent characteristic: it "*does not manifest itself prior to a change, stresses and shocks*" (Hills et al., 2015). Therefore it is difficult to be certain of the relative importance of the factors that underpin this characteristic. Furthermore, as mentioned by Angeon and Bates (2015) in a study about composite resilience indexes, weighted factors do not necessarily increase the accuracy of an indicator. *"There is no evidence of the higher validity of weighted variables compared with non-weighted variables. Non-weighted variables would not change the message conveyed through a composite index in comparison with weighted variables"*. In line with these authors, we did not put weights to our variables unless we had valid reasons to do so, e.g. when we combine several variables of the same nature to quantify a single factor, or when distinct variables overlap without being totally redundant.

Examples of scoring

We illustrate the scoring exercise with our example on "vulnerability of the village to crop damages". As previously mentioned, we consider that the vulnerability of a system is characterized by: **V= E.S/R**, with:

- **E**: exposure to the risk
- **S**: sensitivity to the risk
- **R**: coping and/or adaptive responses (both ex-post and ex-ante strategies developed to lower the exposure or the sensitivity).

So once we have values for the elements of exposure, sensitivity and adaptation responses, the calculation flows from the formula (multiplying and dividing). However, several preliminary calculations are required before this stage. Some data are collected at village level, others are crop-specific data, and others are individual data (farmer-specific). We apply the formula **V=E.S/R** to all levels but within one calculation, all factors must refer to the same level. The formulas and calculations used to score the vulnerability of villages to the risk of damages on crops are presented in Table 1. The excel file that was used to calculate the actual values is presented Figures 17 and 18.

In the formula **V=E.S/R**, ***S*** is a combination of the crop-specific sensitivit**ies** of each crop grown in the village:
$\mathbf{S}_{\boldsymbol{i}}$ = sensitivity note of the crop $\boldsymbol{i}$ (Table 1).
We consider that each sensitivity $\mathbf{S}_{\mathbf{i}}$, in turn, is determined by various elements (Figure 11 and 18):

- the share of the incomes generated by this crop in total village incomes ($\mathbf{S}^{\mathbf{A}}_{\boldsymbol{i}}$)
- the investment in this crop production, both in time ($\mathbf{S}^{\mathbf{B}}_{\boldsymbol{i}}$) and in cash ($\mathbf{S}^{\mathbf{C}}_{\boldsymbol{i}}$).

We consider that $\mathbf{S}^{\mathbf{A}}_{\boldsymbol{i}}$ weights the sensitivity: the higher the more sensitive the village is to damages to this crop. $\mathbf{S}^{\mathbf{B}}_{\boldsymbol{i}}$ and $\mathbf{S}^{\mathbf{C}}_{\boldsymbol{i}}$ are two variables of the same nature, quantifying a single factor: the investment dedicated to this crop production. Therefore they cannot appear as two independent factors in the fraction; they combine to constitute one single factor, being weighted according to the importance the villagers give them. We give $\mathbf{S}^{\mathbf{B}}_{\boldsymbol{i}}$ a weight 1 and $\mathbf{S}^{\mathbf{C}}_{\boldsymbol{i}}$ a weight 3 (Figure).

Table 1: Formula used for calculation of the composite index "vulnerability to crop damages"

	Exposure	Exposure lowered by practices	% total village incomes from crop *i*	Labor investment in crop *i*	Cash investment in crop *i*	Weighted sensitivity note for crop *i*	Crop-specific interme-diary note	Village-level intermediary note	Crop diversity index	Overall note of the village vulnerability to damages on crops
	E_i	E_i'	S^A_i	S^B_i	S^C_i	S_i	$E_i'.S_i$	V'	R^B	V
Crop 1	$E_i = \Sigma_j (E_{ij})$ $= \Sigma_j (f_{ij}.int_{ij})$	$E_i' = E_i/R^A_i$ $= \Sigma_j(f_{ij}.int_{ij}/ R^A_{ij})$				$S_i = S^A_i .(S^B_i + 3S^C_i)$		$V' = \Sigma_i (E_i.S_i/R^A_i)$	**cf diversity index building*	$V=V'/R^B$
Crop 2										
Crop 3										

With:

E_{ij}= exposure of the crop ***i*** to the cause of damages ***j*** (rats, birds…)

E_i= overall exposure of the crop ***i*** to all the causes of damages

f_{ij}= number of times the cause ***j*** affected the crop ***i*** over the past 10 years in the village

int_{ij}= intensity of the damages it caused: % of harvest loss

R^1_{ij} = first component of adaptive responses: specific practices used by villagers to deal with the damages on crop ***i*** caused by the cause ***j***

E_i'= overall exposure of the crop ***i***, lowered by the specific practices villagers used against the causes of damages

S^A_i= % total village incomes from crop ***i***

S^B_i= labor investment in crop ***i***

S^C_i= cash investment in crop ***i*** (expenses for direct inputs: tillage, seeds, herbicides…)

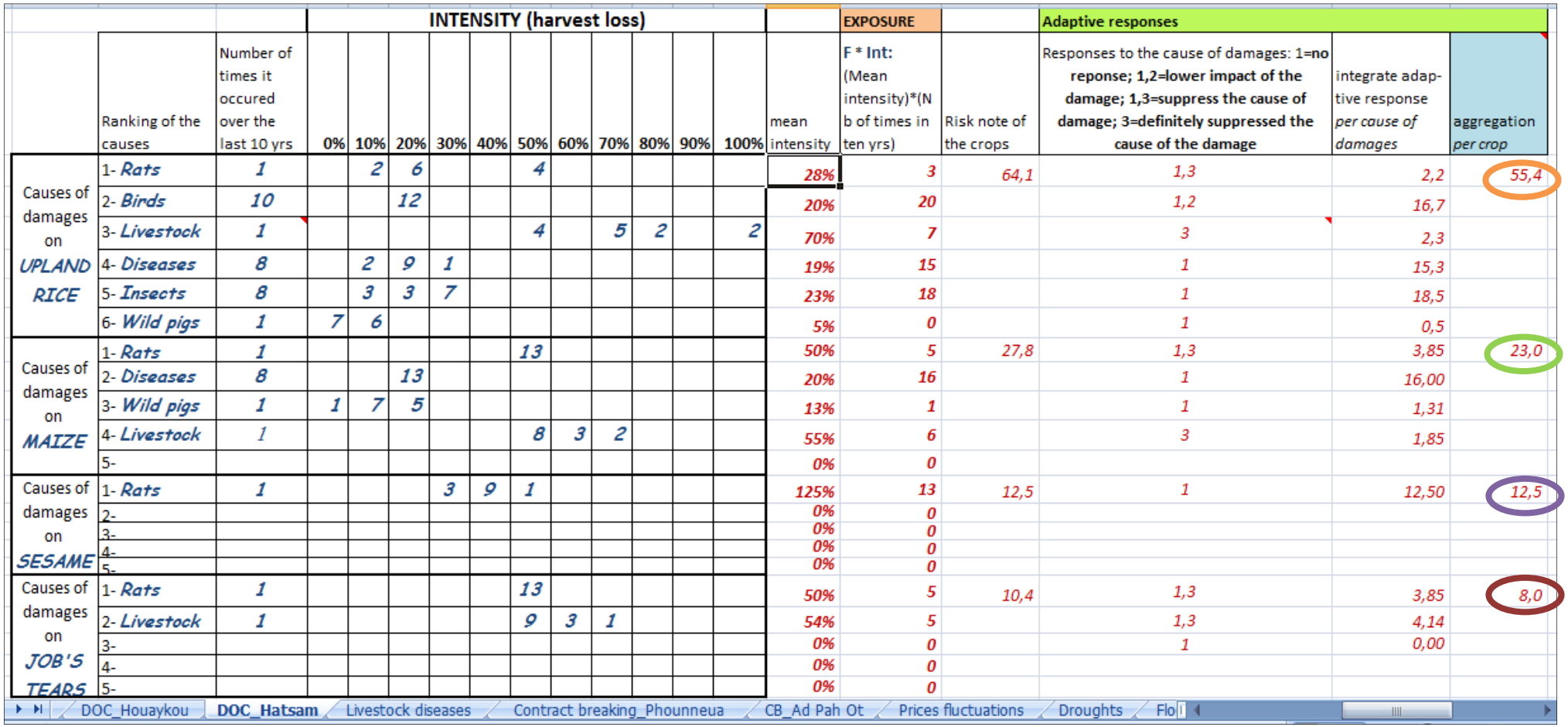
S_i= weighted sensitivity note

V'= village-level intermediary note of vulnerability to damages on crops

R^2 = second component of adaptive responses: diversity of crops in the village: diversity index (cf details next paragraph "*Crop diversity index building and calculation"*)

V_{DOC}= Overall note of the village vulnerability to damages on crops

Figure 17: Example of excel file used to calculate indicator values in the case of Hatsam village



			INTENSITY (harvest loss)												EXPOSURE		Adaptive responses		
	Ranking of the causes	Number of times it occured over the last 10 yrs	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	mean intensity	F * Int: (Mean intensity)*(Nb of times in ten yrs)	Risk note of the crops	Responses to the cause of damages: 1=no reponse; 1,2=lower impact of the damage; 1,3=suppress the cause of damage; 3=definitely suppressed the cause of the damage	integrate adap-tive response *per cause of damages*	aggregation *per crop*
Causes of damages on UPLAND RICE	1- *Rats*	1		2	6			4						28%	3	64,1	1,3	2,2	55,4
	2- *Birds*	10			12									20%	20		1,2	16,7	
	3- *Livestock*	1						4		5	2		2	70%	7		3	2,3	
	4- *Diseases*	8		2	9	1								19%	15		1	15,3	
	5- *Insects*	8		3	3	7								23%	18		1	18,5	
	6- *Wild pigs*	1	7	6										5%	0		1	0,5	
Causes of damages on MAIZE	1- *Rats*	1						13						50%	5	27,8	1,3	3,85	23,0
	2- *Diseases*	8			13									20%	16		1	16,00	
	3- *Wild pigs*	1	1	7	5									13%	1		1	1,31	
	4- *Livestock*	1						8	3	2				55%	6		3	1,85	
	5-													0%	0				
Causes of damages on SESAME	1- *Rats*	1				3	9	1						125%	13	12,5	1	12,50	12,5
	2-													0%	0				
	3-													0%	0				
	4-													0%	0				
	5-													0%	0				
Causes of damages on JOB'S TEARS	1- *Rats*	1						13						50%	5	10,4	1,3	3,85	8,0
	2- *Livestock*	1						9	3	1				54%	5		1,3	4,14	
	3-													0%	0		1	0,00	
	4-													0%	0				
	5-													0%	0				

DOC_Houaykou | DOC_Hatsam | Livestock diseases | Contract breaking_Phounneua | CB_Ad Pah Ot | Prices fluctuations | Droughts | Flo

Raw data in ***blue*** is collected in the villages through focus group discussions while values in ***red*** are obtained from later calculations.

Figure 18: Scoring formula and weights: example of vulnerability to crop damages

H6 | =E6*(F6+3*G6)*10

	B	C	D	E	F	G	H	I	J	K	L
		HATSAM									
		"Severity": Frequency*Intensity	1st component of adaptive responses integrated: Protection practices	Sensitivity						Second component of adaptive responses	
	CROP *SYSTEM*	**Risk note** of the crop: sum of weighted "**severity**" of each cause of damages: frequency*intensity Cf excel file *crops damages intensity*	Severity/adaptive responses	share of this crop in village incomes (if 100% production sold)	Labor investment in this crop: labor costs/ha (MLAK/ha)	Cash investment in this crop: direct inputs costs/ha (MLAK/ha)	**Weighted sensitivity note**	**Intermediate note of vulnerability** *of the village* to causes of damages *on this crop* : **E*S/R**	Agregated	Crops diversity index	**agregated vulnerability of the village to damages on crops**
	PADDY RICE	_	_	1%	4,71	1	1,0	_			
	UPLAND RICE	64	55,4	15%	8,10	0	12,0	664,1			
	MAIZE (hybrid)	28	23	2%	2,8	0,2	0,6	14,0			
	JOB'S TEARS	10	8	0%	1,7	0,36	0,1	1,0			
	SESAME	13	13	1%	4,5	0	0,2	2,8	681,9	14,1	48,4
	STICKLAC										
	RUBBER	_	_	0%	_	_	0,0	_			
	SACHA INCHI	_	_	_	2,22	0	0,0	_			
	TEAK										

Weighted sensitivity note = share in total incomes × (1 labor investment + 3 cash investment)

Rmq: a factor 10 was added in order to have the weighted sensitivity featuring tenths instead of hundredths (pure 'esthetic' considerations about the visual aspect of the calculations). It is compensated further in the calculation by another factor 10 at the denominator.

Crop diversity index

The diversity index is a composite index for the diversity of crops grown in the village. It is used in the calculations presented above. In order to have the scoring example complete, we present here the calculation method for this index. We use a formula adapted from the diversity Shannon equitability index.

We collect the following data in the villages:

- List of all the crops grown in the village: annual and perennial crops,
- For each crop, the proportion of villagers growing it (p_i).
- Number of rice varieties grown in the village (N_{rv})

→ We calculate a diversity index for annual crops and for perennial crops as follows:

$$D = \Sigma\, p_i ln(p_i)$$

The final composite index for crop diversification CD is built as follows:

Components of the diversity index	value	weight	formula
Diversity index for annual crops	I_a	1	$CD = 1.I_a + 0{,}5.\, I_p + 0{,}1.\, N_{rv}$
Diversity index for perennial crops	I_p	0,5	
Number of rice varieties grown in the village	N_{rv}	0,1	

The index for annual crops was given a reference weight=1. The index for perennial crops was given half the reference weigh, considering that damages on perennial crops cause less harm to the villagers than damages on annual crops: annual crops are used for self-consumption and they provide annual cash incomes that villagers rely on. Moreover, the six causes of damages considered are mostly pests of annual crops (rats, wild pigs or domestic animals do not damage trees). The number of rice varieties grown in the village was given a tenth of the reference weight, after an empirical sensitivity analysis.

This final indicator for crop diversity is the result of several reflexive loops. By the time we validated the indicator, identified the best way to collect the required data, and adapted the questionnaire accordingly, some of the villages have been already fully surveyed and we did not go back there. Therefore, for these villages we do not have the exact required data to calculate the diversity index. So we adapted the formula to use the available data for these villages:

- Average maximum number of crops in one plot, i.e. total number of crops farmers grow in association in their most diversified plot (M_a)
- Number of rice varieties grown in the village (N_{rv})

The final indicator for crop diversification is then calculated as: $CD' = M_a + 0{,}1.N_{rv}$

The excel file used for values calculation is presented in annex 4.

