

Participatory analysis of vulnerability and adaptation to climate change: a methodological guide for working with rural communities

Moussa Boureima, Tougiani A. Abasse, Carmen Sotelo Montes, John C. Weber,
Boubacar Katkoré, Bayo Mounkoro, Joseph-Marie Dakouo, Ouodiouma Samaké,
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About the authors

The authors are researchers with the World Agroforestry Centre and the national agricultural research institutes in Burkina Faso, Mali and Niger, and members of a research team for the project, “Parkland trees and livelihoods: adapting to climate change in the West African Sahel”.

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Key words

Participatory analysis, vulnerability, adaptation, climate change, risks and threats, livelihoods, rural communities

Foreword

Vulnerability to climate change is an indicator of sensitivity or inability of a system to cope with the adverse effects of climate variability and climate risks. Rural communities understand their situation. They have their way of perceiving the phenomenon of climate change, so any analysis of vulnerability to climate risks should be based on their knowledge of local conditions.

Vulnerability is a function of the nature, magnitude and rate of climate change risks, and the climate variation to which a system is exposed. Thus, the communities' resilience to climate shocks must be supported by local initiatives and innovations to adapt to risks and threats.

Participatory vulnerability analysis provides rural communities with tools to better understand their exposure to risks, threats and shocks. This allows them to develop the capacity to adapt to climate change. Participatory vulnerability analysis should not be limited to the development of climate change adaptation plans; it should also motivate the communities to constantly look for opportunities to strengthen their resilience to the adverse impacts of climate change.

The methods described in this paper were developed for researchers and development project staff who work with rural communities. The document responds to a desire of research and development partners in the West African Sahel to have a common approach for participatory analysis of vulnerability and adaptation to climate change. The approach was used in 12 groups of villages in Burkina Faso, Mali and Niger in 2011, and the examples presented in this document are based on the participatory analysis. The methodological guide was published in French in 2012 (ICRAF Occasional Paper No. 19). It was then translated into English to reach a larger audience.

This guide is dedicated to the late Saley Kanta from the PASADEM project in Niger. Saley contributed to the development of this approach and others used by the World Agroforestry Centre, national agricultural research institutes and IFAD development projects in the West African Sahel. Tragically, Saley died in a road accident on 24 February 2013 in Niger. Saley inspired all of us to make our research more relevant to the needs of resource-poor farmers in the region, and we will continue to do that in his memory.

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- The CGIAR Consortium Research Program CCAFS (Climate Change, Agriculture and Food Security) provided a grant to the World Agroforestry Centre to develop the methodology for the participatory analysis of vulnerability and adaptation to climate change.

Key contributors to this document:

- Mr. Guéro Chaibou, Mr. Hassane Issa and the late Mr. Saley Kanta from the PASADEM project (Projet d’Appui à la Sécurité Alimentaire et au Développement dans la Région de Maradi) in Niger, Mr. Daniel Gampiné from the PICOFA project (Programme d’Investissement Communautaire dans la Fertilité Agricole) in Burkina Faso, and Mr. Mamadou Tiero from the FODESA project (Fonds du Développement en Zone Sahélienne) in Mali provided technical advice for the development of the methodology.
- Dr. Jules Bayala and Dr. Joachim Nyemeck Binam from the World Agroforestry Centre provided comments and made recommendations on the earlier drafts.

List of abbreviations & acronyms

CGIAR	Consultative Group on International Agricultural Research
FANR	Farmer-assisted Natural Regeneration
FODESA	Fonds de Développement en Zone Sahélienne (Mali)
GIEC	Groupe d'experts intergouvernemental sur l'évolution du climat
IER	Institut d'Économie Rurale (Mali)
IFAD	International Fund for Agricultural Research
INERA	Institut de l'Environnement et de Recherches Agricoles (Burkina Faso)
INRAN	Institut National de Recherches Agronomiques du Niger (Niger)
IPCC	Intergovernmental Panel on Climate Change
NGO	Non-governmental Organization
PASADEM	Projet d'Appui à la Sécurité Alimentaire et au Développement dans la Région de Maradi (Niger)
PAVACC	Participatory analysis of vulnerability and adaptation to climate change
PICOFA	Programme d'Investissement Communautaire dans la Fertilité Agricole (Burkina Faso)
UNFCCC	United Nations Framework Convention on Climate Change

Introduction

Climate change is a reality. In the West African Sahel for example, several global circulation models predict an increase in temperature, a decrease in rainfall and an increase in rainfall variability this century (Buontempo 2010). Sahelian farmers have faced droughts or floods for years and the impacts threaten their livelihoods. Therefore development projects in rural communities should work with the communities to develop and monitor action plans that would help the communities adapt to climate change. Adaptation to climate change should be done locally and based on local knowledge and practices. This requires a consideration of rural communities' vulnerability to different risks and their capacity to adapt.

