Step-by-step guidance
for Farmers' Organisation
and its members

AgriCord
Building Resilience
Toolkit

—

Part 1

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Farmers' Organisation Members Assessing Climate Risks and Designing Adaptation

AgriCord afdi TRIAS ffd.fi

Acknowledgement

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1 Introduction

1.1 Why this tool is needed

AgriCord Building Resilience Toolkit PART I, ***FO Members Assessing Climate Risks and Designing Adaptation***, provides a tool for a Farmers Organisation (FO) to conduct a climate risk assessment amongst their member farmers/producers, and to facilitate the planning of efficient and feasible adaptation responses in support of resilient livelihoods of FO members. The tool lays a foundation for participatory climate planning and is the first part of the AgriCord Resilience Toolkit. The Building Resilience Toolkit PART II, ***Climate Proofing Farmers' Organisations and Planning for Resilience***, continues the process started in Part I, focusing on proofing FO's operation and services to establish the basis to design a Resilience Action Plan at the level of the Farmers' Organisation.

Farmer Organisations (FO) have many reasons for assessing and understanding their member farmers' vulnerabilities to climate change as well as for screening their own activities through a climate lens. Firstly, smallholder farmers are those who are hit hardest by climate change. Extreme weather events and climate variability already threaten smallholders' livelihoods in many parts of the world, and more climate risks are likely to materialise in the coming years and decades. More action is needed to strengthen resilience and adaptive capacity of farmers' livelihoods in response to climate variability and extremes.

Secondly, FOs play a key role in creating adaptive capacity and thus reducing vulnerability of their members in ever-changing climatic conditions. For farmers to be able to adapt swiftly and adequately to climate change, they need access to knowledge, assets, good governance (decision making), institutions and innovation. Adding aspects of recognition, participation and empowerment of farmers to view themselves as climate actors is an important result of this process. AgriCord Building Resilience Toolkit enables them to participate in climate activities, decision-making and finally providing visibility for their efforts. This is an integral part of the environmental justice framework highlighting the three elements of justice – procedural, distributional and recognition justice, which are quintessential to ensure a just transition.

Together, as a system, these elements determine the adaptive capacity of smallholder farmers. Farmers' Organisations play a pivotal role in strengthening and sustaining this adaptive capacity (or resilience) for their members, from the extremely vulnerable to the wealthier farmers. To fulfil this role, FOs need to understand how climate change is likely to affect their members, and what are the characteristics that make members, their production and related value chains vulnerable to the changes. On the other hand, the changing climate may in some cases open new opportunities for FO members which need to be explored, and related structural barriers in their value chains to be addressed.

Thirdly, the FOs need also to assess their own capacity to take necessary actions to better meet their members' needs in the face of climate change. This may require developing new services or adjusting the existing ones. Furthermore, the FOs may need to climate proof their own infrastructure and facilities to better withstand extreme weather events, such as floods, high temperatures and storms. This is studied more in detail in Part II of AgriCord Building Resilience Toolkit.

1.2 Objectives of the tool

The tool aims:

- → to empower farmers to see themselves as proactive climate actors, giving them agency in addressing climate challenges, and
- → to enable farmers to articulate their experiences, challenges, and solutions using their own vocabulary which is recognised by climate scientists.

This is achieved through:

- → identifying the main climate hazards affecting the FO members, their livelihoods, and farms.
- → assessing the extent and nature of risk that these hazards pose to the FO members.
- → identifying specific vulnerabilities amongst FO members that make them especially susceptible to climate hazards.
- → creating understanding of adaptation options available.
- → giving guidance for identifying and prioritising appropriate adaptation strategies and actions.
- → identifying adaptive capacity development needs.
- → creating a basis for the preparation of an adaptation action plan at the FO level by BR-II.

1.3 Structure and principles of the tool

AgriCord Building Resilience Toolkit PART I, ***FO Members Assessing Climate Risks and Designing Adaptation***, is designed to facilitate climate risk analysis and adaptation planning at the level of FO members. It consists of the tool itself (text part) and the reporting format for climate risk assessment and adaptation planning (Annex I). In addition, there is User's guide providing guidance for the facilitation of different sessions. The tool is structured to help in several aspects of a vulnerability and risk assessment, starting from a short overview to climate change with key definitions and concepts. Secondly, it helps define climate related hazards and their potential impacts and assess the level of risk farmers face due to the hazards. Thirdly, it looks into factors behind climate vulnerability of FO members' and their livelihoods, including analysis on adaptive capacities, gender related differences and considerations about specific vulnerable groups. Fourthly, the tool facilitates reducing or eradicating climate risks through identification of appropriate adaptation actions. Fifthly, it draws attention to capacity building needs amongst the FO members in order to reduce vulnerability and increase the resilience of members' livelihoods. Finally, the tool provides means to systematically record and analyse climate change information relevant to the FO members, and use it for formulating an adaptation action plan.

Several guiding principles throughout the analysis must be retained:

1. The analysis must include current and future climate risks and vulnerabilities
2. The method must ensure participation, transparency, gender equality and inclusion of all groups
3. The participants must be informed with relevant, updated and popularised climate data
4. The analysis must be locally determined, as well as context and time-specific.

Conducting a climate risk analysis requires various types of data and information. Depending, e.g. on the purpose and geographical scope of the analysis, different data collection methods can be applied. Sometimes a structured survey among the FO members is an efficient way to collect data, while in some other cases it is more relevant to organise a participatory workshop involving FO members and possibly external experts to discuss and prioritise vulnerability elements and potential adaptation options. In this tool, we assume that data are collected, and a vulnerability assessment conducted in an FO members'

workshop. It is recommended that the FO conducts a gender analysis prior to the climate risk assessment and studies existing data on vulnerable groups, markets, weather and climate and ecological conditions of the area in concern. This gives depth to the vulnerability and risk analysis and creates common understanding of the relevant contextual factors and underlying vulnerabilities. It is worth noting that the data collected locally often need to be supplemented with data from agriculture/forestry/livestock/aquaculture/horticulture and climate research. Therefore, engaging some experts in the workshop, or doing some preparatory work prior to the workshop is needed.

1.4 Scope of the tool

The scope of the climate risk assessment and adaptation planning in the FO is designed to cover

- → **Most significant hazards**
  1–3 climate hazards
- → **Geographic area**
  FO's area of operations
- → **Selected livelihood sectors (e.g. forestry)**
  1–3 sectors
- → **Level/unit of analysis**
  FO members, farms and livelihoods
- → **Temporal scale**
  Past 20 years, coming 20 years
- → **Target group**
  FO members

1.5 Climate change in short

The climate of the planet is changing. The change is caused by greenhouse gas emissions from human activities, including the use of fossil energy (oil, coal etc.), traffic, construction, agricultural production and deforestation, and waste management.

During the past decades the greenhouse gases – mainly carbon dioxide, methane and nitrous oxide – have accumulated in the atmosphere and started affecting our climate. Therefore the mean temperature of the planet is higher, the extreme climate events more frequent and the rainfall patterns more unreliable than in the past.

The more the climate is changing, the more difficult and costlier it becomes to adapt to the new climatic conditions. Therefore, we urgently need to reduce greenhouse gas emissions (=mitigate climate change) and, at the same time, adapt to the changes. Unfortunately, even if the whole planet stopped emitting greenhouse gases today, the climate would continue changing for decades due to the emissions of the past.

Therefore, it is key to support smallholder farmers and other FO members to improve their resilience and adapt their production to the changing climate and, where possible, support farmers' efforts to reduce greenhouse gases. For selecting best adaptation solutions for each location, we need to understand potential climate impacts and different factors of vulnerabilities. Farmers' Organisations can play an important role in addressing climate risks affecting their members and increasing farmers' adaptive capacity.