In the case of the target villages of the EFICAs project, the values of the crop diversity index range from 9.1 to 14.1. The villages with lower diversity index are mostly villages growing large areas of

cash crops under monocropping. Those with higher diversity index are mostly remote villages, with little access to markets and growing a large variety of crops for self-consumption.
Note that in general the villages surveyed in this study are not so much involved in cash-crops growing compared to villages in other provinces of Lao PDR such as Sayaboury, Oudomsay or Xieng Khouang. Even the least diversified villages here are still much more diversified than most villages in other provinces.

Illustration in case study villages

The vulnerability to the risk of crop damages seems to be very different from one village to another. The values obtained after calculations range from 51 to 70.6. We comment below the situation of three villages and the respective notes they obtained.

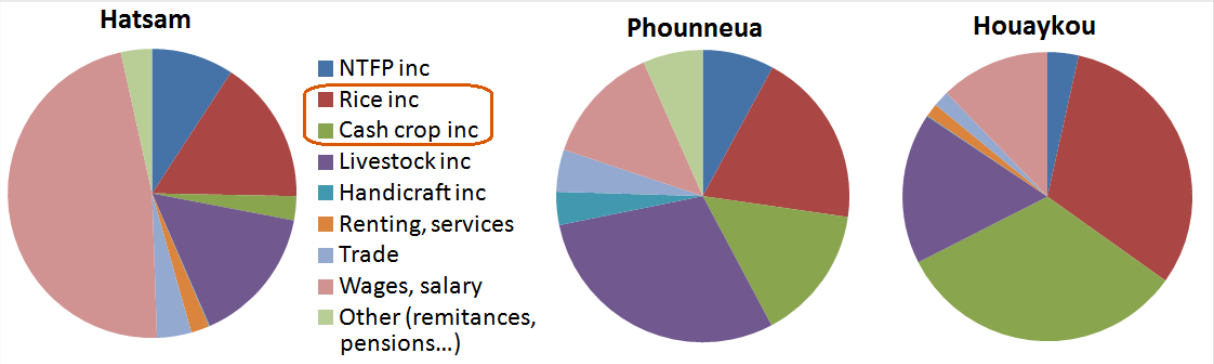
Hatsam village features the lowest note for vulnerability to damages on crops among the villages noted so far. This is mostly due to the fact that crops production in Hatsam constitutes a minor source of incomes: rice and cash crops altogether represents 19% of the total village incomes (see Figure , and Annex 4). Note that we consider the hypothetical incomes from rice, i.e. the income generated if 100% of the rice were sold which is never the case. Indeed the indicator "share of the crops in village total incomes" is supposed to reflect the village reliance on crop production. In the case of rice, whether villagers eat or sell it does not change anything to the importance of rice production for local livelihoods as rice is the main staple food. In other countries/continents similar adjustments could be necessary with maize, cassava, etc.

The distribution of incomes sources in Hatsam village is very different from other villages in our study sample because a Chinese company recently planted hundreds of hectares of rubber trees in the village territory, reducing the land available for smallholders. The company hires a lot of labor force for the weeding and caring of the plantation. Thus many villagers in Hatsam stopped doing shifting cultivation and got hired by the company. They shifted from subsistence farming activity to daily wage workers. As a consequence, Hatsam village economy now relies more on wages than on income from smallholder agriculture.

In addition, villagers who keep producing and selling crops grow a large diversity of crops – not all farmers grow the same species – and they practice crop associations. Therefore in spite of a relatively low production in the village, the diversity is quite high (crop diversity index = 14.1). The frequency and intensity of diseases affecting crops is high (Annex 4): the risk scores for the main crops are higher than in most other villages of the study. But the adaptive responses are also higher. Hatsam villagers are very innovative when it comes to cope with crop damages.

All these factors make Hatsam village less vulnerable to the crop damages than most other villages. Its score for vulnerability to crop damages is **51**.

Figure 19: Income source distribution in the three case study villages



Household incomes in **Phounneua** village are more evenly distributed than in Hatsam (Figure). The percentage of incomes from crops is higher in the former village; rice and cash crops provide 34% of total incomes. The crop diversity is quite low in Phounneua – rice and maize are the main products and the crop diversity index = 9.2. Moreover crops suffer attacks from pests (rats and birds mainly) almost every year, and villagers do not react very actively against it (Annex 4). However, Phounneua incomes from crops being still relatively low, this keeps the village from being too vulnerable to crop damages. Based on all these factors, Phounneua score for vulnerability to crop damages is **64**.

Houaykou is a quite remote Hmong village, far away from any town with few opportunities to work as laborers or doing any trade. Houaykou crop diversity index is higher than Phounneua, but still relatively low (10.2). Farmers grow only four to five distinct crops. Moreover farmers do not practice a lot of crop associations: cash-crop fields are exclusively mono-specific, and even in the plots for self-consumption farmers do not mix many species within the rice. Houaykou economy mostly relies on crops production: over 64% of the village incomes come from cash-crops and from rice (including self-consumption). All these factors make Houaykou village quite vulnerable to the risk of crop damages; its note for vulnerability to crop damages is **71**.

Discussion

Flirting with the limits of the quantification exercise

In previous sections we used the composite index "vulnerability to crop damages" to illustrate the scoring process in three case study villages. A similar approach was used for all indicators to generate one value per village. However we cannot assess the accuracy of the values calculated so far, for two main reasons. First, stakeholder participation is limited in the scoring process and results need to be validated with local stakeholders in the next round of survey. Second, the indicators and the values cannot be validated -or invalidated- on a strictly objective basis; and here come the limits of the quantification exercise. For a large number of indicators, the values were not yet available for all villages at the end of the internship: either because some data required for the calculation were still missing, or because the calculations were not done yet. Collecting the data and doing the calculations are time-consuming operations, and the time dedicated to this study was limited. This is actually a challenge for quantifying resilience at a broad scale.

Another issue is the absence of agreed metrics. The indicators of resilience have no official units (there are not even official resilience indicators), therefore the risk is that the way of recording them vary from one study to another, from one person to another. Within the same study, an indicator can serve as a tool for comparing several communities. But when it comes to compare villages' situations that were assessed using distinct units, or measured on different ways, the absence of agreed metrics becomes a real issue. It is therefore important to reach an agreement between all individuals and agencies involved in the M&E system and to carefully document the methods used so that it can easily be reproduced by people who were not involved in the methodological design phase.

Setting aside the above-mentioned issues, quantification itself is a serious limit to the exercise. Let's illustrate once again with the example of the indicator "vulnerability to crop damages". We explained earlier the choice of weights in the building of the sensitivity indicator (Table 1). Weight =1 for the investment in time ($\mathbf{S}^{\mathbf{B}}_{i}$) and weight = 3 for the investment in cash ($\mathbf{S}^{\mathbf{C}}_{i}$). These weights were given considering the fact that villagers give more importance to investments in cash than in kind. But the factor 3 is somewhat arbitrary. How could we quantify with certitude how much importance people give to one thing or another? Is it even quantifiable? Aren't these individual preferences, probably varying from one villager to another? We cannot know for sure. Sensitivity analyses to each parameter would therefore be required, which would make the process very cumbersome. We have to deal with the fact that the scoring exercise and the verification of the indicators are subjective exercises that rely mostly on an "expert judgment". We put values and weights to indicators according to our knowledge and understanding of the system; and we judge the validity of the values thus obtained by comparing them to what we understand of the system, but other people may proceed differently and obtain different values based on a different understanding of the system.

Representing villages' characteristics using quantitative variables is indeed a highly subjective exercise, and there is no way to objectively assess the results in absolute terms. For example, what does the value '71' mean for vulnerability to crop damages in Houaykou village? Quantitative assessments become meaningful in relative terms, e.g. when comparing villages at a given point in time or the same villages at different dates. These elements of sensitivity analysis will come later on, when the M&E system of the EFICAS Project will be fully operational. Also what do these indicator

values mean for decision makers? How can they be useful to guide practical interventions in the village. The experience of previous projects shows that highly precise data is not required to make wise decisions (Castella et al., 2014). Most strategic decisions are made based-on on simple value scales from 1 to 5 or 1 to 10 to assess for example how serious is a shock or resulting damages (e.g. Richter scale on earthquakes).

Finally, it is important to keep a reasonable distance with the figures and indicators values to concentrate on their meaning and limits to decision making. This requires putting the M&E system in the hands of the stakeholders who contributed to the initial stages of its construction as described in this report.

Perspectives for the monitoring and evaluation system

The next phases of the EFICAS project M&E activities will consist in finalizing the tool based on the whole data set collected in the 24-villages sample. The method will be gradually refined through the multiplicity of local contexts it will be applied to. Each village brings in new stories, specific situations that the M&E system has to deal with through a continuous learning process. The capacity of the M&E system to continuously adapt to the changes in local conditions, partners and projects is a key element of its sustainability. And the M&E system needs to survive to the initial four-year project that initiated it to actually become meaningful for decision makers. Beyond the initial baseline, the successive rounds of data collection will give its full value to the M&E system. Other experts, other agencies will therefore inevitably take part in the next rounds of data collection, scoring and result interpretation. The soundness and relevance of the M&E tool will therefore be assessed at that time as it is too early, at the time of writing this report to judge the usefulness of the tool, which should go far beyond judging the accuracy of the indicators values used to represent the village situation at time t0.

More qualitative approaches based on local and/or expert knowledge will be used in the future, for example to address indicators such as the ‘capacity for self- organization’ or ‘social cohesion in a village’. We initiated this approach with district staff from DAFO (District Agriculture and Forestry Office) who are knowledgeable about the villages. In order to appraise villages' "social cohesion", we assess villagers' aptitude to seize opportunities and make the most of it when projects were implemented in the village. We gathered the extension agents of each district and we asked them to assign a value from 0 to 5 to each target village of the EFICAS project, according to what they thought of the villager's ability to take common decisions and implement projects collectively. They were asked to answer the following question: "*according to you, how likely is the village to fully implement the new land use plan that was designed in the framework of the EFICAS project? Will villagers succeed in consulting and agreeing with each other, taking common decisions and sticking with them?".* The categorized responses ranged from *0=very unlikely to succeed* to *5=very likely to succeed*". The advantage of getting quantitative answers is that we can calculate means, and take the "average opinion" as a value for the corresponding indicator (in this case, one component of a composite indicator about social cohesion).

Once the baseline will be completed, with data from all villages collected and values for each indicator calculated, we will be able to represent the situation of each village with three spidergrams,

one per category of information addressed: see orange box in Figure , which is a hypothetical example as none of the villages baseline is completed yet. These spidergrams provide a visual representation of the baseline at time t0 (year 2015) that can actually facilitate decision making base on village comparison and later on changes in time. The expected changes in the indicators values are represented at the right hand side of Figure for the intervention-villages of the EFICAS Project, i.e. vulnerability values should decrease, and a general increase should be observed for buffer capacity and farming systems.

Figure 20: Graphic representation of changes in village resilience

From methodological design to broad scale implementation

One perspective of the EFICAS project at medium term is to scale-out its activities, i.e. replicating to more villages. Applying the monitoring method on a routine base to more villages requires reducing the amount of time and resources necessary for data-collection, for keying-in the data, and for calculating the indicators values. Towards this perspective, we have to take stock of the achievements so far and to prioritize the steps towards our scaling-out objective.

The final **list of indicators and variables** is settled, but as discussed above it is still likely to evolve. We cannot say yet that the indicators and variables selected so far are the most relevant ones to monitor the changes induced by the project to the village landscapes and livelihoods. These

answers will come along with time from the actual use of the method on a routine basis by district staffs and development projects. For that reason we explained as clearly as possible the way these indicators and variables were identified and selected, as a reference for other people we will get involved in this M&E process on the ground.

The **data collection method** went through a first round of participatory validation using the reflexive loops described in this report. This method includes many artifacts that were prepared in the framework of this internship: e.g. questionnaires for the individual surveys, guidelines for the focus group discussions, explanatory notes and instructions to the person collecting the data (DAFO staff), Excel tables (Annex 5 to 8). We combined various methodological approaches, e.g. individual interviews, resource people, focus groups, direct observations, in order to address all levels of resilience.

However, data collection is still a very long process with the method in its current state. This is due to the great number of variables finally selected, and to the data collection methods that favors individual surveys whenever possible in order to optimize data accuracy. In order to reduce the amount of data to collect we intend to identify relevant proxies: it would reduce the number of variables in the baseline. Let us illustrate this with a case in which a proxy would be very useful to save time and energy.

In the category *Farming system*, one of the components is "*diversity*". One of the indicators of this component is "*on-farm diversity*", and a sub-indicator is a "*diversity index for NTFP, annual crops, perennial crops, and animal species and rice varieties*". The data needed to calculate this index are:

- The exhaustive lists of all the crops (annual *and* perennial) grown in the village, of all the animal species raised, and all the NTFPs collected;
- For each one of these species, the number of farmers growing it/raising it/collecting it.
- The exhaustive list of all the varieties of rice grown in the village

Collecting these data requires asking thirty farmers, individually, the exhaustive list of all what they grow, raise and collect. This questionnaire is quite long to complete. For this reason, a relevant proxy for the "on-farm diversity" indicator would be welcome.

To this extend we are collecting additional data in the villages: data that we do not use for the calculations of the indicators, but that we hope might turn out to become a relevant proxy. But the quality of the future proxy can only be assessed once we have enough villages included in the database to show statistically significant correlations.

Furthermore, *crop diversity index* is an element of vulnerability to crop damages, and *animal diversity index* is an element of vulnerability to livestock diseases. So, if we use a proxy for the "*on-farm diversity*" indicator, we will also have to find proxies (or other data sources) for the two indexes mentioned above.

On the other hand, even though this questionnaire is long, it provides very interesting knowledge about the village livelihood system. And, as stated above, understanding the village context is essential to develop a relevant monitoring method and to interpret the results obtained.

The **keying-in method** is not finalized yet. The current way of storing the information is to key-in data in Excel files and in Access databases, one per questionnaire or per focus group. The current system is not practical for a broad scale use. It could be improved by collecting data with a digital tablet and uploading on a server online. This option could not be considered in the context of the internship as the list of variables and indicators was not settled (it was constantly moving all along the 6 months); now that it is almost finalized, the online database planned by the EFICAS Project will operationalize the baseline and methods described in this report.

The **scoring exercise** consists in building formulas to calculate indicators values, then applying these formulas to the data collected in the villages. It was started during the internship but could not be completed because of time constraints. The formulas were processed for two thirds of the indicators (all vulnerability indicators and buffer capacity indicators). The calculations were done for vulnerability indicators only, and yet: not for all villages, as some data were still being collected towards the end of the internship.