An action plan is intended as a framework to allow communities to organize themselves better to deal with the complex factors that affect their resources and livelihoods. It should therefore be designed to sustainably improve the following livelihood assets of the rural communities:

- Human capital: health, nutrition, education, knowledge and skills, ability to work, ability to adapt.
- Social capital: social networks (patronage, neighbourhood, kinship), relationships of trust and mutual support, formal and informal groups, common rules and sanctions, collective representation, mechanisms for participation in decision-making, leadership.
- Economic capital: savings, credit/debt (formal, informal), transfer of funds, pensions, wages, infrastructure, tools and technology.
- Political capital: government institutions.

- Natural capital: land, water and aquatic resources, trees and forests, wildlife, wild foods and fibre, biodiversity, environmental services.

This methodological guide was designed to help researchers and development workers to conduct a participatory analysis of vulnerability and adaptation to climate change (PAVACC) with rural communities, and to develop action plans that reflect the concerns of the rural communities. The approach helps rural communities to assess their vulnerability to climate change, and to identify and plan appropriate activities to reduce their vulnerability. In addition, it helps them to organize and analyze information about the vulnerability and resilience of their community, households and individuals, and to use local knowledge about coping strategies to help them adapt to climate change.

The methodological guide is divided into four major steps, and the sequence of activities is illustrated in Figure 1:

1. Assessment of the current situation and vulnerability of village resources to threats
2. Analysis of vulnerability by gender groups
3. Development of climate change action plans
4. Implementation and participatory monitoring and evaluation of activities of the action plan.

Before discussing the steps in the process, we present definitions of some technical terms and recommendations about the coordination and implementation of the PAVACC process.