1.6 Climate change vulnerability and risk in short

Climate change vulnerability is always a combination of different factors and describes the susceptibility to harm caused by climate related shocks and stresses, i.e. climate hazards. Vulnerability of people, farm ecosystems, or whatever is the unit under our observation, requires 1) looking into the general context and underlying causes of vulnerability (why some may be more likely or more badly affected by climate events than others), 2) sensitivity to climate related hazards (which specific factors contribute to severity of harm), and 3) adaptive capacity (capacity to act to resist, recover and reduce the harm).

Poverty, food insecurity, marginalisation (e.g. ethnic or political minority), conflict and geographical location can be underlying causes of vulnerability, as they may put people automatically in a worse position than others before climate events. In the same way, the environment can be under constant stress (e.g. deforestation, land degradation), making it less functional than in a normal situation, thus making it vulnerable to even moderate shocks. **Recognition of gender differences in vulnerability is very important**. Women farmers are often more exposed to climate risks compared to men because women usually have fewer assets, have limited access to resources, information and services, and are less mobile.

Besides these underlying causes, there may be very specific sensitivity factors contributing to vulnerability. These sensitivity factors are directly linked to the characteristics of a farm ecosystem, infrastructure, activity or whatever is the unit under observation. A particular farm ecosystem can have very sandy soils making it prone to drought due to low water holding capacity. Or a particular water channel is easily broken during floods because it has been built with poor quality cement. Or a certain trading activity can be sensitive, because storms prevent customers arriving to the marketplace.

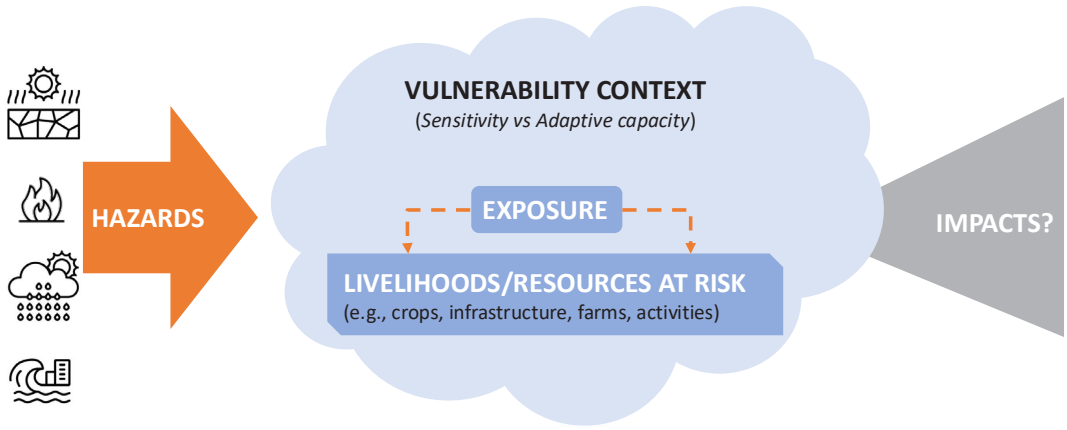
If nothing is done, climate hazards can have very negative consequences on the unit under observation. The potential negative impacts are considered as climate risks. The good news is that in most cases these can be reduced, or even mitigated, if first identified and then addressed with accurate adjustments, i.e. adaptation measures. However, adaptation requires a certain level of capacity to make the necessary changes. Therefore, adaptive capacity can be understood as the availability and access to means to reduce the climate impacts. Without them, climate risks can turn into very negative consequences. Therefore, vulnerability is a combination of underlying vulnerabilities, sensitivity factors and adaptive capacities.

Risk results from the interaction of vulnerability and exposure to climate related hazards. It is the potential negative impact of hazards on farms, farmers and their livelihoods. The degree of risk can be reduced by addressing vulnerability causes and, in some cases, decreasing exposure to climate-related shocks and stresses.

1.7 Climate risk assessment theory and key concepts

Vulnerability can be defined in several ways. In this tool, vulnerability to climate change is seen as a combination of underlying contextual vulnerabilities (such as inequalities) and specific climate vulnerabilities linking to **exposure** of a given system (such as farm or a woodlot), **sensitivity** of the system and its **adaptive capacity** to cope with the climate impacts (see Figure 1).

Figure 1.
The elements and central concepts of vulnerability and risk assessment



When assessing the degree of climate vulnerability and risk of a farm, household, or enterprise, we need to work with four central elements: **hazard, exposure**, **sensitivity, and adaptive capacity.** These concepts are explained in Box 1, based on the definitions of the Fifth Assessment Report of International Panel of Climate Change (IPCC AR5).

Box 1

Key concepts in a vulnerability analysis

Exposure is the presence of people, livelihoods, species or ecosystems, environmental functions, services, and resources, infrastructure, or economic, social, or cultural assets in places and settings that could be adversely affected.

Hazard refers in this text to climate-related physical events or trends or their physical impacts, which may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems, and environmental resources.

Sensitivity determines the degree to which a system (e.g. a farm or a value chain) is adversely affected when exposed to climate related hazards. Sensitivity is typically shaped by natural and/or physical attributes of the system including topography, the capacity of different soil types to resist erosion or land cover type. But it also refers to human activities that affect a system, such as tillage systems, water management, resource depletion and population pressure. As most systems have been adapted to the past and current climate (e.g. construction of dams and dykes, irrigation systems), sensitivity already includes historic and recent adaptation actions.

Impact: Effects on natural and human systems. In this context, the term *impact* is used primarily to refer to the effects on natural and human systems of extreme weather and climate events and of climate change. Impacts generally refer to effects on lives, livelihoods, health, ecosystems, economies, societies, cultures, services, and infrastructure due to the interaction of climate changes or hazardous climate events occurring within a specific time period and the vulnerability of an exposed society or system. Impacts are also referred to as *consequences* and *outcomes*. The impacts of climate change on geophysical systems, including floods, droughts, and sea level rise, are a subset of impacts called physical impacts.

Adaptation: The process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects.

Adaptive capacity: The ability of systems, institutions, humans, and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences.

Vulnerability is the propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements including sensitivity or susceptibility to harm and lack of capacity to cope and adapt. Vulnerability can also be differentiated between men and women farmers or according to location of the farm, e.g. between lowland and highland areas. After an agreement on the level of vulnerability has been achieved, it is possible to move to discussing adaptation options.

Risk: The potential for consequences where something of value is at stake and where the outcome is uncertain, recognising the diversity of values. Risk is often represented as the probability of occurrence of hazardous events or trends multiplied by the impacts if these events or trends occur. Risk results from the interaction of vulnerability, exposure, and hazard. In this context, the term *risk* is used primarily to refer to the risks of climate-change impacts.

Resilience: The capacity of social, economic, and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganising in ways that maintain their essential function, identity, and structure, while also maintaining the capacity for adaptation, learning, and transformation. BR-II aims at systemic resilience combining actions through different dimensions of resilience.

Definitions modified from IPCC AR5

2 Context

2.1 General Vulnerability Context

Describing the general vulnerability context is important for setting the general scene for the assessment, and for identifying underlying causes and trends causing challenges to farmers or particular groups amongst farmers that may make them susceptible to changes. These may include factors from socio-economic, environmental and political contexts. These factors can be systematically described in a context matrix, as in Table 1. Creating a common understanding of significant environmental trends and socio-economic inequalities helps conclude if a special focus should be given throughout the assessment to certain groups of farmers, types of farms or certain type of production. These underlying vulnerability factors may affect significantly farmers' possibilities to act in out-of-ordinary situations, and thus makes farmers more susceptible to the harm caused by climate change. Also, it creates a basis for understanding prevailing gender inequalities that may result in different climate impacts on women and men. The gender related vulnerability factors are assessed more in depth along the different steps of the tool.

Table 1.
Context matrix with examples. Remove the examples and replace with relevant information.