Calculating the indicators' values is still very time-consuming as we made the calculations almost manually: for each calculation, the required data were extracted one by one from distinct files in which they were keyed-in. The data is keyed-in according to the sources of information and the order of collection, rather than per indicator they are used for. If the monitoring method is to be applied to more villages, rationalizing these tasks will become a major issue. An online database seems appropriate for that purpose.

The **data analysis** started before the baseline was fully documented (Castella et al., 2015; Rivera et al., 2015). Local changes in landscapes and livelihoods were analyzed using statistical software and graphic modeling methods. This part of the work, which was an integral part of the internship, is reported in another document (Rivera et al., 2015).

As the baseline was not completed at the end of the internship period (i.e. 14 villages had not yet been surveyed), we have only presented here a ‘work in progress’. In addition, only time will allow us to appraise the relevance of the methods and results presented here to track the changes in villages' resilience. Once the baseline will be completed, the villages will have to be regularly revisited and surveyed before the proposed design can be actually called a M&E system.

Conclusion: a continuous learning process

It would not have been possible to build the M&E baseline without a good understanding of the livelihood systems under study. Prior knowledge of the village contexts from e.g. the experience of other team members or literature review was very useful. But firsthand knowledge of the local drivers of land use change, institutional settings, and decision making processes was necessary to design a baseline fully adjusted to the local reality – and useful to reveal changes in time. The identification of the relevant 'SMART' indicators was made possible only through direct observation, discussions with villagers and other stakeholders, sharing the community everyday life, during the weeks spent in the villages. Similarly, the questionnaires and guidelines got sharper and more realistic (i.e. adjusted to local conditions) as we better understood the systems under scrutiny. In short, the baseline building process was at least as informative about the livelihood systems as the baseline itself (i.e. datasets).

Furthermore, this intimate knowledge of local situations provides leverage points for actions that can be implemented by the project in order to induce changes in the system, such as practices promoting intentional shifts towards sustainable agricultural intensification. Hence the advantage of adopting an iterative/reflexive approach for the whole project: activities can be adjusted and adapted as the M&E tool provides feedback about local perceptions of project implementation. By contributing to the building of the method, the villagers and other stakeholders get to fully understand the objectives and challenges of the project, and, little by little, get a sense of ownership of the activities planned and implemented collectively. This increases the engagement of everyone in the project activities, which is a key asset to sustain activities beyond the period of the project.

Assessing the vulnerability of a village to climate change turned out to be very rich in terms of lessons learnt but also at some points frustrating in the absence of perception of actual climate change events by villagers. They have always adapted to changes occurring in their environment under the direct influence of natural events and they did not feel like they needed to be more aware than before. This attitude may be considered as passive or fatalist, but in the absence of major climatic event it was difficult to address the *latent* characteristics of vulnerability with local stakeholders. However, the cropping season 2015 that just started when we were finishing our field work may turn out to be very important in terms of awareness raising of local communities to negative effects of climate change and analysis of their adaptive capacity. A very active *El Niño* effect led to a very unusual climatic season with droughts and locus outbreaks at the beginning of the rainy season leading villagers to change their practices (e.g. they had to re-sow their rice crop, they loss large areas of maize and had to replace it by other short cycle crops such as sesame or soybean), and then heavy rains that constrained weeding, enhanced soil erosion and triggered landslides. Specific questionnaires derived from the baseline were applied by the team of the EFICAS Project to survey adaptive capacity of villagers at the time they were facing these climatic events. It is expected that asking people when they are in the action will provide better insight that relying on their memory of past events.

Eventually, an evaluation of villages' resilience requires assessing the dual nature of resilience, which combines processes/strategies and results/impacts. For this reason we collected data based on carefully selected variables, *and* we analyze the data in order to reveal changes, explain local contexts. The spidergrams alone do not make much sense in the absence of causal relations between

all variables. They will acquire a real meaning when associated with a data analysis, such as the initial one presented in Rivera (2015) that used baseline data collected in the first 10 target villages of the EFICAS Project. This part of the work should therefore be fully integrated in the understanding of the baseline as we have seen that the local context largely influenced the methods presented in this report. For the sake of simplicity we choose to separate the processes and the results of the baseline into two different reports, but a full understanding of each report requires reading the other one.

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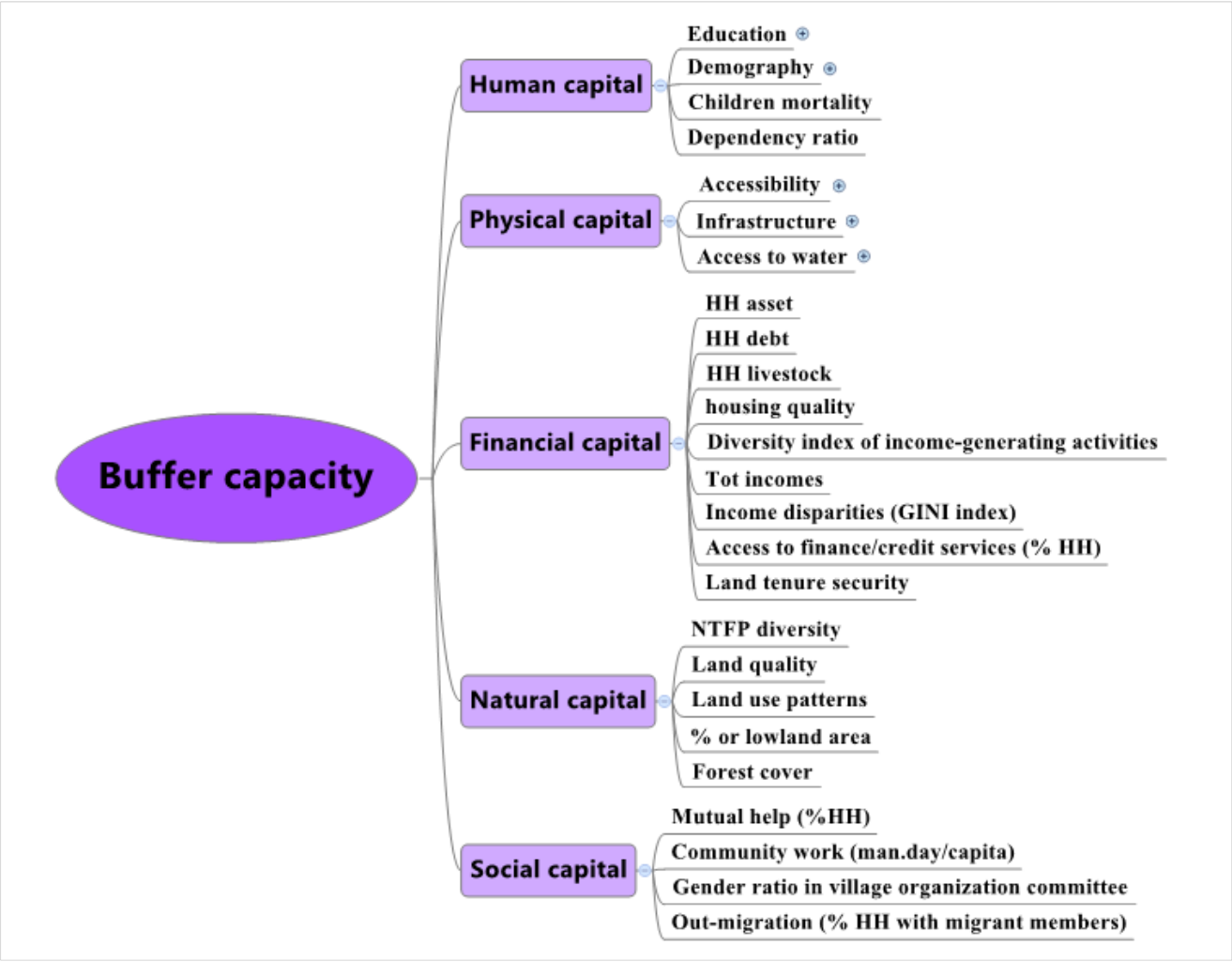
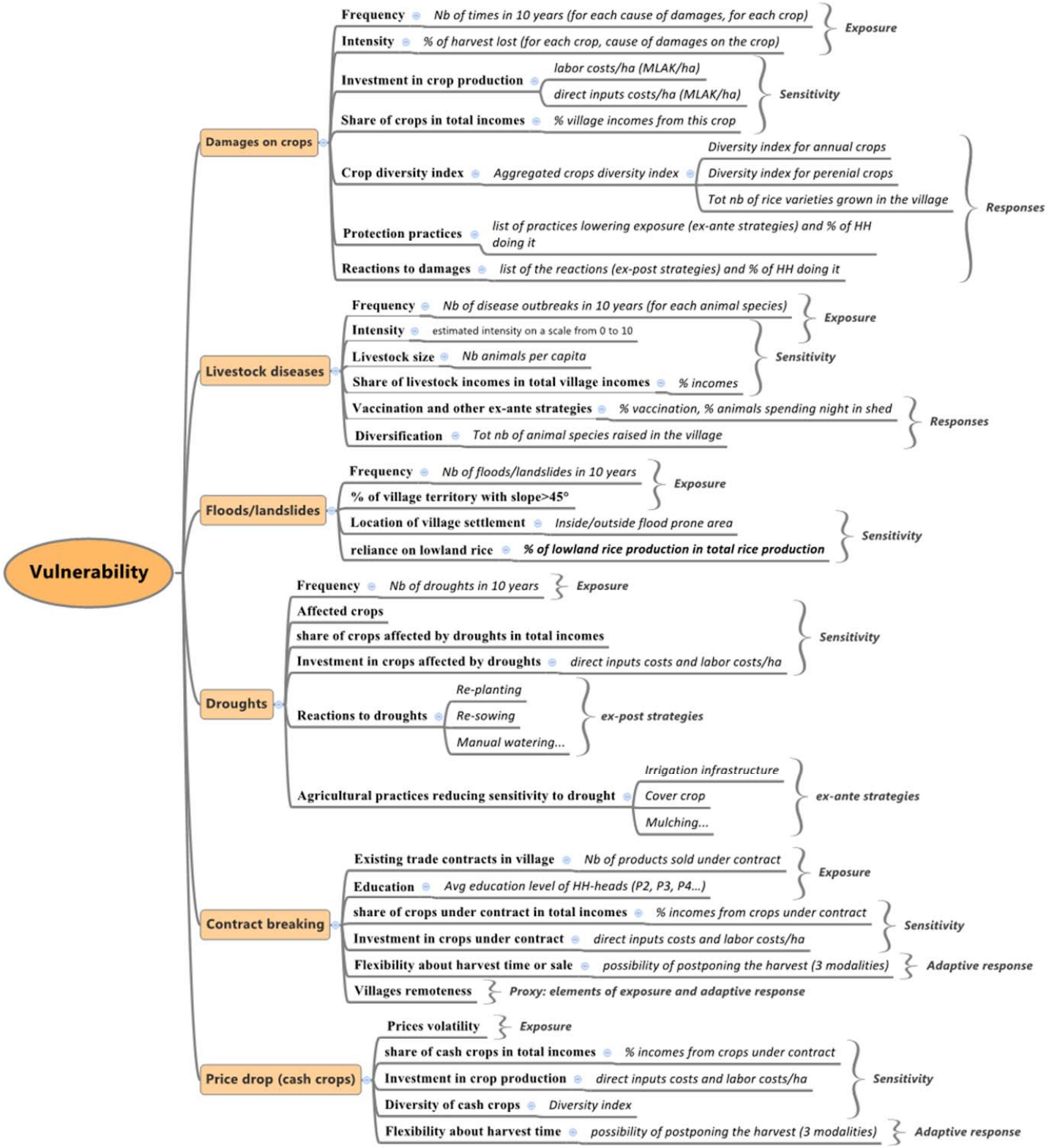
Annexes

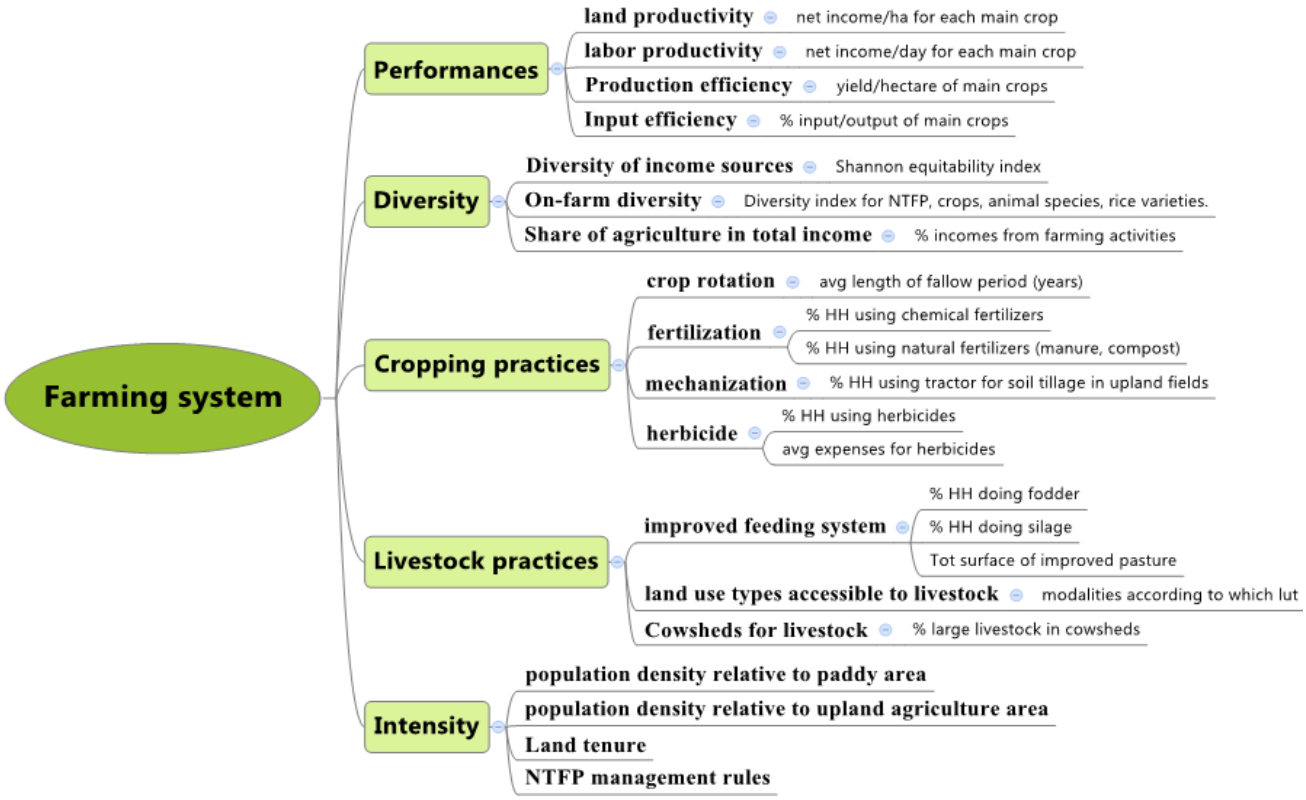
Annex 1: Components and indicators of the buffer capacity