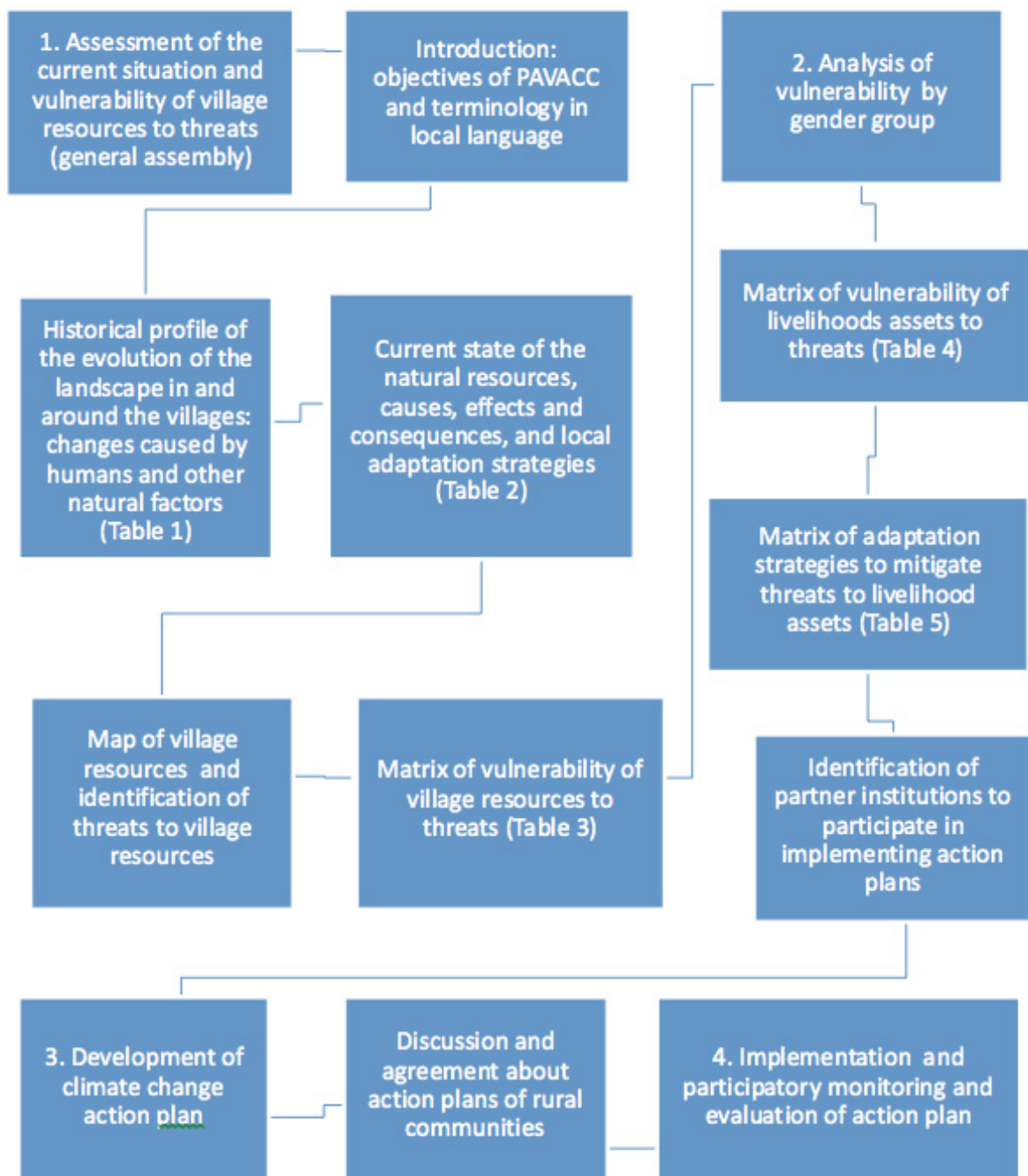


Figure 1. Sequence of activities in the participatory analysis of vulnerability and adaptation to climate change

Definitions of some technical terms

Climate change: The United Nations Framework Convention on Climate Change (GIEC 2007) defines climate change as “change which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods”.

Vulnerability to climate change: This is the extent to which a system is susceptible to, or unable to cope with the adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the nature, extent and pace of change and climate variation to which a system is exposed, the sensitivity of this system and its ability to adapt.

Adaptive capacity to climate change: This is the set of capabilities, resources and institutions of a country, rural community, etc. that allows it to implement effective measures to adapt to climate change.

Adaptation to climate change: Adaptation to climate change or climate disturbances means strategies, initiatives and individual or collective actions (companies, associations, etc.) which aim to reduce the vulnerability of natural and human systems against actual or expected effects of climate change.

Resilience to climate change: This is the ability of a social or ecological system to absorb disturbances while retaining its basic structure and modes of operation. In other words, it is the ability to organize and adapt to climate change.

Parkland agroforest: Parkland agroforests are landscapes managed for tree, crop and livestock production, and are the primary agricultural production system in the West African Sahel (Boffa 1999).

Recommendations regarding the coordination and implementation of PAVACC meetings in rural communities

- Before the meetings in the rural communities, prepare draft definitions of vulnerability and adaptation to climate change in the local language and illustrations of the concepts using local metaphors, prepare tables and illustrative drawings on flip charts for the various steps, and obtain the supplies for the meetings (flip chart and paper, marking pens, tape and clips to hold the paper on the flip charts);
- Engage four facilitators who speak the local language for the meetings: one person to lead the meetings, one person to prepare drawings and complete the tables on flip charts, one person to take notes of comments by the men, and one person to take notes of comments by the women.
- Coordinate meetings to ensure the participation of four gender groups from the rural communities – young men, young women, adult men and adult women (at least four people from each of the four groups), as well as local governmental authorities and chiefs/leaders of the participating villages.
- Hold the meeting in a central location and coordinate transport of participants from surrounding rural communities.
- Ensure that the participants from the rural communities and the facilitators understand the concepts of vulnerability and adaptation to climate change.
- Facilitators should (a) manage the time to ensure that the steps are conducted within a reasonable period of time (2-3 hours); (b) encourage the participation of all

participants in the discussion; (c) be able to rephrase or reformulate points if needed to ensure that everyone understands the points; (d) ask the participants to be more specific in their comment if the comment is not clearly understood or if the answers are not well understood; (e) ensure that all the participants can see the flip charts with the various drawings and tables; (f) record

the following information – date, names of participating villages, geographical location, total human population size in the rural communities (available from local authorities), names of facilitators, number of participants in each of the four gender groups; and (g) meet to discuss and synthesize the results after completing the meetings in the rural communities.

Stages in the assessment of vulnerability in the community and development of action plans



Photo 1. General assembly of participants from a group of villages in Niger

1. Assessment of the current situation and vulnerability of village resources to threats

General assembly of representatives from rural communities – introduction and objectives of PAVACC

This introduction should be brief (30 minutes) and present the objectives of PAVACC. The overall objective is to collect information to develop a participatory action plan to improve the adaptation of the rural communities to climate change. During this general meeting, the facilitators should encourage the participants from the rural communities to discuss their perceptions of climate change and their vulnerability to climate change. The participants should reach a consensus about the definitions of key concepts (climate change, vulnerability, adaptation) in their language before proceeding to the next activity.