Context segments	Description	Factors contributing to vulnerability of farmers
Geographic area of analysis	e.g. 2 counties where FO members are active	
General description of climate	e.g. rainfall pattern, length of dry season, monthly mean temperature and precipitation	climate includes lengthy dry seasons
General information on environmental context and landscapes:	e.g. topography, (agro)ecological zones, land use, ecosystems, soil types, environmental trends and stresses	- water-holding capacity of sandy soils are poor, - continuous conversion of forest to agricultural land
Demographics	population, age-distribution, geographic distribution of population	e.g. - young population, nearly 50% minors - high population pressure on lowlands
Socio-economic context, gender equality	e.g. number of people living below poverty-line, people experiencing food insecurity, education levels, services, and differences in these between women and men - Ethnic groups, vulnerable groups, informal and formal institutions to support farmers, women and vulnerable groups	- large number of single- headed households, - illiteracy common amongst women over 50 years old
Economic and political trends and stresses	- e.g. market prices and trends of agricultural products - farmers	- e.g. fluctuating market prices of commodities - decline in productivity in forestry - increased land-related conflict in county x
Policies and institutions relevant to livelihoods and adaptation	- national/sub-national and community level institutions - national/sub-national and community level policies and policy processes	- no sub-national adaptation plans or climate change focal points - lack of information about local disaster preparedness plan - limited opportunities to participate in political processes

The context matrix facilitates concluding if underlying vulnerabilities exist, and what are the main contextual factors causing challenges to farmers, such as environmental stresses, local conflicts or gender inequalities. These factors may add to the negative impacts of climate burden, by making certain farmers less capable of coping with and adapting to climate change and thus increasing their climate risk. Identification of vulnerable groups and factors behind the vulnerability is important for the further climate risk analysis.

2.2 Climate trends and hazards

This section aims to identify the changes and trends in local climate, and to identify the most significant climate related hazards experienced by farmers, by looking into the past data and future forecasts. Climate information is collected by combining farmers' and experts' knowledge and scientific data.

2.2.1 Historical perceptions of climate variability and change by farmers

Local perceptions of climate patterns, extreme weather events, climate variability and change are an important starting point of the assessment. Farmers often have a clear record of climate events, as weather has a direct effect on farm livelihoods. In addition, scientific weather data may not be available or detailed enough to cover all the time-periods and geographic areas, therefore farmers' knowledge is valuable for getting a comprehensive picture of the local climate and its changes. The aim is to create common understanding of the possible trends in climate experienced by the farmers in the past 20 years. What are the signs of these changes, e.g. in terms of rainfall patterns, length of the growing season, temperature extremes, flooding and droughts? Have these changes been observed all over the area in question, or are there differences between areas? Do women and men have different perceptions of the changes?

Table 2 is used to record the trends in weather extremes, climate events and variability experienced by farmers.

Table 2.
Climate trends past 20 years – farmers' experience

Weather extremes, climate events and climate variability	Trend
Irregularity of rains	e.g. →
Frequency or intensity of heavy precipitation	
Frequency or intensity of windstorms/cyclones	
Number of hot days/nights	
Number of cold days/nights	
Duration or frequency of heat waves	
Average monthly temperature	
Other…	

→ **No change** ↗ **Increasing** ↘ **Declining**

Climate related hazards are stresses and shocks caused by climate variability and change. The listed climate phenomenon listed in left hand column may have triggered these harmful shocks and stresses (rapid and slow onset) affecting humans and their livelihoods, such as destructive storms, exceptionally late rainy seasons, floods, droughts, extreme heat waves etc.

2.2.2 Scientific and expert information of climate variability and change – past and future

Collecting scientific data and expert information is crucial to climate risk assessment, especially in identifying future climate trends and long-term changes. This can be done by interviewing climate change experts, reviewing historical weather data, and becoming familiar with recognised climate models and scientific literature. These methods facilitate achieving science-based understanding of climate trends and phenomena. The relevant information can be collected to Table 4 to support the further analysis. Information on future climate scenarios at the national level is often available also in, for example, the following documents.

- National Communications and Nationally Determined Contributions (NDC) to the United Nations Framework Convention on Climate Change (UNFCCC), which usually include national climate scenarios (check the Ministry of Agriculture or Environment).
- National Adaptation Programme of Action (NAPA) and National Adaptation Plan (NAP) documents, which are based on a national level analysis of climate change (check the Ministry of Agriculture or Environment).
- Maps showing topography, agro-ecological regions, infrastructure etc.

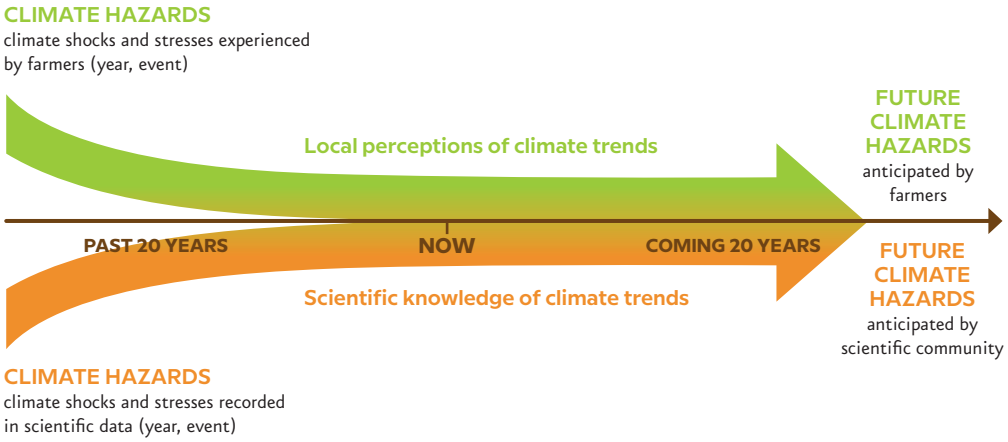
Additional sources of climate change scenarios and data:

- IFAD's Climate Adaptation in Rural Development – Assessment tool that provides country-level yield scenarios of various crops. Available at: https://www.ifad.org/en/web/knowledge/publication/asset/41085709
- FAO's GEONETWORK for geo-spatial data. Available at: http://www.fao.org/geonetwork/srv/en/main.present?from=1&to=10
- Country profiles in the WorldBank climate change portal: https://climateknowledgeportal.worldbank.org/

2.2.3 Combining information from scientific data and local knowledge

The listed hazards triggered by climate phenomena in the past can be placed to an illustrative time-line, as in Figure 2, together with the information found in the scientific data. Also, the perceptions about climatic trends, such as rising temperatures or increasing intensity of storms, should be analysed, discussed and recorded. The future forecasts given by climate models should be revealed and reflected together with local perceptions. Combining the findings of local knowledge and scientific literature and models creates understanding of the changing climate, future forecasts and shocks and stresses climate variability and change are likely to cause.

Figure 2.
Timeline combining farmers knowledge and scientific/expert information of climate related hazards, changes and trends



Farmers' experience of the past climate trends and the data from the scientific community and experts can be collected and compared also in matrix form, as in Table 3. Discussion could take place on similarities and differences between different sources of information. For example, sometimes part of the weather data series is missing, or the climate models are generic, covering wide geographic areas, but are not able to deliver locally relevant information. Also, sometimes events that took place a long time ago may not be remembered clearly.

The combined data of the main climate trends and climate related hazards in the past and future based on local knowledge and scientific/expert information are used as the basis for further analysis.

Table 3.
Combining the information from farmers and scientific community/experts

Description of climate variability and change	Information from farmers/ producers	Science-based/ expert information
What are the extreme weather events occurring in the past 20 years in the area?		
What are the key climatic trends and long-term changes in climate in the past 20 years?		
Most significant climate related hazards in the past 20 years.		
Expected changes in climate in the future (e.g. in the next 20 years).		