Annex 2: Components, indicators and variables of the vulnerability



Annex 3: Components, indicators and variables for the farming system analysis



Annex 4: Excel file used for calculation of the diversity indexes

		Annual crops																										Perennial crops							
DS2 page	line n	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29		1	2	3	4	5	6	7	8
1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	1	1	1	0		1	0	1	1	1	1	1	0
1	2	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1	1	0	0	0	1	0	1	1	1	1	0		0	0	1	1	1	1	1	0
1	3	1	1	0	0	1	0	0	1	1	0	0	1	1	1	0	1	1	0	1	1	0	0	0	0	1	1	0	1	0		0	0	0	1	0	1	0	0
1	4	1	1	1	0	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0		0	0	0	1	0	0	1	1
1	5	1	1	1	1	0	0	1	1	1	1	0	1	1	0	1	1	1	0	0	0	0	1	0	0	1	1	1	1	1		0	0	0	1	1	1	1	0
1	6	1	1	1	0	1	0	1	1	1	1	1	0	0	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	0		0	0	0	1	1	0	1	0
1	7	1	1	1	0	1	0	1	1	1	0	1	0	1	1	0	1	1	0	1	0	0	0	1	1	1	1	0	1	1		0	0	0	1	1	0	1	1
1	8	1	1	1	0	1	0	1	1	1	1	1	0	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1		0	0	0	1	0	0	1	1
1	13	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	0	1	1	0	1	1	1	0	0	1	1	1	1	0		1	0	0	0	0	0	1	1
1	14	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1		0	0	1	1	1	1	1	1
1	15	1	0	1	1	0	0	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	0	0	0	0	1	1		0	0	0	0	0	0	0	0
2.1	1	1	1	1	0	0	0	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1		0	0	0	0	0	0	1	0
2.1	2	1	1	0	1	1	0	1	1	1	1	1	0	1	1	0	1	1	0	1	1	1	0	1	1	1	1	1	1	1		0	0	0	1	0	0	1	1
2.1	3	1	1	0	0	0	0	0	1	1	1	1	1	1	1	0	1	1	0	0	0	0	0	0	0	1	1	1	1	1		0	0	0	0	0	0	1	0
2.1	4	1	1	0	0	0	0	1	0	1	0	1	1	1	1	1	1	1	1	0	0	1	1	0	1	0	1	1	0	1		0	0	0	0	1	0	1	0
2.1	5	1	1	1	1	1	0	1	1	1	0	1	0	1	1	1	1	1	1	0	1	1	1	0	0	1	1	1	1	0		0	0	0	1	1	0	1	1
2.1	6	1	1	1	0	0	0	1	0	1	1	1	0	1	1	0	0	1	0	1	1	1	0	1	0	1	1	1	1	0		1	0	1	0	1	0	1	1
2.2	7	1	1	1	0	0	0	1	1	1	0	1	0	1	0	0	0	0	0	0	1	1	0	1	1	1	1	0	1	0		0	0	0	0	1	1	1	1
2.2	8	1	0	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1		0	1	1	0	1	0	1	1
3	4	1	1	1	1	0	0	1	1	1	1	1	1	1	1	0	0	1	0	1	1	1	1	0	0	1	1	1	1	1		0	0	0	1	0	0	1	1
3	5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	0		0	0	0	1	1	1	1	1
3	6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1		0	0	0	0	0	0	0	0
3	7	1	0	1	1	1	0	1	1	1	1	1	1	1	1	0	1	1	1	0	1	1	0	1	0	1	1	1	0	1		0	0	0	0	0	0	0	0
3	8	1	1	1	1	0	0	0	1	1	1	1	1	1	1	0	1	1	0	1	1	1	0	1	1	1	1	1	1	1		0	0	1	0	0	0	1	1
3	9	1	0	1	1	1	0	0	1	1	1	1	1	1	1	0	0	1	0	0	1	1	0	0	1	1	1	1	1	1		0	0	0	1	0	0	1	1
31	TOTAL	31	27	27	19	21	8	26	29	31	26	30	19	30	27	9	21	30	17	18	25	23	13	22	15	28	29	26	30	19		5	3	10	15	16	10	26	18
	Pi (%)	1	0,87	0,87	0,61	0,68	0,26	0,84	0,94	1,00	0,84	0,97	0,61	0,97	0,87	0,29	0,68	0,97	0,55	0,58	0,81	0,74	0,42	0,71	0,48	0,90	0,94	0,84	0,97	0,61	Diversity	0,16	0,10	0,32	0,48	0,52	0,32	0,84	0,58
	ln(Pi)	0,00	0,14	0,14	0,49	0,39	1,35	0,18	0,07	0,00	0,18	0,03	0,49	0,03	0,14	1,24	0,39	0,03	0,60	0,54	0,22	0,30	0,87	0,34	0,73	0,10	0,07	0,18	0,03	0,49	INDEX	1,82	2,34	1,13	0,73	0,66	1,13	0,18	0,54
	Pi*ln(I	0	0,1	0,1	0,3	0,3	0,3	0,1	0,1	0	0,1	0	0,3	0	0,1	0,4	0,3	0	0,3	0,3	0,2	0,2	0,4	0,2	0,4	0,1	0,1	0,1	0	0,3	5,28	0,3	0,2	0,4	0,4	0,3	0,4	0,1	0,3

Annex 5: Notice for the district staff in charge of collecting villages data

Instructions and explanations were written in order to help the technicians in charge of collecting data in the villages. It was compiled into a "User notice". The notice provides details about the collecting method – how to proceed and how to use the questionnaires and guidelines in order to collect the required data.

All questionnaires and notices were translated into lao language.

This notice briefly presents the procedure to conduct the EFICAS BASELINE in a village, in one week by two technicians. We present here the general organization of the week, and logistical aspects. Each activity is briefly presented, but the full details and explanations are in the guidelines of each questionnaire.

Week schedule

Here is a tentative schedule for the week. For some focus groups, two technicians are required: one animating the discussion, the other taking notes and/or drawing on posters; for other focus groups and activities you can split and work separately.

Technician 1	
Technician 2	

	Day1			Day2			Day3			Day4			Day5		
	am	pm	ev	am	pm	ev	am	pm	ev	am	pm	ev	am	pm	ev
Meeting with the village head															
Village general information															
Village meeting & FG 'Village history''															
FG 'Cropping system'															
Rapid survey (RS2 or RS1)															
FG 'Livestock System'															
FG 'Problem census Women'															
FG 'Problem census Men'															
FG 'Sales and Contract															
Field survey															
Detailed Survey (DS2 or DS1)															

Table: Participants needed for each activity along the week

Activity	*participants*
Village general information	Naiban, and any other villager likely to provide the needed information: vice-head, teachers, members of elder-committee…
Village meeting	All HH (household-heads or representatives)
FG 'Village history''	about 10 persons, **including members of the elder committee who are knowledgeable about the history of the village**
FG 'Cropping system'	About 15 farmers, men AND women, as diverse as possible: rich, poor, people growing cash crops, members of big HH and small HH, people hiring labor-force…
Rapid survey (RS2 or RS1)	All households will be surveyed.
FG 'Livestock System'	About 15 farmers, men AND women, all raising at least one animal species: buffaloes, cows, pigs or goats.
FG 'Problem census Women'	10 to 12 women, of all categories (young, old, rich, poor…)
FG 'Problem census Men'	10 to 12 men, of all categories (young, old, rich, poor…)
FG 'Sales and Contracts'	10 to 15 villagers, who sell (or used to sell) some production: cash crop, animals, NTFPs…
Field survey	3 HH. 1 Rich, 1 Medium, 1 poor. A technician will go with them to their plot and measure it with GPS.
Detailed Survey (DS2 or DS1)	30 HH. The list of these 30 HH has to be random: random selection from Naiban's list of all the HH in the village.

1. Meeting with the village-head

When you first arrive in the village, a few points have to be discussed with the village-head (called *Naiban* in lao):

- Present the week schedule and explain every activity that will be implemented. According to the villagers constraints (busy with agricultural work, celebrations …), you will have to adapt the week schedule. Moving some focus groups in the evening can be an option.
- For the focus groups, the village-head can help convoke participants. Give him the criteria for participants to each focus group (see table above), and ask him to make a list of villagers for each focus group and then convoke them.
- Ask Naiban to provide you with a list of all the HH in the village.
  →Then randomly select 30 HH for the **detailed survey**. It might be useful to give this list of 30 household-heads to Naiban, so that he can inform them they will be surveyed along the week.

- Ask Naiban what are the main 4 crops grown in the village, apart from rice.
  → Then fill the titles of the columns in the questionnaires Rapid Survey: crop 1= ……..; crop 2=……..; etc.).

2. Village meeting

On the first day (evening is usually a good time), gather all the household-heads of the village in order to introduce the project and inform them about the activities of the week. Expose the aims of the week, present the week schedule and describe briefly the content of each focus group and questionnaires.

3. Village history (focus group)

Reference document: 1_VH

The objective is to get information about the history of the village: the main events, the big trends etc. Based on this information, you will be able to ask more accurate questions during the following focus groups and surveys.
This focus group can be done right after the 1st-day village meeting if it is not too late.
It is really important that people knowledgeable about the history of the village be present (meaning: not only young villagers or people who just moved in…)

Annex to fill if necessary:

Pesticides & chemical fertilizers adoption: Reference document: 1_VH1
Road opening to production areas: Reference document: 1_VH2

4. Village general information (focus group)

Reference document = Village general information" questionnaire: 2_VI

This is a questionnaire you will have to fill along the week, based on information you get from Naiban, and any other local informants (villagers, teacher, etc.) likely to provide the information required in the questionnaire.

5. Problem census (focus groups)

Reference documents: 3_PC_M (for men) and 3_PC_W (for women)

Two problem censuses have to be done: one with men and one with women, separately.
We ask the participants to describe the problems they face and what they would like to change to overcome these problems (see guidelines).

6. Cropping system (focus group)

Reference document: 4_CS

This focus group should be attended by at least 12 to 15 participants.
We ask villagers about many aspects of their agricultural practices. It is structured in 5 main sections as presented below.

Crop/ animals/NTFP diversity

This section aims at drawing up with the villagers exhaustive lists of all the crops they grow, of the rice varieties they have, of the NTFPs they collect and the animal species they raise.
This data will be used to prepare the questionnaire of Detailed Survey (8_DS_List): the list you obtain in focus group will be the header of the columns for a questionnaire of the Detailed Survey.

➔ List of the different crops grown in the village

➔ List of the different NTFP collected in the village

➔ List of the different livestock raised in the village

Report the lists in the sheets of DS2: **diversity of crops** and **NTFP collected and animals raised** (8_DS_List)

- Fill the tables "**annual crops**" and "**perennial crops**":
  Ask villagers to list all annual and then perennial crops they grow. (All crops: even the species that only a few farmers grow, and the species they grow in small quantity). ➔ *Tick on the tables the species they cite, or add them if they do not appear in the tables yet.*
- Fill the table "**Livestock**":
  Ask villagers about all the animal species they raise; tick them in the list or add them if they do not appear yet.
- Fill the table "**rice varieties**":
  Ask villagers about all the rice varieties they grow; tick them in the list and add the varieties that do not appear yet.
- Fill the table "**NTFPs**":
  - Ask villagers to cite all NTFPs they collect (/!\ *whether they sell it or not*). Add in the 1st column those that do not figure yet.
  - 2nd column: 1=the NTFP is collected, 0=Not collected.
  - 3rd and 4th columns: is the NTFP collected for self-consumption and/or is it commercialized (it can be both).
  - 5th column: what access do villagers have to this NTFP: is there any regulation about the

quantity, time of collection? Is the NTFP domesticated? → fill the column with the modalities proposed above.

Rotational system

In this section we intend to "draw"/illustrate the main agricultural systems existing in the village, according to what farmers explain and describe.

With cards representing the crops, plantations, livestock, NTFPs etc, we will represent schematically the way all these components of the system are linked and the way villagers manage them.

The output of this section will be a large poster that you will have to take a picture of.

➔See the focus group guideline for all detailed explanations. Materials needed: set of cards, 2 large posters, markers, camera.

Pest damages

In this section we list all the causes of damages on crops, rank them and asses their intensity. The process for the rankings and scaling the intensity is fully described in the guidelines.

➔See focus group guideline. Materials: around 30 little stones/big seeds/bear bottle caps (for the rankings and intensity scaling), posters with tables already drawn on it (see guidelines)

Drought & excess of water

We try to assess the vulnerability of the village to droughts and heavy rains (floods, landslides…).

➔See focus group guidelines

7. Livestock system (focus group)

Reference document: 5_LS

Livestock management

→See guideline.

Annexes to fill if necessary:

- Vaccination annex
  Reference document: 5_LS_1
- Fences annex
  Reference document: 5_LS_2
- Improved pasture and forage processing annex
  Reference document: 5_LS_3

Livestock disease outbreak

In this section we list the health problems villagers face with livestock, we rank them and asses their intensity. The process for the rankings and scaling the intensity is fully described in the guideline.

Materials: around 30 little stones/big seeds/bear bottle caps (for the rankings and intensity scaling).

8. Sales and contracts (focus group)

Reference document: 6_SC

In this focus group we inventory all the products villagers sell, and the way they sell them. We ask about the possible contracts they signed and the conditions, etc. If some contract breakings occurred

in the past for a given product, we ask further questions about in the story of this contract breaking (how did villagers react, etc.) using an additional 'contract breaking' annex.

Annexes to fill if necessary:

- Contract breaking
  Reference document: 6_SC_1
- Land concessions
  Reference document: 6_SC_2

Question leading to this annex: in focus group "sales and contract farming":
"Is part of the village area managed by people from outside the village? Do people from outside the village own or control land within the village area?
Ex:
-> A company that was attributed land concessions in the village (for plantation, cash crops, mining activity…)
-> Private investor buying land in the village
-> Protected Natural Area created and set under management of district or province…"…

9. Rapid survey

Reference document: 7_RS

The rapid survey has to be done with ALL the HH of the village: it is an exhaustive survey.

⇨ Before starting it, complete the titles of the rapid survey questionnaire (2nd page of the survey): names of the main crops, established with Naiban on the first day (cf **1. Meeting with the head-village**). /!\ Fill ALL the questionnaires, and make sure you write the names of the crops in the same order in all the questionnaires.