Historical profile of the evolution of the landscape in and around the villages

The historical profile is a tool that enables the rural communities to understand the evolution of

the natural resources in their landscape (land, forest, crops, water, wildlife, changes in the population, etc.), as well as major changes in infrastructure (houses, mills, etc.). It also allows the communities to understand who and what is responsible for the changes, and the effects on their natural resources. This activity should take 30-45 minutes.



Photo 2. Discussion of historical changes in the landscape around a group of villages in Niger

To provide data necessary to develop the historical profile, the participants from the rural communities should prepare a schematic drawing illustrating the state of the resources of their landscape at different time periods. A facilitator needs to help the people to prepare the schematic drawing for each period (see example

below and Figure 2). The facilitator should ask when the village was created: if the participants do not know, then the facilitator can ask if there was any important event around the time that the village was created.

Period 1: Situation before the village was created. What characterized this period? For example, maybe the participants will say that this period was characterized by a large diversity of tree species, an abundance of tall trees, forest products, wildlife, rainfall, sources of water for wildlife and plenty of fertile land. Although this period may be unknown to most of the participants present at the general meeting, they should prepare the drawing based on their collective memory.

Period 2: Situation shortly after the village was created. What characterized this period? For example, maybe the participants will say that this period was characterized by the felling of trees to build houses, clearing land for crop fields, production of livestock herds, abundant pasture for cattle, and many sources of water for livestock.

Period 3: Transition between the creation of the village and the current situation. What was the state of the natural resources during this period? Were the resources increasing, decreasing or not changing?

Period 4: Current situation. What is the state of the natural resources today? Is there enough agricultural land? What are the visible changes in the natural resources and how did these changes occur? For example, have some indigenous tree species disappeared in the landscape; have exotic tree species been introduced; and do some invasive plant species now dominate the landscape?

The facilitator should write the resources and the current state of the resources in the first two columns of Table 1, and then ask who or what is responsible for each change. If the change is largely caused by human beings, the facilitator should write an X in the appropriate column. If the change is largely caused by natural factors beyond the control of human beings, the facilitator should write O in the appropriate column.

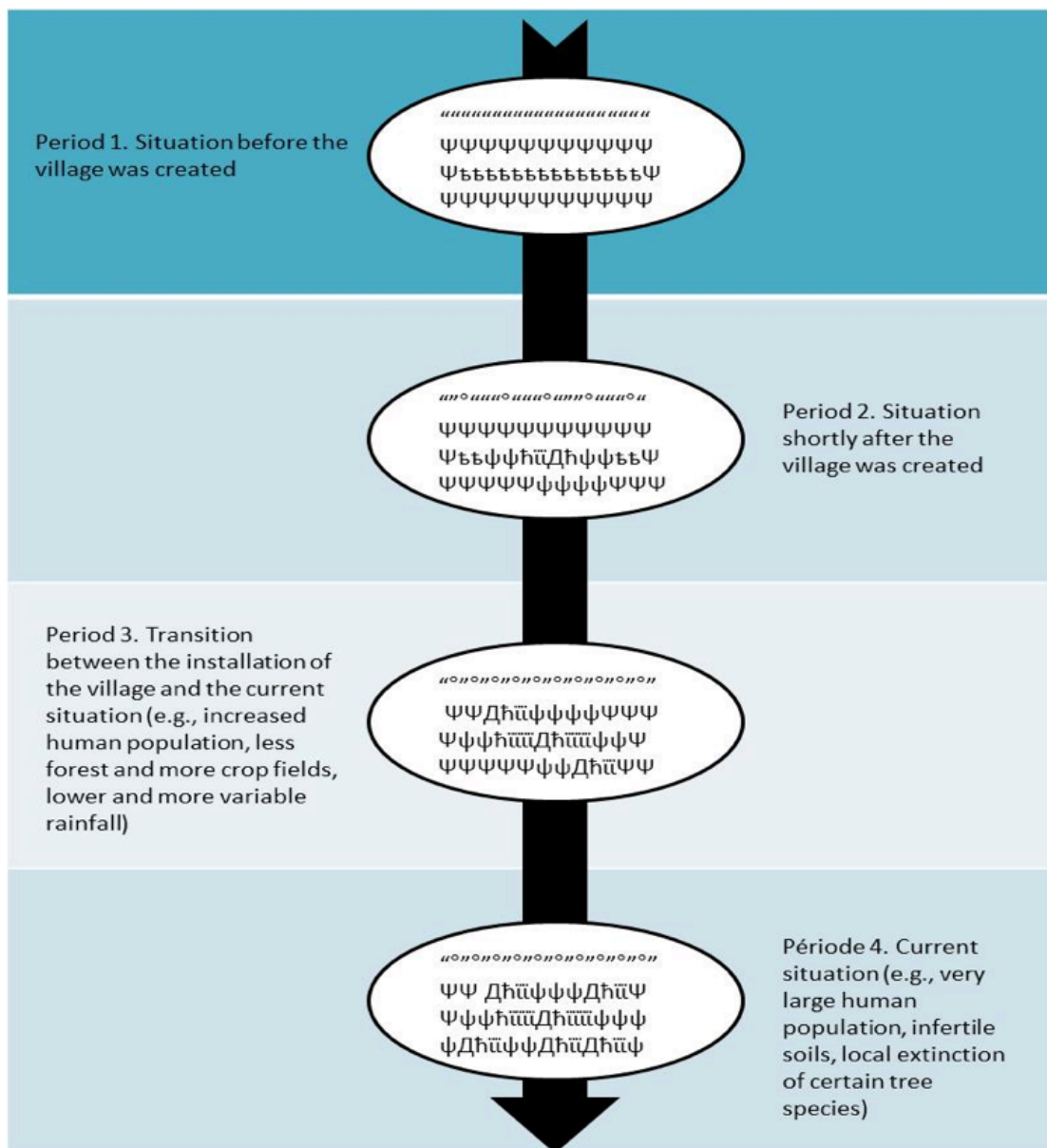
Table 1. The current state of the natural resources and the factor responsible for the change