3 Hazards and risks

3.1 Climate hazards posing a significant risk to farm production and livelihoods

This section aims to assess the level of risk posed by different climate hazards with a special focus on the impacts on farm production and livelihoods. Therefore, the climate related hazards listed in the previous sections should be ranked based on 1) the likelihood of their future occurrence and 2) the severity of consequences for farm production and livelihoods, i.e. impact. Farmers are experts in assessing the impact of climate phenomenon on their livelihoods, thus their participation is crucial in shortlisting the most significant hazards in the context of vulnerability and risk assessment. For narrowing down the scope of analysis, only the most severe and likely climate hazards are subjected to further analysis. The climate hazard risk matrix can be used for ranking (Figure 3) using the supportive guidelines of Table 4. The most significant hazards posing a major risk to livelihoods can be found in the upright corner of the matrix. Disaggregated data can be obtained (women, men, other vulnerable group) for the ranking. Alternatively, the likelihood and impact of each hazard is ranked to give a numeric indicator of the risk they pose. The scores per each hazard are totalled, and the highest score indicates the most significant risk to livelihoods.

Prior to ranking, a discussion on the potential impacts of different types of climate stresses and shocks on the farm production and livelihoods should take place. What are the most harmful changes caused by different hazards to agriculture/forestry/other production? Do the harmful changes have a specific or differentiated relevance to women, men and vulnerable groups? What is the growing season going to look like in 20 years? Could some of the changes be beneficial to agriculture/forestry/other production?

Table 4. **Supportive guidelines for qualitative ranking of likelihood and impact of hazards**

Qualitative **LIKELIHOOD** measurement system	
1 Unlikely	Is not expected to occur; little opportunity, reason, or means to occur.
2 Possible	Might occur; may occur or be exceeded once every 20 years;
3 Likely	Will probably occur; may occur every 5–10 years.
4 Almost certain	Expected to occur; many recorded incidents; may occur or be exceeded once every 1–4 years.

Table 4.
Supportive guidelines for qualitative ranking of impact and likelihood of hazards

Qualitative **IMPACT** measurement system	
1 Insignificant	No significant damage to farms or their production. Little or no disruption to community/FO services. Little or no financial loss.
2 Minor	Small number of partially damaged farms and ruptures in production. Delays in community/FO services. Some disruption. Some financial loss.
3 Moderate	Localised damage that is rectified by routine arrangements. Normal community/FO services functioning with some inconvenience. Some damage to humans, production, property, yields, and/or animals. Significant financial loss.
4 Major	Significant damage that requires external resources. Farms only partially functioning, and most community/FO services to farmers unavailable. Some farmers displaced. Significant financial loss – some financial assistance required. Extensive damage to humans, production, property, yields, and/or animals.

Figure 3.
Climate Hazard Risk Matrix – the most significant hazards affecting farmers and their livelihoods

LIKELIHOOD				
Almost certain				e.g. drought
Likely			e.g. destructive storm	e.g. forest fire
Possibly				
Unlikely			e.g. hailstorm	
IMPACT	**Insignificant**	**Minor**	**Moderate**	**Major**

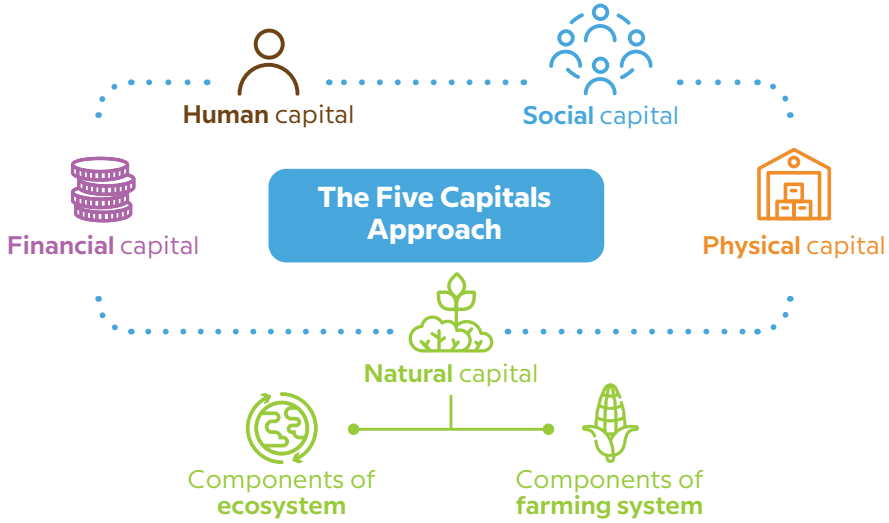
Only the most significant climate hazards in terms of the risk level, i.e. those that are likely to occur and have potentially very damaging impacts on production and livelihoods, should be included in the further analysis. Commonly this would mean 1–3 hazards. However, all hazards that are found in the "dark red corner" of the Climate Hazard Risk Matrix (Figure 3), or alternatively the total scores of which are 7 or 8, should be included. The hazards reaching the "lighter red area" can be included if considered significant.

3.2 Assessing the climate risk to the basis of farm production and livelihoods

The climate hazards, such as weather extremes and long-term climatic stresses, can impact production and livelihoods of farmers in various ways and require further analysis. This section aims to reveal in more detail what kind of damage these hazards cause to livelihoods? Damage to what? And how important is it in terms of overall livelihoods? The exposure to a climate hazard may pose a risk to the basis of livelihoods, such as to different types of resources and assets (human, social, physical, natural, financial,

hereon referred to as the five capitals) and activities (planting, harvesting etc.). Hazards can damage or destroy assets, including natural resources, and rupture normal activities and community or FO services. Men and women, as well as other groups, may have varying experiences of the extent of these risks, for example due to division of labour and different level of access to the assets. Therefore, disaggregated data is needed to have a complete picture of the exposed livelihood components at risk.

Figure 4.
Capitals of livelihoods



3.2.1 Identifying livelihood components at risk

This section aims to identify the livelihoods at risk, assess their level of risk, and evaluate the significance of specific activities within the overall livelihoods framework. It is important to remember that risks are evaluated solely against the most significant hazards identified in Section 3.1. Livelihoods at risk can be represented as livelihood capitals (see Figure 4) or as a sequence of productive activities within an agricultural calendar.

As discussed previously, farm production systems and livelihoods rely on various resources and functions, including farm activities, assets, infrastructure, and natural resources. We utilize the five livelihood capitals to identify these resources and functions and to highlight which ones are at risk. Table 5 aids in assessing livelihood capital and its associated risks.
Also, activities which may be jeopardized by climate change should be listed. These activities can be added to Table 5 if the facilitator feels confident with the methodology. Otherwise, this can be done by using an agricultural calendar. The activities are listed as in Table 6. and ranked by the level of risk that climate change poses to them.

Both approaches follow the same analytical steps:

1. Farmers rank the level of risk for each livelihood component (assets/capitals or activities) as high, medium, or low.
2. The importance of these risks to overall livelihoods is evaluated from the perspectives of women, youth, and vulnerable groups, ensuring that diverse perceptions of climate exposure, risk levels, and significance are captured.
3. Only those livelihood components deemed to have high or medium risk and high importance to overall livelihoods are included in further analysis.

In addition to basic production, some FOs may engage in other aspects of the value/supply chain. In such cases, the analysis can be expanded to assess the risk levels of additional activities along the value chain. It is crucial to identify which parts of the value chain are directly influenced by farmers (e.g., organic input production, cleaning, drying, transport, aggregation, packing) while excluding areas beyond farmers' or FOs' control. The exercise on value chain can be carried out as a part of FO risk assessment in Building Resilience Part II.