To complete the rapid survey, you can ask villagers to come to the village meeting room (or in the school or any other place) so that you can interview them one by one.

10. Detailed survey

Reference document**s**: 8_DS, 8_DS_FC, 8_DS_List

The rapid survey has to be done with 30 HH of the village, randomly selected in the Naiban's list of all households in the village.

Note: if there are less than 30 HH in the village then interview all of them. In this case you can decide to make the rapid and detailed survey at the same time with each HH.

/!\ The Detailed survey is composed of **several sheets.** For each HH surveyed you have to fill all of them:

- Main questionnaire - Reference document: 8_DS
- Household composition: sheets with 4 tables/sheet: fill one table per HH surveyed (Reference document: 8_DS_FC)
- Diversity of crops: fill one line per HH (Reference document: 8_DS_List)
- NTFP collected and animals raised: one line per HH (Reference document: 8_DS_List)

Notice for filling the sheet "Household Composition"

HH N°…

Family & HH members (All children born from the mother)	Lives in HH (1=yes; 0=no)	Gender M /F	Year of birth	Year of death	Still attends school (1=yes; 0=no)	Educa-tion level
HHH	1	M	1966	_	0	P5
HHW	1	F	1968	_	0	P3
C1	0	F	1987	_	0	M1
C2	1	M	1989	_	0	M1
C3	0	F	1990	_	0	P5
C4	_	M	1991	2013	0	P5
C5	1	F	1995	_	1	U
C6	1	M	1998	_	1	M4
C7	1	M	2000	_	1	M2
C8	_	F	2002	2002	0	0
DIL 2	1	F	1994	_	0	M1
GC1	1	F	2008	_	1	P2
GC2	1	M	2011	_	1	KG
O	1	F	1947	_	0	0

Notice/explanations

Family & HH members: list all people living in the HH + other family members: children from the mother.
HHH = Household head (can be a woman)
HHW = Household head wife (or husband)
C1, C2, C3 = 1st child, 2nd child, 3rd child: /!\ ALL children *of the mother (even those from 1st marriage)*: we need to know how many childbirth she had.
DIL = Daughter-in-law (ex: DIL**2** = wife of the ***second*** child: C2)
SIL = Son-in-law *(idem)*
GC = grand-child
O = other people living in the HH: parents, brothers, sisters of the HHH, aunts, nephews, brothers and sisters-in-law, etc.

Lives in HH: does the member currently live in the HH. Children attending school elsewhere but coming back home on week-ends or holidays do count as living in the HH: "yes".

Education level:
KG = kindergarten
P1-P5 = primary 1 to 5
M1-M7 = secondary 1 to 7

For the last two sheets mentioned above, you first have to fill the titles of the columns with the lists established during the focus group "cropping system" Reference 4_CS. Thus this focus group has to be done at the beginning of the week, BEFORE starting the detailed survey.

- After having selected the 30 HH to be surveyed, take an appointment with them in order to meet them in their home. Some questions are easier to ask in a private context.
- You can plan to do :
    - 5 detail surveys in the morning
    - 5 detail surveys in the after noon
    - 3 detail surveys in the evening

11. Field survey

Reference document: 9_FS

This survey aims at assessing land productivity and labour productivity of the cropping system. To do with 3 HH. Choose 3 HH growing main crops. Try to have them being representative of the different practices in the village.

You will go with the owner of the plot to his/her plot of last year (2014), and measure it with a GPS. Then you will ask a few questions about the crops they grew in it, the cropping practices and the time spent for each task.

12. Final synthesis

To verify the results of the overall baseline a final questionnaire is filled by the DAFO staff himself based on his/her understanding of the village situation : 10_FS

If he/she is unsure about some information, questions can be asked to the village head.

Annex 6: Guideline for the focus group discussion about the village history

Village history

Origins of the village

Events to write in the table:

- Village settlement location changed. Note the reason why they moved. Ex: to get closer to the road, on governmental order, a big fire destroyed the houses, threat of climatic event (flood, landslides…)…
- Population changes: several HH from outside came to live here (immigration), or several HH moved away (emigration). Note the year it happened, and the number of HH who moved in (or out). Where did they come from or where were they moving out and their reasons? And step by step, subtract (if move out) or add (if move in) the number of HH to the Tot number of HH for each event.

Event	Year	No of HH moved in	No HH moved out	Tot No of HH	Origin/Destination and reasons
Date of village establishment					
Current situation	2015				

- Infrastructures built: school, health centre, road (main road or road to production area), water, electricity network, market place…

Infrastructure	Year	Who paid for it?

- Changes in agricultural practices. Examples of changes:
    - Started growing a new crop (what crop, how many HH did it etc.)
    - Started using herbicides/insecticides/fertilizers (precise the product)

      →See annexe: **Pesticide and fertilizer adoption**
    - Started using tractors for tillage (precise: in upland or lowland? For what crop?)
    - Building of a road to production areas: -> they started using tractor to carry the harvest from the plot to the village

      →See annexe: **Roads to production area**
    - Started/stopped fencing plots…

Event	Year	Description of the event, causes, impacts…

- Main events related to livestock. Ex: changes in herd size, new livestock in the village, major disease outbreaks, establishment of a livestock area, beginning of a livestock bank, new animals in the village (new species, new breeds, …).

Event	Year	Description of the event, causes, impacts…

Note all events mentioned by participants during opened discussion about their village history.

Village:…… Interviewer: …….. Date: …… Sheet n° …./….

Annex 7: Additional questionnaire in case of pesticides or chemical products used in the village.

Pesticides and chemical fertilizers adoption

Kind of product used in the village: fill ONE sheet by kind of product used in the village

- o Insecticide
- o Herbicide
- o Fungicide
- o Chemical fertilizer

Name of the products	**Form** (powder, liquid, liquid to dilute, …)	**Price** per unit (ex: LAK/L; LAK/kg; LAK/tube of 50mL…)

1. **When did you apply it for the first time? ……**

2. How did you learn about it?

- o Relatives/friends from the village
- o Relatives from other villages/provinces
- o DAFO staff
- o Trader
- o Project
- o Company as part of a contract
- o Radio, TV, …
- o Others: ……..

3. Who provided you with the pesticide for the first time?

- o You bought by yourself
- o Relatives
- o DAFO staff
- o Traders
- o Project
- o Company as part of a contract
- o Other: ……

4. Why did you use it for the first time?

- o Very low yields
- o Lack of labor force
- o Weed/pest pressure too high
- o Other : ……..

5. Where do you buy the product now?

- o You buy it by yourself
- o Relatives
- o DAFO staff
- o Traders
- o Project
- o Company as part of a contract
- o One person buys for all villagers
- o Other : ……..

6. In the first year of use how many HH used it? ……..

7. How has the number of HH using this product evolved in the recent years?

- o Increased: -> cf question **8.**
- o Decreased: -> cf question **9.**
- o Remained the same

8. Why did it increase?

- o It is easier than hand-weeding so more and more families are interested
- o Lack of labour force: less and less labour force in the village

- o Weeds pressure increased
- o Pests pressure increased
- o Pesticides/fertilizers provided for free to the farmers

9. Why did it decrease?

- o Health problems on animals occurred or are feared
- o Health problems for humans occurred or are feared
- o There was a new regulation in the village about its use (forbidding or limiting it)
- o Villagers observed contamination of the river/soil and decided to stop
- o Weeds pressure in the field is not so high any more
- o Products used did not give good results, not efficient
- o Not enough money to buy it

10. How did you learn how to use it?

- o Training with DAFO
- o Reading the instructions on the product package
- o Don't really know how to use it
- o Other : …….

11. Do you use specific protection equipment when spraying it?

- o Yes
- o No

Village:…… Interviewer: …….. Date: …… Sheet n° …./….

Annex 8: Additional questionnaire if roads towards production areas have been built in the village

Roads to production areas

Total number of roads leading to production areas: ……..

Road n°__: name: …… Length (km): ……..

1. Year it was built: …… Total price of the road (MLAK): ……..
2. How many HH benefit from this road? ……
3. Who paid for it?
   - Villagers themselves
   - Private company
   - Government agency
   - Development project
   - Both villagers + company: ……..km paid by villagers and ……..km by the company
4. Reimbursement modalities:

How many years: ……..… Interests: ……

5. Did/will all households contribute to pay the road?

   o YES o NO: no of HH contributing: ……. Reasons:

6. Did/will all households pay the same amount?

   o YES: amount paid per HH (MLAK): ……..
   o NO: they pay depending on certain criterions.
   - Wealth of the HH
   - They own vehicle (tractors, hyundai),so they need the road
   - Size of the HH, labor force in the HH
   - Contract with a trader
   - They have plots in the area reached by the road
   - Other: ……..

Village: …….. Date: ……

Annex 9: Questionnaire for general information about the village

Village general information (direct observation + resource people)

Infrastructures

• Village accessible by:	Dry season (1=yes; 0=no)	Rainy season (1=yes; 0=no)
motorbike		
car		
truck		

- Electricity network in village: O YES O NO

Date of connection to the national power grid:……..

Alternative electricity sources in the village:……

- Water for family consumption :

☐ In house pipe, ☐ water points (total number: …….), ☐ river, stream, ☐ other: precise……..

Is there enough water for domestic consumption? O YES O NO

Water shortages

O – No water shortage: permanent access to water *in the village*
O – Occasional water shortage in the village but there is a water source further: stream or container outside the village with unlimited water.
O – Regular water shortage in the village but there is a water source further: stream or container outside the village with unlimited water.
O – Regular water shortage and rationing: use of water is regulated.

Public Infrastructure	In the village (1=yes / 0=no)	Distance to the closest one (km)
Village office		0
Health station		
Temporary market place		
Permanent market place		
Sport facilities		

Shops and services:

Village: …….. Date: ……

Shop/service type	number

School infrastructure

	Presence of school in the village (1=yes, 0=no)	Distance to the closest school (km)	School building walls made of (1=bamboo, 2=wood, 3=concrete)
Kindergarten			
Primary school			
Secondary school			

Institutions

Local organizations

Composition of the village organization committee (kanjaktan ban)

	Total members	Women
Village committee (kana ban)		
Elder committee (neohom)		
Security (kong lon)		
Soldiers (tahan ban)		
Women union		
Youth union		
Unit heads		
Other:_____		
Other:_____		
Total		

Medical worker living in the village O YES O NO

Veterinary volunteer in the village O YES O NO

Village: …….. Interviewer: …….. Date: ……

No participants to the focus group: ……

Annex 10: Guideline for the focus group discussions about problems in the village.

Problem census (men and women separately)

2 groups, about 10 persons each: men and women separately. Review of village problems, causes, impacts, proposed solutions. Ranking by importance for the village

Questions to ask:

- What issues do you face in your everyday life? What would you like to change?
- Rank from the most serious problem to the least serious.

For each problem, ask:

- According to you, what are the causes to this problem?
- What are the impacts? What consequences in your life?
- What could you do to solve this problem? What solutions can you imagine?

Problem Census

Problem census	Rank ♀	Rank ♂	Cause	Impact	Proposed solution
Not enough water	1		•Water system is not working well, especially during dry season. •Other streams are far away from the village (more than 10 min walk) and lower, difficulties to bring water back to the village.	•Not enough water for drinking, for animals and for domestic uses. •Diseases happened. •Villagers spend a lot of time to get not much water.	Need help to: •repair the old water supply system. •connect pipes to another stream to have more water.
Animal diseases/ mortality	2	1	•Roaming animals increase the risks of contamination. •Weather too dry for the animals •No vaccination in the village	•Get less income from animals. •Livestock breeders become poorer	•Separate the animals by fencing dedicated livestock areas. •Would like to learn by themselves how to inject vaccines
Road impassable during wet season	3	3	•Road very small and steep. •Village in the mountains and located far from town.	•Hard to bring sick people to the hospital during the rainy season. •Difficult to sell products.	Need material from the district to improve the road, villagers can provide labour force.
Medicinal system not appropriated	4		•Village far away from the town •Only one man can provide medicines	•Medicines not available all the time because the 'medicine man' often works in the fields. •Poor people cannot buy medicine.	•Need more than one doctor. •Will continue to use traditional medicine
Use of herbicides		2	High weed pressure.	•People often sick and weak. •Livestock touched, one goat died. •Spend a lot of money for herbicides and medicines	No solution, they will continue.

Village: …….. Interviewer: …….. Date: ……..

No participants to the focus group: ……..

Annex 11: Guideline for the focus group discussion about the cropping systems

Cropping systems

I. Diversity of crops, NTFPs, livestock in the village

Annual crops:

Species	Grown in the village?
Rice	
Maize (hybrid)	
Maize (traditional)	
Sesame	
Job's tears	
Stick lac	
Pigeon pea	
Cassava	
Soybean	
Watermelon	
Pumpkin	
Chili	
Cucumber	
Eggplant	
Ginger	
Peanut	
Beans	
Makfak/makton	
Makado	
Maknam	
Mankeo	
Makbouap	
Maknoy	
Mak thoua beu	
Sugar cane	
Tobacco	
Sweet potato	
Garlic	
Onion	
Cabbages	
Salad	
Makpheuak	

Perennial crops:

Species	Grown in the village?
Rubber	
Teak	
Coffee	
Cocoa	
Tea	
Sacha Inchi	
Banana	
Makkao	
Makyao	
Mango	
Jackfruit	
Tamarin	
Linchi	
Makphuk	
Makfeung	
Coconut	
Maklod	
Maklimmai	
Makgnid	
Makkhai	

Livestock:

Species	Raised in the village?
Buffaloes	
Cattle	
Goats	
Pigs	
Chickens	
Ducks	
Turkeys	
Pigeons	
Fishes	
Frogs	
Porcupines	
Rabbit	

Rice Varieties:

Species	Grown in the village?
Khao Deng	
Khao P Khao Luang kham	
Khao Do	
Khao Den du	
Khao kam	
Khao Mak ko	
Khao mak khu	
Khao kang	
Khao Phê	
Khao Na	
Khao Nok	
Khao Way	
Khao Luang kham	
Khao Vay Deng	
Khao Yuak	
Khao Na Bok	
Khao Mitsidam	
Khao Mitnyay	
Khao Mitnoy	
Khao say kan	
Khao Mitsideng	
Khao Mitpom	
Khao Neokepsi	
Kaho Peuak Sidam	
khao kon	
khao xang	
khao ban	
khao Xuay	
khao kai noi	
khao mak kor	
khaodaeng pom	
khao phengdeng	
khao maknaeng	
khao mak ka	

Village: …….. Interviewer: …….. Date: ……

No participants to the focus group: ……..