Resources	Current state of the natural resources	Change largely caused by natural factors beyond the control of human beings	Change largely caused by human beings
Forests	Decreased number of trees in parkland agroforests		X
	Local extinction of certain tree species in parklands and woodlands		X
Rainfall	Decreased rainfall	O	
	More variability in rainfall	O	
Etc.			

It is important that the participants from the rural communities recognize their responsibility for the current state of their natural resources. For example, some participants may say that human beings did not largely contribute to any of the changes indicated in Table 1, while others will recognize that human beings largely contributed

to all the changes, and still others will say that both human beings and natural factors beyond human control largely contributed to the changes. The participants therefore should reach a general consensus about their responsibility for the changes. The causes of the changes in resources will be further explored in the next activity.

Figure 2. Example of a historical profile showing the evolution of natural resources in four time periods



Symbols: rainfall ("), indigenous tree species (Ψ), wild animals (t), human beings (i), dwellings (D), livestock (l), crop fields (ψ), decreased precipitation (°)



Photo 3. Discussion about strategies to adapt to climate change in Mali

Current state of the natural resources, the causes, effects and consequences, and local adaptation strategies

The objective of this activity is for the participants to analyze the current state of their natural resources, the underlying causes that produced the current situation, and the resulting effects and consequences. This activity should last 30-45 minutes, but it may take longer if the participants have difficulty identifying the causes, effects and consequences.

The facilitator should copy the information about the current situation from Table 1 (column 2) into Table 2 (column 1) and then ask the participants to identify the specific causes of the current situation, followed by the effects of the current situation, and the consequences of those effects. As mentioned in the previous section, the causes are due to actions by human beings, natural factors beyond human control or both human beings and natural factors beyond human control. An example is given in Table 2.

Table 2. Current state of the natural resources, the causes, effects and consequences, and local adaptation strategies

Current state of the natural resources	Causes	Effects	Consequences	Local adaptation strategies
Decreased number of trees in parkland agroforests	Over-exploitation and lack of management of trees by human beings	Exposure of crop fields to climatic extremes	<ul style="list-style-type: none"> • Strong winds • Soil erosion • Soil degradation 	<ul style="list-style-type: none"> • Practise FANR • Plant trees in parkland agroforests
Etc.				

The facilitator should then ask the participants to identify an adaptation strategy to the cause or effects (last column of Table 2). For example, strategies to reduce the exposure of crops in the fields include farmer-assisted natural regeneration

(FANR) and planting trees. Using these strategies, the crop fields would be less exposed thereby reducing the negative consequences of exposed crop fields (strong winds, soil erosion and soil degradation).