Table 5.
Five capital of livelihoods and their climate RISKs

HAZARD 1	Risk level low, medium, high			Specific importance for women (W), youth (Y) or vulnerable groups (V)		
Five capitals of livelihoods	**low**	**medium**	**high**	**W**	**Y**	**V**
1. Natural capitals - components of farming system or ecosystems						
e.g. water		x		x	x	x
Soil						
Timber						
Rice						
...						
2. Physical capitals						
Buildings						
Bridges						
...						
3. Social capitals						
Farmer groups						
Cultural mutal aid systems						
...						
4. Human capitals						
Harvesting skills						
Accounting skills						
Participation in local government etc						
...						
5. Economic capitals						
Savings and credit groups						
Insurance schemes						
Social protection schemes						
...						

Table 6.
Identifying livelihood activities at risk

HAZARD 1	Risk level low, medium, high			Specific importance for women (W), youth (Y) or vulnerable groups (V)		
Livelihoods activities	**low**	**medium**	**high**	**W**	**Y**	**V**
Example/Agricultural calendar on coffee						
Flowering		x		x	x	x
Crop development						
Cherries ripening						
Pruning						
Fertilising						
Weeding						
Mulching						
Pest control						
Harvesting						
...						

3.3 Sensitivity to climate change contributing to the risk

Sensitivity to climate change can be understood as specific characteristics, qualities and conditions increasing susceptibility to harm caused by climate variability and change. Sensitivity also contributes to vulnerability, as vulnerability to climate change is a combination of sensitivity of a human or natural system, and a lack of capacity to adapt to climate related shocks and stresses. Sensitivity leads to predisposition to be adversely affected, and therefore to greater risk. Vulnerability encompasses a variety of concepts and elements including sensitivity or susceptibility to harm and lack of capacity to cope and adapt.

When considering sensitivity and adaptive capacity, it is good to take another look at the general vulnerability context defined in chapter 1. Examine if there are clearly visible elements that may worsen the possibilities of some to resist the impact, or cope with and adapt to the changes caused by a hazard. In many cases poverty, low education levels, gender inequality or lack of access to technology services increase susceptibility to harm. Also, some characteristics of farm-ecosystems and natural resources management, e.g. low water holding capacity of the soil, or overharvesting of trees may put the farm at greater risk. However, more specific analysis on sensitivity and adaptive capacity affecting vulnerability is needed. The guiding question is

What characteristics make a livelihood/farm/enterprise susceptible, i.e. sensitive, to the impacts of changing climate?

Sensitivity determines the degree to which a livelihood component, e.g. a farm or ecosystem, infrastructure, or activity is adversely affected when exposed to climate related hazards. It is determined by those factors that directly affect the consequences of a hazard. Sensitivity is typically shaped by natural and/or physical attributes of the system including topography, the capacity of different soil types to resist erosion or land cover type. But it also refers to human activities and constructions that affect a system, such as quality and condition of materials (bridge made from non-resilient materials) and natural resources management practices (e.g. unsustainable tillage systems, or poor water management). Additionally, are there certain weaknesses in the modes of farm production chosen (e.g. monocropping, mixed cropping etc.)? Or is the plant variety chosen sensitive to climate variability? Is the plantation on a steep slope or do the soils in the field have low water retention capacity? Is the area susceptible to flooding? If so, why? Are the construction method, material and condition behind the sensitivity of infrastructure to climate change?

3.4 Formulating impact chains

Specific impacts of hazards and sensitivity of farms Formulation of impact chains is beneficial for understanding climate risk through the flow of events followed by climate triggers and hazards. The chains begin with the most significant hazards and triggering climate phenomena identified in section 3.1. The next step is to consider the direct consequences of the hazard on the livelihood resources and activities considered under high risk identified in Tables 5 and 6, followed by a description of sensitivity factors (specific qualities) that make the livelihood/farm/enterprise especially susceptible, i.e. sensitive to the impacts of the particular hazard.

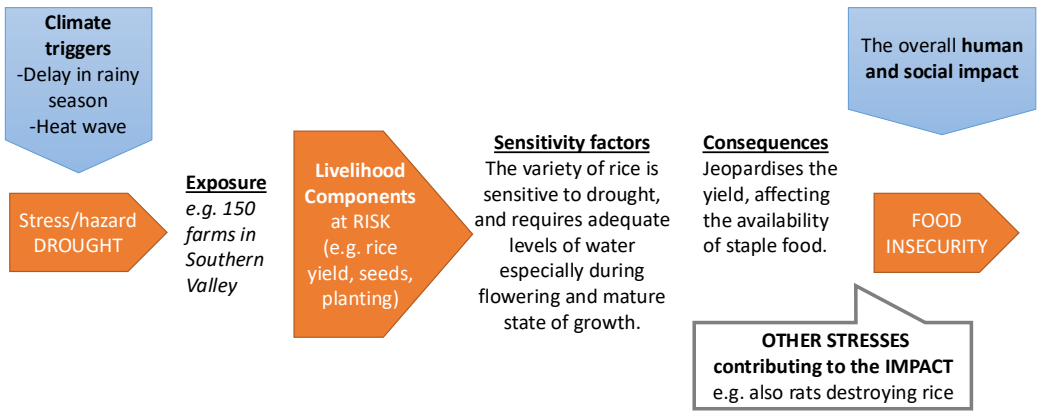


Figure 5. **The identified hazard triggers the chain of events referred to as impact chain**

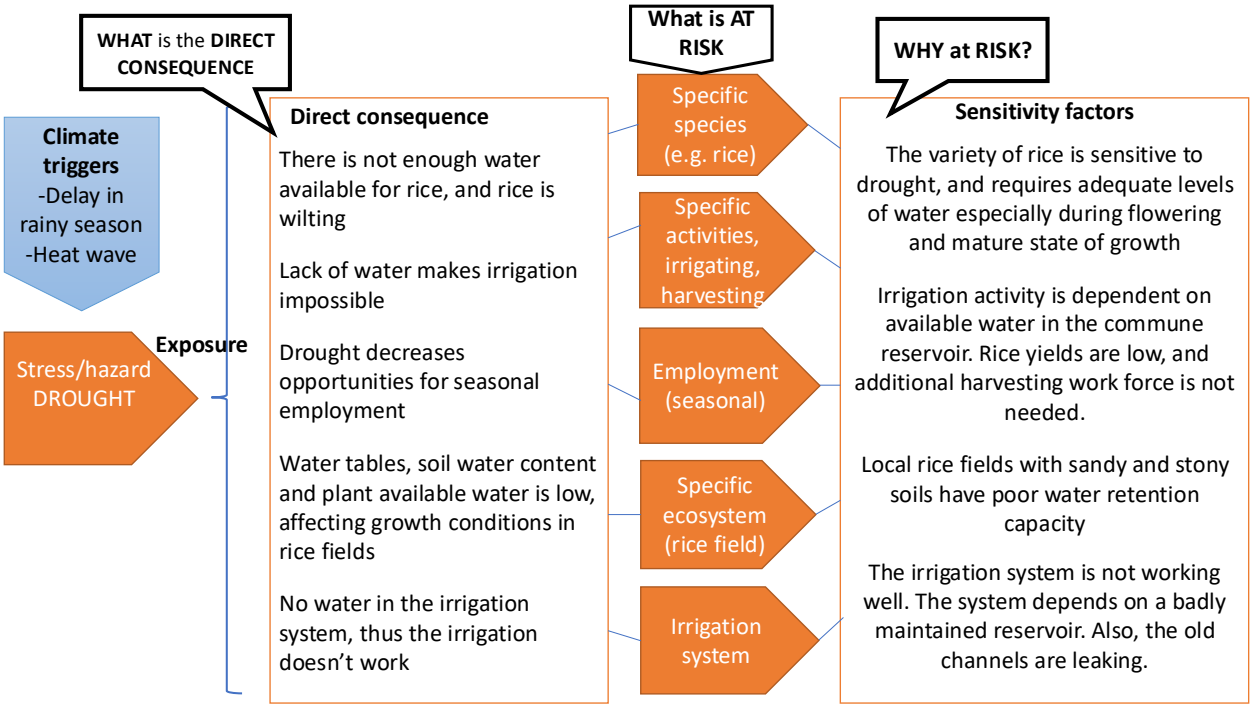


Figure 6.
Sensitivity factors of livelihood resources and activities contributing to direct consequences