NTFPs:

NTFP species	**Collected (1=Yes, 0=No)**	**Self-consumption (1=Yes, 0=No)**	**Sold (1=Yes, 0=No)**	**Access the resource(1)**
Broom grass				
Mulberry paper				
Peuak Meuak				
Pompeng				
Bamboo shoots				
Bamboo worms				
Wildlife: dead animals				
Wildlife: living animals (birds in cage,…)				
Fuel wood				
Bamboo for construction				
Mushrooms				
Homsarmmeuang				
Maksamsip				
Eonling				
Cardamom				
Makmanka				

(1) **A**= Open and unlimited access

B= Regulation about the quantity collected per HH: maximum … kg/HH. (quotas)

C= Regulation about the time of collection: limited number of days of collection each year (ex: collection allowed from 3rd to 16th of September; forbidden otherwise)

D= Regulation about the use: collection allowed for self-consumption only…

O= Other: precise…….

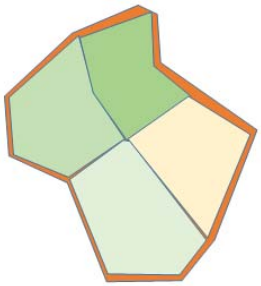
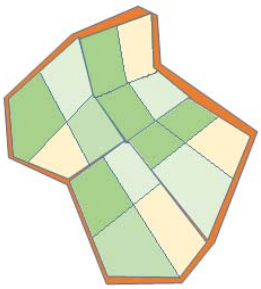
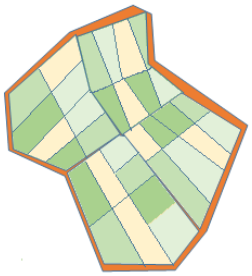
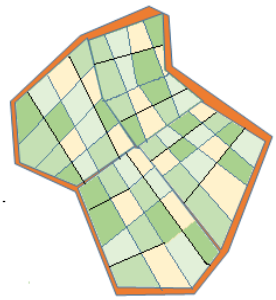
E= NTFP domesticated: farmers *grow* it in order to increase the production.

Village: …….. Interviewer: …….. Date: ……
No participants to the focus group: ……..

II. Rotational system

Cultivation patterns in rotational systems (from few collective blocks to many individual plots)

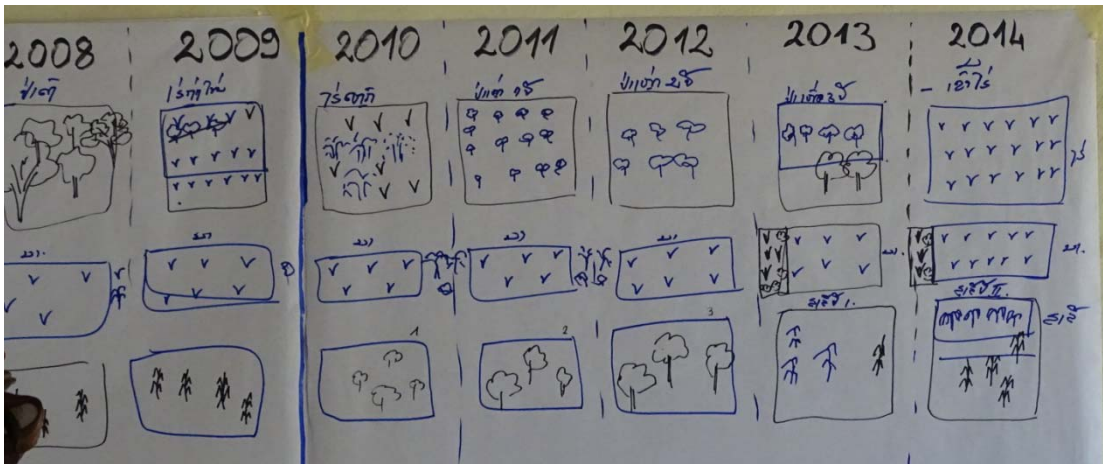
Example of cropping patterns with a rotation of 4 years and different number of production groups

Case 1	Case 2	Case 3	Case 4
 1 production group	 4 production groups	 8 production groups	
All the HH of the village open in the same block for cultivation (plots are borrowed, lent, … in order to allow everybody to cultivate in the same area)	Families gather in cultivation groups -> Every year there are in the village as many opened areas as groups of families. Number of groups in 2014 :		No production groups. Each family decides where they will crop according to their own objectives and constraints (scattered plots in the landscape).

- **How many "production groups" are there in the village?**
  - 1-3 groups
  - 4-6 groups
  - 7-9 groups
  - > 9 groups
- **Maximum number of crop cycles per year in the paddy fields: …….**
- **Maximum number of crop cycles per year in the vegetable gardens: …….**
- **What were the main cropping systems in the village in 2014?**
  - Crop 1: ……
  - Crop 2: ……
  - Crop 3: ……
  - Crop 4: ……
  - Plantation 1: ……
  - Plantation 2: ……
  - Plantation 3: ……

Village: ……. Interviewer: …….. Date: ……

- **Drawing the poster:**



A. Draw the columns

Draw columns on the poster, for each year: 2014, 2013, 2012 etc.

B. Draw the plots of 2014

In the column "2014", draw one plot for each main crop they grow. Ask if they grow other crops associated, mixed in the same plot: if yes, draw the associated crops. (ex: pumpkin with maize, pigeon pea within rice…)

C. Draw the "history" of the plots

For each plot, we draw what was in this plot in the previous years (fallow, crop, forest…). Ask how old was the fallows they opened, and draw "fallow" in the corresponding years. For the paddy plots, ask if they opened it recently or if they have had paddy fields for a long time.

Village: …….. Interviewer: …….. Date: …….

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Cropping system 1: ……. (if paddy rice: include off-season crops)	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
Cropping system 2: …….	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	
Cropping system 3: …….	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	
Cropping system 4: …….	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	

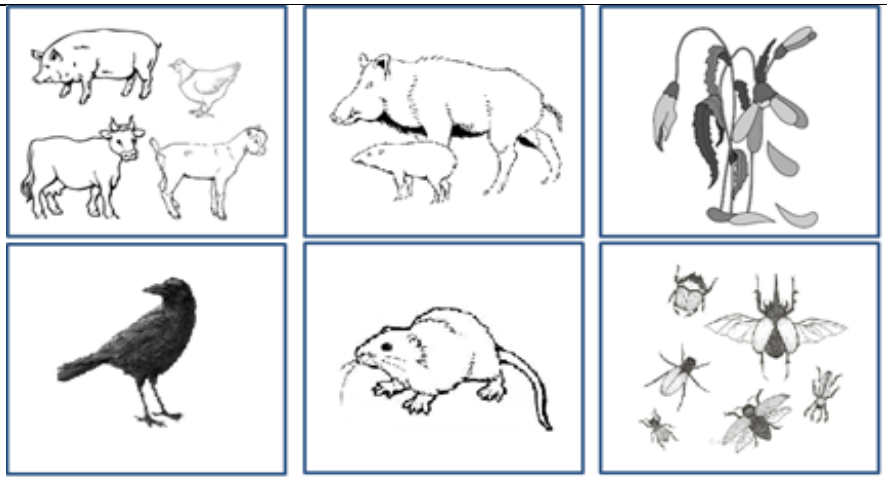
Village: …….. Interviewer: …….. Date: ……..
No participants to the focus group: ……..

III. Pest damages on crops

Number of people attending the focus group: ……..

Damages ranking and intensity assessment.

⇨ *Copy this table on a poster*:



0	1	2	3	4	5	6	7	8	9	10

➢ **For each main crop, one by one, fill the table below.** See Notice (baseline method) for full explanations.

Village: …….. Interviewer: …….. Date: ……..

No participants to the focus group: ……..

				INTENSITY (harvest loss)										
	Ranking of the causes	**Year of the last big damage**	**Number of thimes over the last 10 yrs**	**0 %**	**10 %**	**20 %**	**30 %**	**40 %**	**50 %**	**60 %**	**70 %**	**80 %**	**90 %**	**100 %**
Cropping system 1: ……	1-													
	2-													
	3-													
	4-													
	5-													
	6-													
Cropping system 2: …….	1-													
	2-													
	3-													
	4-													
	5-													
Cropping system 3: ……	1-													
	2-													
	3-													
	4-													
	5-													
Cropping system 4: ……	1-													
	2-													
	3-													
	4-													
	5-													

Village: …….. Interviewer: …….. Date: ……
No participants to the focus group: ……..

- **Solutions/Reactions to pests damages**

Fill the table below (see full explanations in the notice).

Damages	Practices	Number of participants doing it
Wild pigs	Did not do anything	
	Went to hunt at night	
	Fire around the plot	
	Rags soaked with perfume or soap	
	Cut trees around the plot to make a natural fence	
	Barbed wire fence	
	Electric fence	
	Traps	
	Other: ……..	
Rats	Did not do anything	
	Put traps	
	Hunted rats at night	
	Used rat poison	
	Other: ……..	
Birds	Did not do anything	
	Scarecrows	
	Nets	
	Staying in the field to frighten the birds	
	Hunted them	
	Mechanic sound systems	
	Automatic sound systems	
	Other: ……..	
Insects	Did not do anything	
	Picked them by hand	
	Unsystematic application of pesticide	
	Systematic application of pesticide	
	Other: ……..	
Livestock	Did not do anything	
	Cut trees around plot to make natural fences	
	Built fences (bamboo, wood)	
	Barbed wire fences	
	Electric fences	
	Negotiate with the owner of the animals for solving the problem (speaking to him or threatening him of compensation…)	

Village: …….. Interviewer: …….. Date: ……..
No participants to the focus group: ……..

	Other: ……..	
Plant diseases	Did not do anything	
	Pick the infected seedlings out	
	Unsystematic application of pesticide	
	Systematic application of pesticide	
	Other: ……..	

IV. Droughts

- Year of last drought: ……..
- Which months did it occur? 1 2 3 4 5 6 7 8 9 10 11 12
- Number of droughts over the past 10 years: ……..times
- Crops affected by droughts: fill the table below.

Crops	Practices [2]	Number of participants doing it
1-		
2-		
3-		
4-		

[2] Practices used to cope with droughts:

A= Irrigation
B= Manual watering
C= Cover crop - mulching
D= Replanting the same crop
E= Replanting another variety
F= Replanting another crop
G= Don't do anything
H= Other, describe the practice

Village: …….. Interviewer: …….. Date: ……..
No participants to the focus group: ……..

V. Excess of water/heavy rain

- Do floods or landslides occur in the village? O Yes O No

If "NO": skip section V.

- Year of the last big event due to an excess of rain: ……..
- Which month did it | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | occur?
- Occurrences over the past 10 years of such an event: ……..
- What were the reactions? → Fill the table below

Events	1=Yes, 0=No	No HH affected	Practices set up to face the problem :	No participants doing it
Landslide in the production area			Do not cultivate on steep slopes	
			Living fences or grass strips	
			Cover crop	
			Do not do anything	
			Other :……	
Landslide in the village settlement			Establish a protection forest	
			Regulation about where they can build houses	
			Do not do anything	
			Other:……..	
Landslide on the road			Establish a protection forest	
			Collective work to maintain/fix the road	
			Do not do anything	
			Demarcate 'risk area' – warning signs	
			Other:……..	
Flood in the lowland area			Level up the land after the flood	
			Stabilise the river banks (vegetation, gabions, bamboo wall…)	
			Do not do anything	
			Other:……	
Flood in the village			Build a dike around the village	
			Demarcate 'risk area' – warning signs	
			Do not do anything	
			Other:……	

Village: …….. Interviewer: …….. Date: ……
No participants to the focus group: ……..

VI. Paddy field construction

If no paddy fields were opened in the village over the past decade, skip this section. The focus group is over.

- How large is **the entire paddy area opened in the last 10 years?** …….. ha
- **How many HH where involved in the opening of new paddy land?.....HH**
- Who paid? O Individual HH, O Project, O Government initiative, O Other
- **Total investment for terracing paddy land?** ……MLAK
- **How did villagers finance it?**
  - Collected money into a village fund for the construction
  - Individually investment, individual deal with a company or loan from the bank
  - Borrowed money collectively from the bank
  - Other:……

Collective labour activities:

Task	Number of time/year	Number of hours per time	Number of people	Total labor force per year (man.day)
Fixing and cleaning the village roads				
Cleaning the village and school				
Fixing and cleaning the water adduction system				
Other collective works (e.g. livestock area, maintenance of irrigation system)				

Financial resources

- Village development funds

Name of the fund or project	Date of creation	Total amount of the fund	Maximum amount of money a HH can borrow	Interest rate	Credit duration

- Livestock bank: O yes – O no,
  Year of creation_____,
  Still functioning: O yes – O no,
- Rice bank: O yes – O no,
  Year of creation_____,
  Still functioning: O yes – O no,

Village: …….. Interviewer: …….. Date: ……
No participants to the focus group: ……..

- Commercial banks

Name of the banks	Year started activities in the village	Total amount of the fund	Maximum amount of money a HH can borrow	Interest rate	Credit duration

Village awards

Village award	**1 = yes; 0 = no**	**Year obtained 1st time**
Clean		
No crime – no case		
Healthy		
Cultural		
Primary education for all HH heads		
Other		

Village: …….. Interviewer: …….. Date: ……
No participants to the focus group: ……..

Annex 12: Guideline for a focus group discussion about livestock systems

FOCUS GROUP GUIDELINE: Livestock system

I. Caring for animals

1. **Fill the table below. See notice for full explanations.**

	Sleep in shed				Shared care for animals (1=yes, 0=no)	Circulation of animals: A= free-roaming ; B=tended ; C= inside fence ; D= in shed
	Dry season		Rainy season			
	No 'yes'	**No 'no'**	**No 'yes'**	**No 'no'**		
Buffaloes						
Cattle						
Goats						
Pigs						

2. **How frequently do farmers go and see their animals?**

→ *Draw beside table on a poster:*

Number of days between two visits to ***buffaloes and cows***									
1	2	3	4	5	6	7	8-10	11-15	16-30

→ *Ask participants how frequently they go to see their <u>cows and buffaloes</u>: number of days between two visits. Then report the results on the table below. See full explanations in the notice.*

No days b/w visits	1	2	3	4	5	6	7	8-10	11-15	16-30
Dry season										
Rainy season										

II. Circulation of the animals

1. **Are there livestock areas?** O No O Yes No of areas:…… Total area (ha):……..

2. **Where do the roaming animals circulate?**

Buffaloes-cattle

Land use types they can get access to

Land use types	forest	fallow	natural pasture	paddies	village settlement
Dry season					
Rainy season					

Goats

Village: …….. Interviewer: …….. Date: ……
No participants to the focus group: ……..