Mapping village resources and threats

In this activity, which should take 30–45 minutes, the participants will prepare a map of their village resources and identify specific threats to the resources. Examples of village resources are trees in parkland agroforests and managed woodlands, food crops, ponds, vegetable gardens, pastures, houses, etc. Facilitators should ask the participants to list the resources and state where they are located in the

landscape. Another facilitator should draw the map of the village resources. To prepare the map, divide the landscape into four quadrants (north, south, east and west), locate the resource in the landscape, and draw the resources in schematic form on the map. Then estimate the relative area of the landscape occupied by the resources. The relative area could be in hectares, percent of the total landscape, or even a simple comparison (e.g. the combined parkland agroforests are two times larger than the combined woodlands, five times larger than the combined water ponds, etc.).

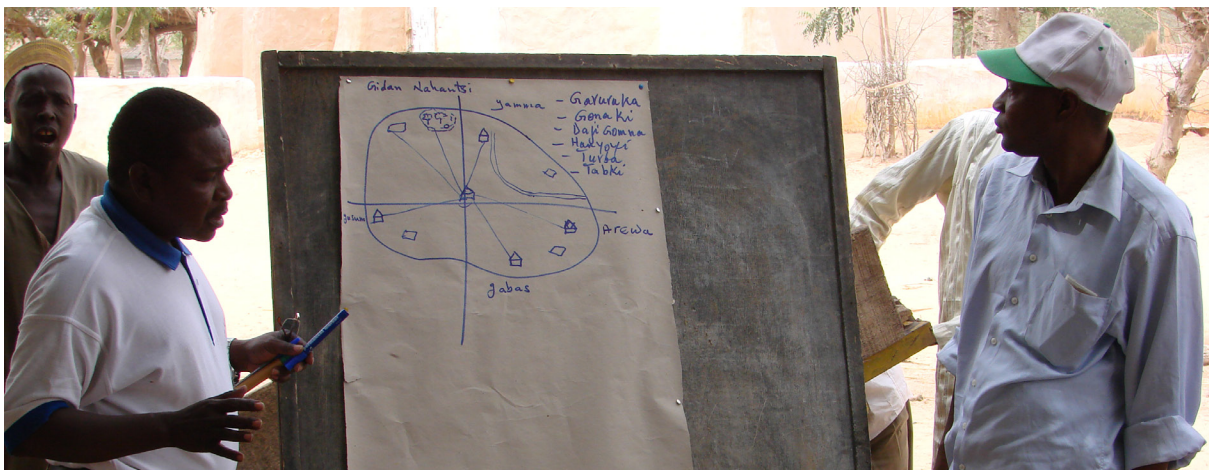


Photo 4. Facilitators discuss a map of village resources in Niger

The map with location and estimated area of village resources helps the rural communities understand the area's potential resilience to threats. For example, imagine that two villages share ten resources. In village A, millet fields and every other resource occupy a similar area of the landscape. In village B, millet fields are ten times larger than the area occupied by each of the other resources. If the millet fields in both villages produce no grain in a particular year, village A will have nine resources remaining in most of its landscape, but village B will have nine

resources remaining in a relatively small part of its landscape. Therefore, village A could be less vulnerable (or more resilient) than village B in the case of millet crop failure.

After preparing the map, the facilitator should ask the participants to describe the threats to each village resource. The threat may be environmental such as heavy rain, flooding, drought, extreme heat, parasites, lack of water or pasture for livestock, bush fires, etc., and non-environmental such as inappropriate natural resource policies, lack of capital, etc.