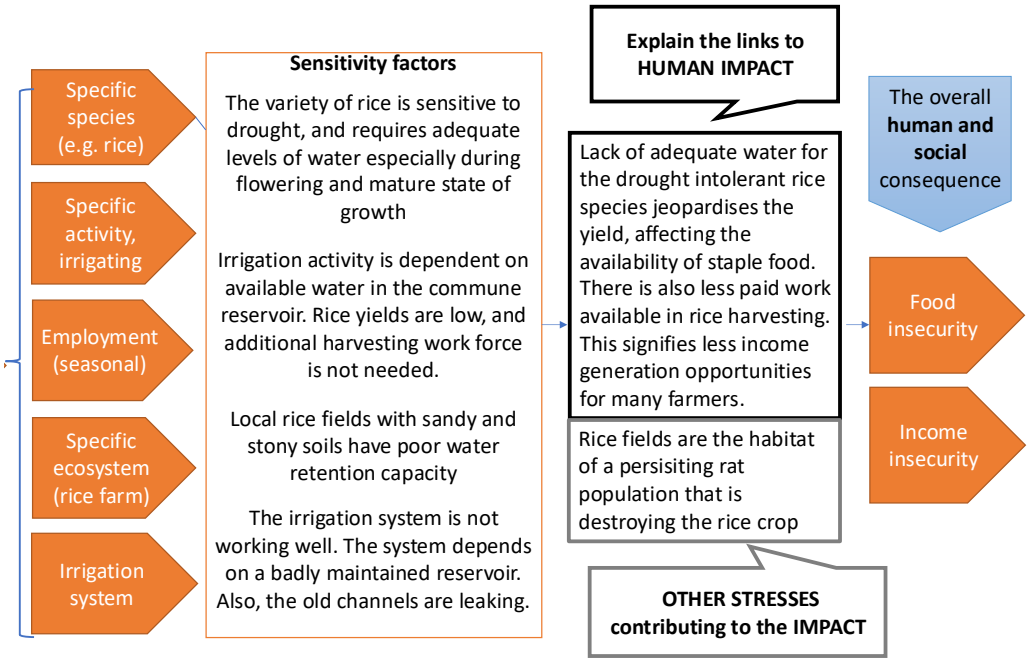
After identification of the specific impacts on livelihoods and different sensitivity factors, it is time to look at the link to wider human and social impact on the FO members and their farms and households, some of which are listed below in Table 8. Could the exposure and sensitivity of different livelihood components potentially risk human well-being, such as food security, or income security? In what way?

Table 7.
Examples of human and social impact

Potential human and social consequences of climate hazards
Health impacts (injuries, sickness, fatalities)
Food insecurity
Energy insecurity
Water insecurity
Income insecurity
Increased inequality
Increased poverty
Degradation/loss of natural resources
Increased migration
Increase in illegal activities
Decreased access to information (e.g. news, weather forecast, warnings, information technology)
Decreased opportunities in learning, capacity development
Decreased access to important community services (e.g. logistics, institutions, peer-groups, financial services)
other…

The aim is to explain the links between the climate hazards, exposure, physical impact on livelihood components and create understanding of the potential human/social impact. Consider if there **are other non-climate related stresses** contributing to the overall impact, as illustrated in Figure 7. Discuss at all stages how the impacts may vary depending on gender and other vulnerability factors.
Simplified version can be done by using guided questions to conduct impact chain exercise

Figure 7.
Other stresses and human and social impact



A simplified version (Figure 8) can be done by using guided questions to conduct impact chain exercise
If the impact chain as a concept seems too difficult for farmers, the exercise can alternatively be conducted by listing elements of the impact chain through guided questions:

1. **What** is at risk? (livelihood capitals at risk: specific resource such as crops, activity)
2. Can **exposure** be minimised to alleviate direct consequences e.g. by changing the **location** of the resource/activity? (e.g. moving from lowland to highland in flood risk areas)
3. **Why** is it at risk? Can the **characteristics** be changed to make it less **sensitive**? (sensitivity factors of livelihood resources and activities)
4. What are the **direct consequences** of the hazard on the specific resource such as crops/activity? List all you can think of and be specific.
5. What **other stresses** are contributing to the impact?
6. What is the overall **human and social impact**?

Figure 8.
Simplified impact chain

4 Adaptation

This section aims to look into farmers' opportunities and challenges in adapting to climate change and to identify potential adaptation strategies. Farmers have thousands of years of experience in coping with weather related difficulties. The tools and coping mechanism of the past may not be sufficient anymore, and farmers are forced to reorient their activities and systematically design adaptation interventions to sustain their livelihood. The "new normality" of changing climate has serious economic and social impacts on farmers, which require carefully planned and effective responses. It requires a process of adjustment to actual or expected climate and its effects.

Although adapting to climate change is requires significant efforts and financial efforts from smallholders, often borne at their own expense. A 2023 study by the International Institute for Environment and Development (IIED) suggests that smallholder farmers worldwide are already spending 368 bn USD annually adapting to climate change. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects[1].

Adaptation can be done with a short-term perspective or to achieve a more structured adjustment to the livelihood practices. Coping mechanisms are short-term strategies developed by farmers to cope with the aftermath of climate change induced shocks and stresses. They are often considered as short-term and unplanned action, and ad hoc measures at the time of crisis: if flooding reaches the storage, a farmer may change the stock to his/her house from the storage floor or build shelves for the stock. Also, a short-term employment (selling labour) may be a coping strategy. Coping mechanisms are often low-cost and easy to implement. Good coping mechanisms can develop into adaptation strategies in the long run. They can save farmers from great losses. The current coping mechanisms used by FO members, and the pros and cons of these mechanisms, should be identified.

As described earlier, high adaptive capacity has the potential to offset or at least alleviate the potential climate impact, which reduces the vulnerability of the system in question. Prior to assessing the capacities in place, it is meaningful to look into potential adaptation options, identify feasible adaptation activities and reflect the necessary capacities required to achieve expected adaptation result. AgriCord has established 5 Steps to Adaptation to facilitate identification of potential adaptation pathways.

1 Smallholder farmers worldwide spending $368bn annually adapting to climate change, nature loss | International Institute for Environment and Development https://www.iied.org/21976iied

4.1 AgriCord 5 Steps to Adaptation

AgriCord's 5 Steps to Adaptation methodology is designed for systematic identification of potential adaptation options:

STEP 1 DECREASING EXPOSURE/DIRECT CONSEQUENCES

Exposure is the presence of the selected unit of observation, e.g. people, farms, animals, ecosystems, livelihoods, resources and other assets in places and settings that could be adversely affected. Step 1 to Adaptation aims to find ways to decrease exposure. This is seldom possible with farms, farmers and farm practices, which are tied to a certain location. However, in some cases components of livelihoods are mobile, and can move away from the areas prone to hazards. For example, a rice storage, beehive or trading activities could be moved to a less flood-prone area to decrease the exposure but transferring farm-ecosystems or farm-households from one place to another often proves impossible. Nevertheless, It is important to consider if there are ways to decrease exposure at least for some resources.

STEP 2 DECREASING SENSITIVITY

A vast number of the potential adaptation interventions seem to be based on decreasing sensitivity. It requires careful identification of sensitivity factors, i.e. qualities and conditions that may increase susceptibility to harm/ damage, in the face of climate hazards. Covering these factors and considering how to decrease sensitivity can lead to well-targeted adaptation interventions. If the current rice variety is sensitive to drought, an adaptation option could be changing the rice variety to a more resilient one. If the wind is blowing the fertile soil away from an erosion prone farm-ecosystem, wind blocks (e.g. tree fences) and nutrient management (e.g. manure application or cover crops) could be considered. Or if an irrigation system is leaking, resulting in less water for watering the home garden during the time of drought, it should be fixed to reduce the sensitivity.