Land use types they can get access to

Land use types	forest	fallow	natural pasture	paddies	village settlement
Dry season					
Rainy season					

Pigs

Land use types they can get access to

Land use types	forest	fallow	natural pasture	paddies	village settlement
Dry season					
Rainy season					
Total number of "ticks" in the column					

3. **Regulations about animals' circulation in the village (***multiple responses possible***):**
   - o **No regulations at all**
   - o **Owners of *plots* responsible** for livestock damages on crops: farmers have to fence their plot in order to protect it from livestock damages.
   - o **Owners of *animals* responsible** for livestock damages on crops: farmers have to keep livestock from getting into the plots. -> Parked, tended…
   - o **Established/institutionalized 'livestock area'**. Inside the area, owners of *plots* are responsible. Outside the area, owners of *animals* are responsible.
   - o **Animals are forbidden to get into some specific areas**. Precise: ……. **(ex**: protection forest, village settlement, paddies…)

4. **Are there fences in the village?** O Yes O No

5. **Type of fences existing in the village and fenced areas: tick the existing fences**

Type of fences	Paddy fields (1=yes ; 0=no)	Livestock area (1=yes ; 0=no)	Upland fields (1=yes ; 0=no)
Bamboo/wood			
Barbed wire			
Living fence			

III. Conflicts about livestock circulation and damages on crops

6. **Are there conflicts about livestock?**
   Within the village O Yes O No
   With neighboring village O Yes O No

7. **Compensation in case of damages on crops by livestock:**

Village: …….. Interviewer: …….. Date: ……
No participants to the focus group: ……..

- o No compensation, never.
- o Systematic: the owner has to pay/compensate the damage (in kind or money)
- o Depends on the situation. Negotiation between the owner of the plot and the owner of the animals.
- o Other: ……

8. Management of conflicts within village

- o The two owners reach an agreement by themselves
- o Village committee
- o Conflict resolution committee
- o Elder committee
- o District
- o Other: …..…

9. Management of conflicts with other villages

- o Village-committees of both villages gather and reach an agreement
- o Another committee/institution dedicated to these matters takes charge of it.
  Name of this institution: ……..
- o Conflicts involving two villages are systematically dealt with district authorities
- o Only owners of the animals and of the damaged plots meet and negotiate
- o Other: …….

IV. Livestock pasture

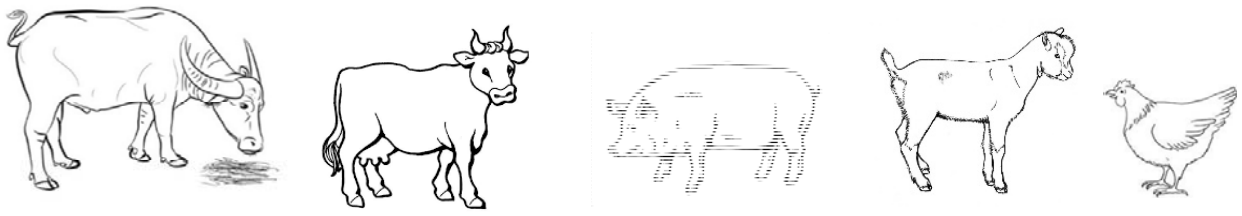
Improved pasture

10. Is there any improved pasture in the village? O Yes O No
➔If Yes see annexe ***Improved pasture and forage processing***

VI. Livestock diseases

Number of participants to the focus group: ……

Example of table to draw on a poster:



0	1	2	3	4	5	6	7	8	9	10

If another domestic animal species is important in the village (a lot of fish ponds in the village,…) draw it also and add it in the following tables.

1. Fill table below. See notice for full explanations

Village: …….. Interviewer: …….. Date: ……

No participants to the focus group: ……..

			INTENSITY										
Animal species	Year of the last big disease outbreak	Number of times over the last 10 years	0 %	10 %	20 %	30 %	40 %	50 %	60 %	70 %	80 %	90 %	100 %
1-													
2-													
3-													
4-													
5-													

2. Reactions/practices in case of disease outbreak

Fill the table below. See notice for full explanations.

		Animal species				
		1-	2-	3-	4-	5-
Name of the last disease						
Reactions (2)	Did not do anything *(number of Yes)*					
	Separated animals from the sick ones *(number of Yes)*					
	Sold their animals *(number of Yes)*					
	Killed the sick animals *(number of Yes)*					
	Used medicinal plants *(number of Yes)*					
	Feed them better *(number of Yes)*					
	Medicine *(number of Yes)*					
	Vaccination(1) *(number of Yes)*					
	Request to the DAFO *(number of Yes)*					
	Other : *(number of Yes)*					
	Other : *(number of Yes)*					
	Other : *(number of Yes)*					

(1) If yes → Fill **"Vaccination history" annex**

Do you **buy** food for animals? O Yes O No

Village: …….. Interviewer: …….. Date: ……
No participants to the focus group: ……..

Annex 13: Additional questionnaire if farmers do vaccinate their animals

FOCUS GROUP DISCUSSION: Vaccination story in the village

Name of facilitators _____ Date:_____
Number of participants to the focus group: ……people.

1. Year of vaccination appearance in the village

Livestock	Buffaloes	Cattle	Goats	Pigs	Poultry
Year					

2. Veterinary workers in the village

☐ No ☐ Yes : since when : _____, how many_____

3. What was the reason the first time villagers vaccinated their animals?

- o DAFO vaccination campaign: DAFO staff came to vaccinate our animals
- o Villagers made a request to the DAFO
- o They bought vaccinations themselves

4. Frequency of vaccination on each animal species:

Frequency	Buffaloes	Cattle	Goats	Pigs	Poultry
Every month					
Every 3 months					
Twice a year					
Once a year					

5. Who vaccinates most frequently?

- o DAFO staff
- o Private veterinary worker
- o Village veterinary volunteer
- o Villagers themselves

Village: …….. Interviewer: …….. Date: ……
No participants to the focus group: ……..

Annex 14: Additional questionnaire in case villagers make improved pasture of precessed forage

FOCUS GROUP: Improved pasture and forage processing

Improved pasture in the village

3. **Since when do you have improved pasture in the village? …….**
4. **Origin of this practice:**
   - o A project
   - o Villagers put it into practice on their own
5. **Area of improved pasture in the village: ……..ha.**
6. **How is it managed:**
   - o Individual areas: each family grows pasture for their own livestock
   - o Common areas: several families having livestock grow improved pasture in common
   - o Collective area: the whole village manages an improved pasture area and anyone can benefit from it
7. **Number of HH involved: ……**
8. **Grazing practice:**
   - o Cut-and-carry system (farmers cut pasture then bring it to the animals)
   - o Animals graze by themselves the improved pasture

Forage production

9. **Is there forage processing in the village?** O No O Yes, since when:
10. **What kind of processing?**
    - o Dry fodder (hay)
    - o Silage
    - o Other: ……..
11. **Origin of this practice:**
    - o A project initiated it and supported its implementation
    - o The idea came from outside (it was suggested to them) but villagers put it into practice on their own, without external help
    - o Other: ……
12. **How is it managed:**
    - o Individually
    - o Collectively: farmers gather for the labour tasks and they share the production
    - o Other: ……
13. **Number of HH involved in forage production: ……**

Village: ……Date: ……Number of participants: …… Interviewer :

Annex 15: Guideline for a focus group discussion about sales and contract breakings

Sales and contract breaking

List all products sold by villagers, either currently or in the past.

Product	Year **started** selling it	Year **stopped** selling it	Reasons you stopped selling it [(1)]	Number of traders buying this product in 2014
Annual crops				
Perennial crop				

(1) A= Price dropped
B= There are no traders any more for this product
C= Big loss due to external event (pest damage, climatic event, …), the villagers decided to stop producing/selling it
D= Yield decreases (lack of fertility, water…)
E= Lack of technical knowledge: villagers do not know how to grow it
F= Not enough labor force anymore
G= Contract breaking with the trader → in this case: see annex "**Contract breaking**"
H= Other (precise)……

Village: ……Date: ……Number of participants: …… Interviewer :

Product	No HH selling it	Year **started** selling it	Year **stopped** selling it	Reasons you stopped selling it [(1)]	Number of traders buying this product in 2014
NTFP					
Livestock					

[(1)] A= Price dropped
B= There are no traders any more for this product
C= Big loss due to external event (pest damage, climatic event, …), the villagers decided to stop producing/selling it
D= Yield decreases (lack of fertility, water…)
E= Lack of technical knowledge: villagers do not know how to grow it
F= Not enough labor force anymore
G= Contract breaking with the trader → in this case: see annex "**Contract breaking"**
H= Other (precise)……

Village: ……Date: ……Number of participants: …… Interviewer :

For the products sold under contract, fill the table below.

	Contract modalities			
Product under contract	Agreed price (LAK/kg)	Price actually paid in 2014	Level of the contract[(1)]	Commitment from company: what does/did the trader commi to [(2)]

[(1)] HH= Individual HH
V= Village
D= District
P= Province

[(2)] Several options possible:
A= To buy the whole production, whatever the quantity
B= To finance the construction of a road to production areas
C= Finance building of any other infrastructure in the village (meeting room, school, etc.)
D= To give money for a village fund
E= Give tools or inputs (pesticide, chemical fertilizer, seeds) from the company
F= Other: precise.

[(3)] Several options possible:
W= they commit to sell their whole production to this trader/company, to no one else
P= minimum quantity they commit to produce: at least …..t of the product.
Q= commitment about the quality of the product (precise)
R= they commit to reimburse for the services/infrastructure/tools provided by the company, within … years (precise) and with interest rate = ……. (precise)
O= Other: precise.

Village: …… Interviewer: …… Date: …… Sheet n°…. /….

Annex 16: Additional questions in case of contracts broken in the past

Contract breaking story n° ….

Contract modalities

1. **Contracted product: ……..**
2. **Name of the company/bank/trader: ……**
3. **Date the contract was signed/settled: …….**
4. **How many HH were involved?.....**
5. **Did the company provide any benefit?** *(cf table below)*

Provided by the company:	YES/NO	Amount of money	Villagers payment (1)	Precisions/comments
Seeds	Yes / No	*Seeds price: …… LAK/kg*	Yes / No ……	
Training/technical advices	Yes / No		Yes / No ……	
Tools/equipment: ……	Yes / No	*Total value: ……LAK*	Yes / No ……	
Infrastructure building in the village (road, bridge, school…)	Yes / No	*Total value:* ……MLAK	Yes / No ……	
Other:	Yes / No	*Total value:*	Yes / No ……	
Other:	Yes / No	*Total value:*	Yes / No ……	

(1) Reimbursement modalities:

0= No repayment

A= They reimburse directly to the company

B= Partnership with a bank (precise in comments the modalities of the reimbursement: **interests**, **duration of the loan….**)

C= The company/trader gets reimbursed by the villagers by buying their production a cheaper price: he deducts the price of the seeds (or anything else he provided) from the price he should pay them.

6. **Contract documents?**
   - o Oral agreement - No document
   - o Written document

7. **Who signed it?**
   - o PAFO
   - o DAFO
   - o Nayban
   - o Every villager who wants to grow the product

8. **Contract guarantees**

- *Agreed price*:……LAK/kg
  - o Fixed price
  - o Security price (minimum price can increase if the market price increases)

- *Guarantees on the collection:*
  - o Date of the collection

Which month?

1	2	3	4	5	6	7	8	9	10	11	12

Village: …… Interviewer: …… Date: ……
Sheet n°…. /….

- o The company commits to buy the whole production whatever the quantity.

Contract breaking causes

9. In what way was the contract broken?

- Disagreement about the selling price:

Price proposed by the company when they came to buy the product:……LAK/kg.

- Disagreement about the collection :

- o The company did not show up to buy the product.
- o The company did not come on the agreed collection date.
- o The company did not buy the whole production.
- o The company bought only to some villagers.

Reactions to the contract breaking

Number of participants: _____

	No of "YES"	No of "NO"
10. Did you sell the production anyway, despite the contract breaking (lower price, delayed date of collection…)?		
11. Did you make any request/protesting procedure? (to DAFO, PAFO, justice…)		
12. Did you find another way to sell the product anyway? (other trader, selling directly in town,….)		

13. How many families are still in debt in the village <u>due to this contract breaking</u>?

……

14. Did you carry on growing this crop the following year?

- o No
- o Yes, but only a little for self-consumption
- o Yes, but only a little to keep the seeds in case we decide to grow it again (inoculum)
- o Yes, same as the previous year (to sell it)

Village: …… Interviewer: …….. Date: ……..
Sheet n°…. /….

Annex 17: Additional questionnaire if land concessions are settled in the village

FOCUS GROUP DISCUSSION: Land concessions - deals

① Who is managing part of the village land through a contract or concession?

- Private investor: agribusiness company (maize, rubber, coffee…), mining company -> cf **question A.**
- District or Province government -> cf **question B.**

② Impact on villagers' access to land:

- Restricted access to former open access land
- Difficult to find plots easily accessible -> shorter rotation
- Price of the plot increased
- Have to borrow/purchase plots

③ Consequences on villagers' access to land:

- They lost part of their agricultural land: % of HH who lost plots: ……..%
- They lost access to forest area: cannot collect NTFPs any more, or leave livestock free-roaming there
- They lost access to a river: less water resource, no fishing any more
- No real impact: the area managed by the company is small or located in an area of the village they did not use much.

④ Any compensation provided? O Yes O No

If yes, describe the compensation system: ……..

A. Private investor(s): agribusiness/hydroelectricity/mining company

1. Name of the company: …….. Registration location: ……
2. What do they do on these lands:
   - Crops (annual/perennial). Species: ……
   - Hydroelectricity O Mining
   - No activity: land speculation
   - Other: ……
3. Area they manage: ……ha % of the total village area: ……..
4. How did they get the land?
   - Attributed by DAFO/PAFO/MAF without asking villagers opinion

- Attributed by DAFO/PAFO/MAF with villagers agreement
- Bought it to villagers (land use titles)
- Rent it from villagers (annual payment)
- Borrow it from villagers (no payment)

5. Did villagers sign any document/contract to attest/validate this deal? O Yes O No
6. If Yes: how long is the attribution for? ……..years
7. Document attesting their ownership/land use right?
   - Property title
   - Temporary Land Use title
   - Written agreement witnessed by village head
   - No document: oral agreement

B. Government project

1. Reason the government took over the land use right from villagers and now manage them:
   - A natural protected area was created, restricted access for villagers.
   - Government project on agriculture: agricultural experiments, TSC…
   - Military/security land
   - Other: ……..
2. Area under government management: ……ha
   % of the village area: …….
3. How was the decision process:
   - The project was presented to villagers and they agreed
   - They were reluctant but the government put pressure for them to accept
   - Villagers did not have a choice: it was imposed to them without asking their opinion
4. Did villagers sign any document/contract to attest/validate this deal? O Yes O No
5. If Yes: how long is the attribution for? ……..years

Village: …… Interviewer: ……. Date: ……. Sheet n°…. /….