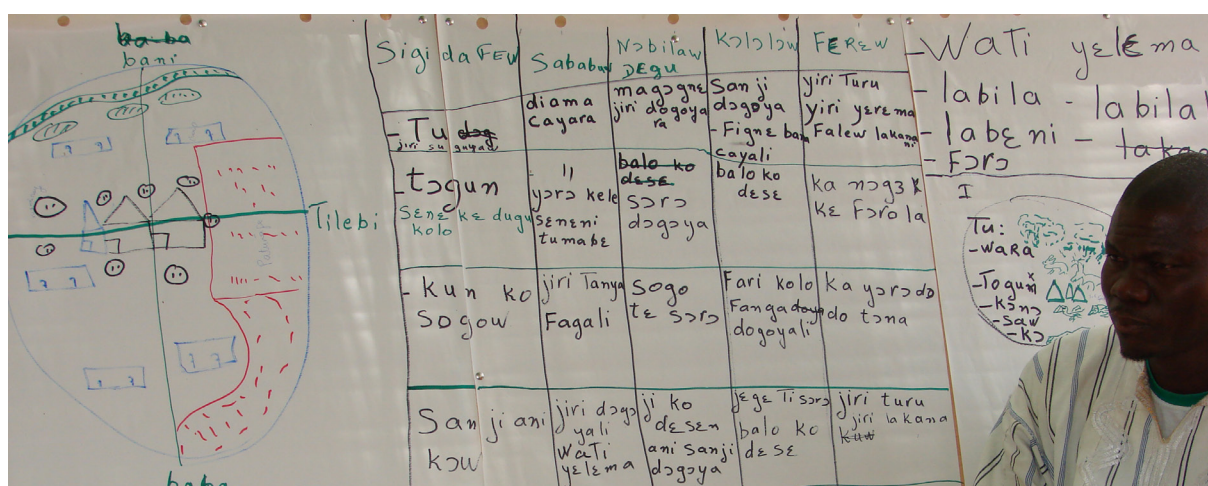


Photo 5. Discussion of threats to village resources in Mali

The facilitator then asks the participants to rank the severity of each threat to the village resources. The severity of each threat can be ranked on a scale of 0 to 4, where 0 = not severe,

1 = slightly severe, 2 = moderately severe, and 3 = very severe. These rankings are entered in a vulnerability matrix (Table 3).

Table 3. Vulnerability matrix of village resources and threats to village resources

Village resources	Threats to village resources				
	Flooding	Drought	Fire	Parasites	Etc.
Trees in parkland agroforests	3	3	0	3	
Woodlands	3	3	0	3	
Water ponds	0	3	0	0	
Houses	3	0	3	0	
Etc.					



Photo 6. Discussion of vulnerability matrix of village resources in Mali

Results from Table 3 are used to develop the action plan. The plan should include actions and strategies that reduce the likelihood of the more severe threats (i.e., severity 2 and 3) to village resources and/or adapt the village resources to the more severe threats. For example, farmer-assisted natural regeneration could be used to increase tree cover in the landscape. The increased tree cover could increase local rainfall and raise the level of the local watertable, thereby reducing the likelihood of severe drought. In addition, increasing drought tolerance of trees in parklands would increase their adaptation to a severe drought.

2. Analysis of vulnerability by gender groups

In this activity, which should take 30–45 minutes, four gender groups identify their major livelihood activities, the threats to their livelihood activities, and adaptation strategies to reduce the risks of each threat to their livelihood. Livelihood can be defined as the set of capabilities, assets and activities required for a means of living. Examples of livelihood activities are farming, raising livestock, collecting firewood, selling fruits and

nuts, fishing and petty commerce. The gender groups are adult men, adult women, young men and young women. In addition to the facilitator, each group should include at least four people and ideally no more than twelve people in order to facilitate the interaction within the group.

A facilitator should work with each gender group to identify the principal livelihood activities, and the major threats facing each livelihood activity. The severity of each threat can be ranked on a scale of 0 to 4, where 0 = not severe, 1 = slightly severe, 2 = moderately severe, and 3 = very severe. The rankings are entered in a vulnerability matrix. The example in Table 4 shows one major livelihood activity for each gender group, but a table should be prepared separately for each gender group.

Results from Table 4 are also used to develop the action plan. Therefore the facilitator in each gender group should ask the group to identify at least one action/strategy to either reduce the likelihood of the more severe threats (severity 2 and 3), or adapt the livelihood activity to the more severe threats. Table 5 gives some examples. One table should be prepared for each gender group.



Photo 7. Analysis of vulnerability of livelihoods by gender groups in Niger

Table 4. Vulnerability matrix of livelihood activities and threats to livelihood activities by gender group

Gender group: livelihood activity	Threats to livelihood activity				
	Decrease in rainfall	Decrease in soil fertility	Lack of capital	Insufficient woodlands	Etc.
Adult men: farming	3	3	2	0	
Young men: raising livestock	3	3	2	3	
Adult women: sell food products	3	3	3	0	
Young women: collect fuelwood	2	2	0	3	
Etc.					