STEP 3 INCREASING ADAPTIVE CAPACITIES

We can also increase capacities which increase farmers possibilities to protect themselves against climate hazards. One of the simplest mechanisms to increase adaptive capacities is to have savings or an insurance. Financial means can help you overcome problems: buy needs seeds if they didn't germinate due to a drought, fix your house if flood managed it. But there are other means which can build one's adaptive capacities. Your skills to practices agroforestry may protect your soil from erosion and increase water retention of field, which helps plants to tolerate drought. Adaptive capacity can also be increased by investing in social practices strengthening preparedness which requires a joint effort, e.g. building a ditch or larger infrastructure.

STEP 4 MITIGATING OTHER STRESSES

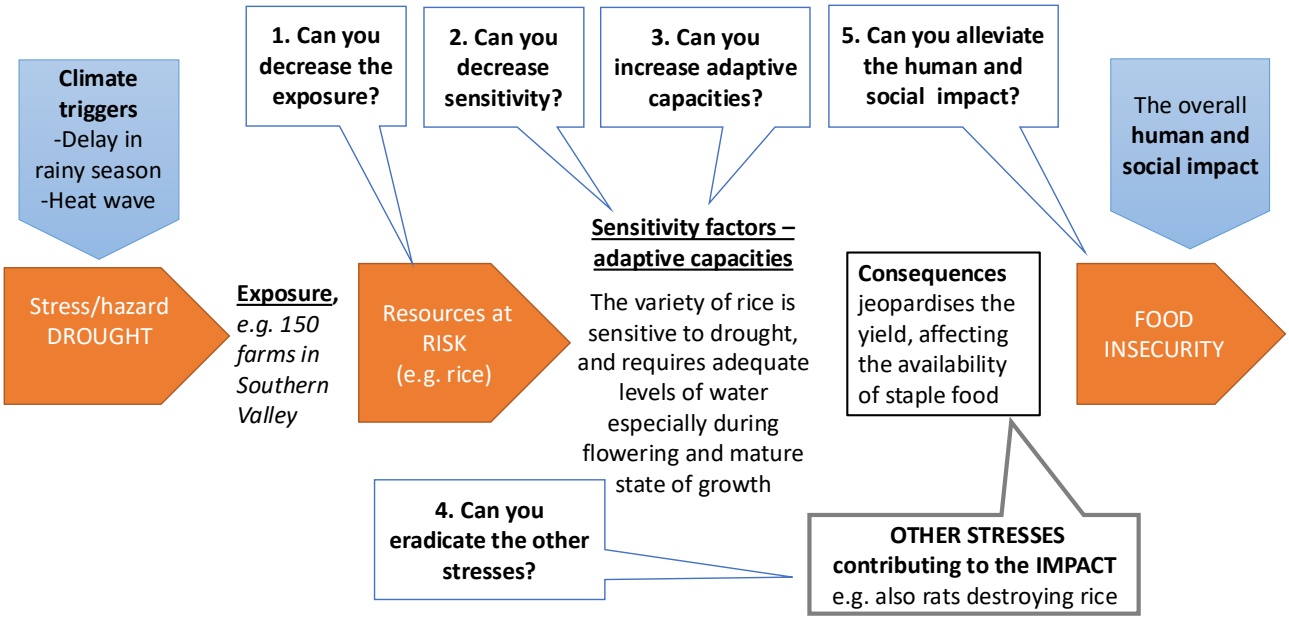
The climate impacts can be aggravated due to other non-climate pressures, which should be taken into consideration when planning adaptation measures. Is there a possibility to decrease or mitigate these other stresses and pressures through adaptation interventions? Sometimes the other pressures can be highly complex phenomenon, such as deforestation or conflicts, and may not be within the reach of farmers' influence, but still important for consideration in the adaptation context. Sometimes the other pressures can have simple solutions, such as pest management or abandoning ecologically deteriorating farming practices.

STEP 5 ALLEVIATING HUMAN IMPACT

Climate change may cause human suffering and prevent the fulfilment of basic human rights such as the right to food or income. Adaptation can and should aim to alleviate the overall human/social impact. If the human impact is a loss of income from rice production, the adaptation measure could aim to diversify income sources, i.e. develop other forms of income generation to complement or substitute the rice income. In case of food insecurity, various measures can be considered from preservation of food to establishing reserves and diversifying to less sensitive products.

Figure 9 illustrates the logic of the AgriCord 5 Steps to Adaptation method in identification of potential adaptation interventions.

Figure 9.
AgriCord 5 Steps to Adaptation



Adaptation solutions should be tailor-made for each site and based on climate vulnerability and risk analysis. Some generic adaptation examples and specific approaches to adaptation, such as **ecosystem-based adaptation, agro-ecological approach, climate-smart agriculture, or regenerative agriculture can be found in the literature**.

4.2 Feasibility of adaptation options

There are many options for adaptation interventions, listed as the outcome of AgriCord 5 Steps to Adaptation in Section 4.1, but critical evaluation of the feasibility of these activities is needed. Prioritising can be done through reflecting the relevance and feasibility against several criteria, such as effectiveness, affordability and easiness of implementation. Subjective views on feasibility can vary greatly amongst the FO members and women, men and possible other vulnerable groups may have different perceptions of the relevance and feasibility of interventions, for example in respect of their labour force/working time requirements or affordability.

There are still several questions to answer; To what extent can the measure reduce the risk of the climate impact and are the benefits of the intervention short-term, long-term or both? Would a delay in adopting a measure increase vulnerability or lead to increased costs at a later stage? Does the intervention in question require labour force? Is it available and at what cost? Are there low-cost measures in the intervention list, do all the interventions listed require additional funding? Can both men and women benefit from the action? To facilitate the comparison and selection of activities, Table 8 provides a simple ranking and scoring of adaptation options based on their efficiency, affordability and easiness of implementation, and allows also acquiring gender disaggregated preferences. Both women and men are expected to mark one or two most feasible and least feasible options against each feasibility criterion. It should be acknowledged that there may be trade-offs between the criteria, and while simple rankings don't show the complexities behind these options, they can facilitate the discussion. Feasibility pros and cons and trade-offs of each activity should be recorded to the comment box, together with the consideration of vulnerable groups.

Feasibility is marked with an "X". The higher the total amount of Xs, the better the feasibility

Table 8.
Feasibility scores and ranking of adaptation interventions

HAZARD 1	Short-term effectiveness		Long-term effectiveness		Affordability (low-cost)		Easiness of adoption (technically)		Time consumption		TOTAL SCORE		RANKING		Comments on pros and cons, with specific focus on vulnerable groups
Interventions	W	M	W	M	W	M	W	M	W	M	W	M	W	M	
e.g. fixing the irrigation channel		x				xxx		x							
household water collection			xx			x				xx					

The prioritising of adaptation options is done to trigger discussions amongst the farmers, as each of the options requires careful thinking about their feasibility. Also, often one measure alone would not make a difference, but a combination of actions could create an impact. The farmers participating in the discussion should arrive at conclusions of the most preferred adaptation options.

4.3 Adaptive capacity

Adaptive capacity is the key for decreasing vulnerability and carrying out various adaptation activities. Adaptive capacity determines the capacity to resist climate impact and generate and implement adaptation measures. Farmers with high adaptive capacity are usually less vulnerable to climate change impact than their colleagues with low adaptive capacity. This is because adaptive capacity can help farmers to lower the sensitivity of their activities to climate exposure. Several factors can shape this capacity, including current skills and knowledge and access to new knowledge and information; availability of and access to technical solutions; existence of institutions and organisations that can provide support to farmers (such as FOs); and socio-economic factors, such as household income, savings, number of children/adult household member, assets, housing and access to credit.