Annex 18: Questionnaire for a rapid and exhaustive survey - general and objective data

No	Name	Unit	Registration no	Main duty 1. swidden, 2. paddy, 3. livestock, 4. plantations, 5. trade, 6. salary	Status 1. rich, 2. medium, 3. poor	HH members	Women	Labor force	Total children <6	Children < 6 going to school	Total children 6-15	Children 6-15 going to school	Total children 15 to 18	Children 15 to 18 going to school	Paddy area	Paddy prod	Upland rice area	Upland rice prod	Crop1 area (kg seeds)	Crop1 prod	Crop1 **income** (MLAK)	Crop2 area (kg seeds)	Crop2 prod	Crop2 **income** (MLAK)	Cro (kg

Crop3 prod	Crop3 **income** (MLAK)	Crop4 area (kg seeds)	Crop4 prod	Crop4 **income** (MLAK)	No Buffaloes	No buffaloes vaccinated	No buffaloes dead last year	No Cattle	No cattle vaccinated	No cattle dead last year	No Goats	No goats vaccinated	No goats dead last year	No Pigs	No of pigs vaccinated	No pigs dead last year	House walls (bamboo, wood, concrete)	TV	Rice mill

Motorcycle	Hand tractor	Big tractor	Car/truck	Backpack sprayer	Motor pump sprayer	Herbicide expenses: money spent to buy herbicides last year (MLAK)	NTFP inc	Rice inc	Cash crop inc	Livestock inc (all animal togeither: frog, fish …)	Handicraft inc	Renting services	Trade	Daily wage, salary	Other, remitances, pensions, etc.	Pending debts

Village: …… Interviewer: …… Date: …… Sheet n°…. /….

Annex 19: Questionnaire for a more detailed survey with 30 households.

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	No	No in RS2	Name	Unit	Registration number	No members of the HH currently living in another province	No members of the HH currently living in another country	Private water tap (1=yes,0=no)	Crop association in upland rice area? (1=yes,0=no)	No crops grown last year (all plots included) -> cf ***sheet "crops diversity": report total number***	No legume species (beans, pigeon peas, peanut, soybean, …) **-> cf sheet "crops diversity": report total number**	No rice varieties (in upland AND lowland)	Off season crops in paddy area? (1=yes,0=no)
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													

	N	O	P	Q	R	S	T	U	V	W	
1	How old was the fallow you slashed this year (for upland rice)?	How old was the fallow you slashed **last** year?	Manure fertilisation (1=yes,0=no)	Compost fertilisation (1=yes,0=no)	Chemical fertiliser use (1=yes,0=no)	No ***manual*** weeding on ulpand rice last year	**Herbicide** use? (1=yes,0=no)	Herbicide expenses: money spent to buy herbicides last year (MLAK)	**Insecticide** use? (1=yes,0=no)	**Insecticide** expenses last year: (MLAK)	Soil
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											

	X	Y	Z	AA	AB	AC	AD	AE	AF	AG
1	Soil tillage with a tractor in upland fields (1=yes,0=no)	Hired people last year (1=yes,0=no)	Used mutual help last year (1=yes,0=no)	Improved pasture area (ha)	Cut and carry system (1=yes,0=no)	Hay (dry fodder) production (1=yes,0=no)	Sillage production (1=yes,0=no)	Do you give names to your big livestock ? **(0=no; 1=yes; X=NO BIGLIVESTOCK)**	Investement in paddy terracing in the past 10 years (MLAK)	Investment in road opening to production areas in the past 10 years ? (MLAK)
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										

Village: ……………………….. Interviewer: ……………………… Date: ……………… Sheet n°…. /….

Crop diversity

Fill the titles of columns with the list previously established in focus group

Crops the HH grew last year (either in the same plot or in separate plots)																																																			
	Annual crops																																					Perennial crops													
DS family number																																																			
1																																																			
2																																																			
3																																																			
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29																																																			
30																																																			

For each species tick the case if the HH grows this crop. Mark the crops that are legume species

Village: …… Interviewer: ……. Date: ……. Sheet n°…. /….

Diversity of NTFPs collected and animals raised

Fill the titles of columns with the list previously established in focus group
For each NTFP tick the case if the HH collects it. For each animal species tick the case if the HH raises it.

	NTFPs ***collected*** (not only those they **sell**)																		Livestock species											
DS family number																														
1																														
2																														
3																														
4																														
5																														
6																														
7																														
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29																														
30																														

Village: ………………………   *Date: ……………..*

Annex 20: Questionnaire about family composition

Family n°…

Family/ HH member	Lives in HH (1/0)	Gender (M /F)	Year of birth	Year of death	Still attends school	Education level

Family n°…

Family/ HH member	Lives in HH (1/0)	Gender (M /F)	Year of birth	Year of death	Still attends school	Education level

Family n°…

Family/ HH member	Lives in HH (1/0)	Gender (M /F)	Year of birth	Year of death	Still attends school	Education level

Family n°…

Family/ HH member	Lives in HH (1/0)	Gender (M /F)	Year of birth	Year of death	Still attends school	Education level

Annex 21: Questionnaire for the field survey

Field survey – Plot n° …

Name HH head: _____ Name Interviewer _____ Date:_____
Family n°… No in rapid survey:_____

1. Estimation of the plot area by the owner (before measurement): _____ Ha
2. Surface measured with GPS: _____ Ha
3. List the main crops grown in this plot last year:
   :

- o Rice
- o Hybrid maize
- o Traditional maize
- o Job's tears
- o Pigeon pea
- o Stick lac
- o Sesame
- o Pumpkin
- o Other: ……..
- o Other: ……

4. Yields:

		Harvest			Sale
Crop name	Kg seeds sown (kg)	Number of bags	Weight of one bag (kg)	TOTAL harvest (kg)	Quantity of this crop you sold last year (kg)
n°1.					
n°2.					
n°3.					
n°4.					

5. Drawing of the plot, localizing the main crops (mixed or separate, distinct sections…)
If the plot is close to the stream and/or road, draw it.

Village: …… *Date: ……..*

6. Cropping operations	**Number of days**	**Number of people each day**	**Total labor (man.days)**	**Comments**
Slashing				
Burning				
Collecting burnt wood				
Fencing				
Other land preparation (e.g. tillage, harrowing)				
Paddy nursery				
Sowing / transplanting				
Manual weeding or spraying herbicide				
Fertilizations				
Harvesting				
Transportation				
Other:…… ອື່ນໆ				
Other:…… ອື່ນໆ				

Village: …… *Date: ……..*

7. Inputs: expenses

A. Did you buy seeds?
O YES / O NO. If yes: fill table below

Crop	Kg seeds bought	Price/kg	Total expense (LAK)

B. Did you hire people to work on this plot last year?
O YES / O NO. If yes: fill table below

Task	Number of days you hired people	Number of people each day	Daily wage (LAK)	Total expense for this task (LAK)

C. Did you spread fertilizer in this plot last year?
O YES / O NO. If yes: fill table below

Fertilizer	Total expense for the quantity used in this plot (LAK)

D. Did you spread pesticides in this plot last year?
O YES / O NO. If yes: fill table below

Pesticide name	Function: H=herbicide, I=insecticide, F=fungicide	Total expense for the quantity used in this plot (LAK)

E. Did you pay for tillage in this plot last year?
O YES / O NO. If yes: how much did you spend (MLAK): ……..

Village: …… *Date: ……*

Annex 22: Instructions for the field survey

Notice for the field survey questionnaire

*Question **1.*** : Before measuring the plot, ask him the surface of the plot: his estimation on the area.

*Question **2.*** : Use the function "measure area" of the GPS to measure the exact surface of the plot. Then if the crops are separated distinctly within the plot, measure each crop area.
/! \ Be careful to walk exactly along the border of each distinct crop area in the plot: ask the owner to follow exactly the contour of the different areas in the plot he cultivated last year.

*Question **3.*** : List the main crops he grew in this plot last year. Maximum 4 main crops.

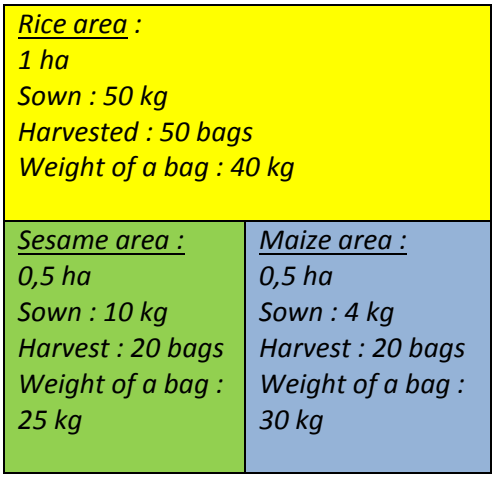
*Question **4.*** : For each crop, ask:

- How much seeds were sown (kg)
- How many bags were harvested
- How heavy is one bag (kg)
- What quantity was sold (kg)

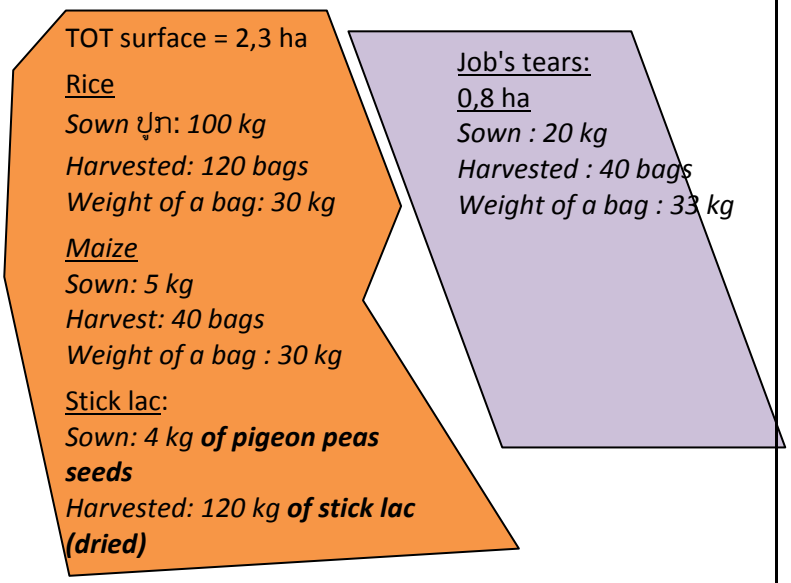
Column "**total harvest**": calculate total = number of bags*weight of one bag.
OR: enter directly the tot harvest if harvest is not in bags.
Ex for stick lac: we need the weight of lac collected, without branches and once it is dried.

*Question **5.*** : Draw a "map" of the plot(s), showing the repartition of the main crops in the plot.

Example 1: *separate sections for each crop in the plot*



Example 2: all crops mixed in the same area + One plot with Job's tears only



*Question **6.*** :

- **Tasks**: list with the owner all the tasks he did in this plot last year, from the beginning: slashing, burning, collecting the wood after burning… Add in the last lines of the table the tasks that are not listed in the table ("other tasks").
- **Number of days the task lasted**: in total how many days to finish the task. Cf examples below.
- **Number of people each day**:
  Example 1: for slashing task: a couple slashed their plot alone, it took them 10 days, working every day the two of them.
  → Then you write **number of days the task lasted**: **10 days.**
  And **number of people each day**: **2 people.**
  Example 2: for weeding task: the first **5** days, **2** people were weeding; then the **6**th day **15** people came to work (mutual help), and then **1** person finished the work alone in **3** days.

No of day จ/ม อัม	1	2	3	4	5	6	7	8	9
No of people จ/ม ถิม	2					15	1		

  → Then you write **number of days the task lasted**: **5 + 1 + 3 = 9 days.**
  And **number of people each day**: **2 (5days) + 15 (1 day) + 1 (3 days)**
- **Tot number of man.days**: Summarize and write the result : **5*2 + 1*15 + 3*1 = 28 man.days.**

*Question **7.*** : **Inputs in the plot**

A. Seeds expenses: calculate how much the farmer spent for seeds he sowed in this plot.
B. Hired labor force: calculate the total expenses for labor force used in the plot last year. Cf *question **6***.: same calculation but only for the *hired* people. Or if the farmer does not remember: write the total amount he spent to pay the people he hired.
C. Fertilizers expenses: money spent to buy the fertilizers he spread in this plot (quantity*price)
D. Pesticides expenses: money spent to buy the fertilizers he spread in this plot. Precise if it is for herbicides or other pesticides.

Annex 23: Synthetic analysis of the farming systems after considering all previously collected data

Agricultural land use systems characterization at the village level

(Analysis grid. "Check list" to read at the end of the week in villages in order to get sure we have the minimum required data to characterize the land use systems.)

Uplands – hill slopes

Fallow length

1-2	3-5	6-9	>10

Cultivation patterns (from collective to individual = few collective blocks to many plots)

1-3 groups	4-6 groups	7-9 groups	Scattered

Labor force

Mutual help	Family labor	Hired labor

Crop associations (maximum number of crops in the same plot)

1 crop	2 crops	3-5 crops	>5 crops

Fences materials: temporary-permanent

bamboo - wood	wood - barbed wire	living trees - bw	concrete poles - bw

NTFP collection

open access	access regulations	time windows	domestication

Lowland – paddies, gardens

Paddy: no of cropping cycles per year

1	2	3	>3

Vegetable gardens: no of cropping cycles per year

1	2-3	4-5	>5

Livestock

Buffaloes-cattle: land use types they can get access to some times of the year

forest	fallow	grassland	paddies

Buffaloes-cattle: management types

free roaming	tended	livestock area	grass cultivation

Buffaloes-cattle: damage management

fenced crops	cultivator responsible	fenced livestock	breeder responsible

Pigs

free roaming	spend night in pen	kept in pen	buy additional feed

Chicken

free roaming	spend night in pen	kept in pen	buy additional feed

Annex 24: Questionnaire for district authorities (secondary data)

Disaster alerts in the district

In order to evaluate if the villages of the district are more or less exposed to: livestock disease outbreak, rat invasion, drought, and excess of water events, we would like to know the different **requests** received by the DAFO from villages in the district ***in the last 10 years.***

- Livestock disease outbreak

Year	No village	Animals concerned	Disease (mouth and foot disease, septicemia, …	Intervention from DAFO

- Rats invasion

Year	No village	Intervention from DAFO

- Drought

Year	No village	Intervention from DAFO

- Excess of rain

year	No village	Nature of the event (1)	Intervention from DAFO

(1) : Flood of paddy area (A), flood of village settlement (B), land slide in production area (C), land slide in village settlement (D), land slide on the road (E), etc