Below, examples of questions for assessing the adaptive capacity are grouped under main headings:

- **Knowledge:** Is there knowledge (both traditional and scientific) and expertise accessible that support adaptation? How does innovation take place?
- **Technology:** Are there technical adaptation options available?
- **Institutions:** Are there institutions, such as FOs, extension services, research stations, farmers groups etc. that could develop farmers' adaptive capacity and support farmers in adaptation?
- **Economy:** Do men and women farmers in the area have access to financial resources? Is there formal or informal credit in order to invest in more resilient practices? Are there insurances against climate risks available and affordable to farmers?

Adaptive capacity may signify a combination of different skills and resources that enable farmers to address climate risks efficiently. Depending on the climate related challenge, a variety of solutions may be needed, including extension services to translate research results into concrete advice, financing institutions providing credit/savings/insurance services and farmers' organisations to strengthen market linkages and advocate for better services. Many of these actions require supportive institutions and collective action as they cannot be implemented by individual farmers. The most feasible interventions are discussed in Table 9. and should be elaborated further with guiding question such as:

- Which are the crucial adaptive capacities that allow your system to handle adverse climate change impacts or lack of which capacities make your system even more susceptible?
- What are the capacities needed for each selected adaptation intervention? Are they currently available for farmers or could they be accessed through different mechanisms? Who has the required capacities, or access to and control of those, and who doesn't?
- Who has the knowledge relevant to adaptation, or who can access it?
- Are there technological solutions that exist for adaptation?
- Are men and women farmers aware of these solutions?
- Who has money and other resources to invest in adaptation?
- Who can access new resources such as credit? Are there institutions that can help, and whom do they help?

This exercise can also be conducted as part of the AgriCord Building Resilience Toolkit Part II. In this context, the adaptive capacities are analyzed not only from the perspective of individual members but also from the perspective of the Farmers' Organization (FO) itself. This dual approach provides a comprehensive understanding of resilience, enabling insights into how both individuals and the FO collectively adapt to challenges and changes.

Table 9.
Adaptive capacity required for adaptation interventions

HAZARD 1 interventions	Capacities and resource required	Type of capacity: Knowledge (K) Institutions (I) Technology (T) Economy / financial resources (E/F)	Currently available	Easily accessible	Difficult to access	Analysis of the capacity gaps with a specific focus on vulnerable groups
1. e.g. improvement and maintenance of the irrigation system	a) basic understanding of a digital irrigation system, b) permission from local government for the reservoir improvement c) coordination for the maintenance			x		Around half of the communities have water management committees but not all. Women are not present in the existing committees.

Finally, it is necessary to make sure that farmers have the necessary capacities for adaptation interventions. Table 9 describes the capacities required and capacity gaps amongst farmers. Table 10 continues by describing the capacity building needs of farmers and activities proposed to build adaptive capacity. In addition, further considerations on the implementation of these actions are needed, as well as related capacity building needs of farmers.

Building Resilience II will focus more on the following questions but if the time and resources allow, you can start the discussion to finalize BR-I. You should ask for example:

- → Can FO provide services to help their members to access and adopt the adaptation options?
- → What is the role of the FO members (farmers), the FO and other actors that can be held responsible for or at least contributing to the implementation of adaptation?
- → What role can the FO play as a service and input provider and marketing channel for new products or an advocate towards decision makers and financing institutions?
- → Would it be necessary for the FO to adjust its portfolio of services to better address its members' needs?

Table 10.
Building adaptive capacity of farmers

Capacity building needs of farmers	Potential capacity building activities
know-how in maintenance of new irrigation system including the technological solution (digital meter)	Training farmers' water management committee in maintenance and digital solutions
gender equality in water management committee	support for women's participation in the water management committee
knowledge of a new variety of management practices	training in planting and tending
knowledge of and impact on policies and decisions affecting farmers	information events, formulation of advocacy messages
livelihood security of single-headed households	establishment of peer-groups and micro-credit schemes

The final list of potential adaptation interventions, including capacity building activities of farmers, is found in Table 11. The table includes also initial considerations of the relevant stakeholders and responsible actors contributing to the implementation of the adaptation interventions.

Table 11.
Adaptation interventions and relevant stakeholders

HAZARD 1 Interventions	**Role of farmers**	**Responsible/contributing actors**
establishment of additional water reservoirs	advocate through FO	community, local government
improving irrigation channels	farmers may provide labour force	community, local government and farmers
adding a digital meter to measure water consumption	adoption of new technology	FO, community, farmers
changing to a drought-tolerant rice variety	testing drought tolerant variety	FO, local research institution
CAPACITY BUILDING activities		
Training a water management committee in maintenance and digital solutions	participation in the trainings and committee	community, local government, FO
support for women's participation in a water management committee	encourage female participation in the committee	community, local government and farmers

5 Summary and next steps

Formulating a summary of results can facilitate the final analysis and conclusion. A summary table for the purpose is illustrated in Figure 10.

Consider if the sensitivity could be decreased

Consider if the exposure could be avoided

Pay attention to underlying vulnerabilities and gender inequalities

Is it possible to decrease the impact of non-climatic pressures?

Is it possible to alleviate human impact?

List potential adaptation activities

Consider which capacity areas are needed for adaptation vs. the current capacity strengths of farmers

HAZARD 1	e.g. drought
Impact on farm production	Lack of an adequate amount water jeopardises the rice yield
Sensitivity factors	- irrigation relies on only a small number of water reservoirs - old channels are leaking - common rice variety doesn't tolerate drought - sandy soils have low water holding capacity
Exposure; affected farms/farmers	- number of rice farms, number of farmers, number of rice fields affected
Socio-economic vulnerability.	- farmers with less than 2 ha plots - farmers from single-headed households
Other stresses	- some community members unfairly divert water to their rice fields - rats are destroying the yield
Human impact	Decreased availability of staple food, less income from rice trade, less farm employment
Potential adaptation interventions	- establishment of additional water reservoirs - fixing the irrigation channels - establishing a water committee's watch group or alternatively a digital meter to measure water consumption - changing to a drought tolerant rice variety - improving the water circulation in paddy fields, - increase manure application for water retention - establishment of peer-group focusing on livelihood development and food security for single-headed households - establishment of seed fund for most affected farmers - diversifying production
Adaptive capacity needed	- financial resources and water management know-how and technology for irrigation infrastructure development - know-how of resilient rice varieties and their management - institutional capacity to establish a water watch - pest control - knowledge of pest control
Current capacity strengths of farmers (access and control	- individual famers and the FO lack financial resources to improve water management infrastructure - FO has a water expert with conventional knowledge of water management - no access to knowledge of technological solutions for water regulation/monitoring - water committee exists and has the capacity to facilitate a water monitoring group. - some male farmers have the know-how of resilient rice varieties after they received training by FO, but no women or farmers from distant location participated. - there is traditional knowledge about rat traps that should be used

Figure 10. **Summary table of findings linked to particular climate hazard**

To conclude, the overall findings of risk assessment and adaptation planning should be listed and the next steps of the adaptation process agreed amongst the FO and its members. The data and results of the AgriCord Resilience Toolkit PART I - *FO Members Assessing Climate Risks and Designing Adaptation* can be recorded using Annex I, *Reporting Format for Climate Risk Assessment and Adaptation Design*. The results, analysis and report produced following the logic of the tool can be used, for example, as a basis for an FO adaptation plan, improved service design or as a background analysis for a project plan.

Conclusions Box

Describe and analyse

→ Main hazards
→ Main elements in farm production/livelihood at risk
→ Vulnerable groups
→ Main impacts
→ Other non-climatic stresses aggravating impacts
→ Main adaptive capacity areas of strengths
→ Main adaptive capacity needs
→ Main adaptation interventions

Tentative plan of action

→ How will the adaptive measures be achieved?
→ What are the next steps?
→ Who will be responsible for the next steps?
→ By when will the next steps be taken?

Annex 1 Reporting Format for Climate Risk Assessment and Adaptation Design

Notes

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