**Photo 8.** Discussion of threats to livelihoods of women in Mali

Table 5. Strategies to reduce the likelihood of the threat or adapt the livelihood activity to the threat

	Threats to livelihood activity	
	Decrease in rainfall	Decrease in soil fertility
Gender group: livelihood activity	Actions to reduce the likelihood of the threat or adapt the livelihood activity to the threat	
Adult men: farming	Plant precocious and drought-tolerant crop varieties	Practise conservation agriculture with trees
Young men: raising livestock	Practise farmer assisted natural regeneration (FANR) of drought-tolerant fodder tree species	Incorporate animal manure and organic litter in soil around fodder trees
Adult women: selling food products	Plant drought-tolerant fruit trees	Incorporate animal manure and organic litter in soil around fruit trees
Young women: collecting fuelwood	Practise FANR of drought-tolerant fuelwood tree species	Incorporate animal manure and organic litter in soil around fuelwood trees

Finally, the facilitator in each gender group should ask all members to list the specific development projects, and governmental and

non-governmental organizations (NGOs) who are working in the rural communities and could participate in the implementation of the action plans.

**Photo 9.** Discussion of action plans of men in Niger

3. Development of climate change action plans

The general and specific information collected about climate change, vulnerability and adaptation strategies in the rural communities is used to prepare an action plan for the communities. The team members should prepare a draft of the action plan for the rural communities using the information in Table 2 (Current state of the natural resources, the causes, effects and consequences, and local adaptation strategies) and Table 5 (Strategies to reduce the likelihood of the threat or adapt the livelihood activity to the threat). Plans must address the causes and/or effects shown in Table 2. The information in Table 3 indicates the severity of threats to each village resource, and the information in Table 4 indicates the severity of threats to the livelihood activities of each gender group. Plans should focus on the more severe threats (level 2 and 3) to village resources and to livelihoods of each gender group.

The action plan is a long-term project and should include the following:

- General and specific objectives
- Specific activities linked to the specific objectives
- Expected results of the specific activities
- Calendar of activities
- Budget for each specific activity
- List of stakeholders who will contribute to the implementation of activities (see example in Table 6. A table should be made for each year of the project)
- Participatory monitoring and evaluation of the action plan (see section 4).

The draft action plan should then be discussed in a meeting with members of the rural communities and other stakeholders involved in the implementation of the project. It is important to encourage dialogue and suggestions during the meeting, and revise the action plan, if necessary, based on the suggestions. This will help create a fruitful partnership among the stakeholders.



Photo 10. Facilitators discussing activities in a draft action plan developed for a group of rural communities in Burkina Faso

Table 6. Example of some activities in an action plan related to village resources and livelihood activities of adult men, adult women, young men and young women in a rural community in the first year of the project

Village resource	Activity	Objective	Expected results	Period for activity	Budget	Stakeholder responsible
Trees in parkland agroforests	Seed collection, production of seedlings in nursery, plantation and protection of trees better adapted to drought	Produce and plant 1000 trees better adapted to drought	1000 plants of <i>Adansonia digitata</i> and <i>Vitellaria paradoxa</i> originating from 25 selected mother trees in a very dry zone produced in nursery, planted and protected in parkland agroforests	<ul style="list-style-type: none"> Collect seeds when mature Immediately start nursery production Plant and protect seedlings during rainy season if plants sufficiently large 	Indicate supplies, services, etc. that are needed and source of funds	Indicate the institution and person responsible for leading the activity
	Farmer-assisted natural regeneration (FANR)		FANR of 1000 <i>Guiera senegalensis</i> trees	<ul style="list-style-type: none"> Prune trees before planting cereal crop (specify number of stems to leave) Use cut stems for fuelwood 		
Livelihood activity						
I. Adult men						
Farming	FANR of trees to improve soil fertility in parkland agroforests		FANR of 1000 <i>Piliostigma reticulatum</i> trees	<ul style="list-style-type: none"> Prune trees before planting cereal crop (specify number of stems to leave) Use cut stems, branches and leaves for mulch before planting cereal crop 		

Village resource	Activity	Objective	Expected results	Period for activity	Budget	Stakeholder responsible
2. Adult women						
Collect fruits, seeds and leaves for household consumption and sale	Silvicultural management of trees for food products in parkland agroforests		Manage 50 trees of <i>A. digitata</i> , 50 trees of <i>Parkia biglobosa</i> and 100 trees of <i>V. paradoxa</i>	<ul style="list-style-type: none"> Prune old, unproductive branches and remove parasitic plants (specify period) Use small branches for mulch around trees Add animal manure around trees before rainy season 		
3. Young men						
Raising livestock	FANR of fodder trees in parkland agroforests		FANR of 1000 trees of <i>Combretum</i> spp. and <i>Faidherbia albida</i>	<ul style="list-style-type: none"> Prune stems and branches in dry season (specify number of stems to leave) Use small branches and leaves for fodder Use large branches for fuelwood or chop in small pieces and use as mulch Add animal manure around trees before rainy season 		
4. Young women						
Collect fuelwood	FANR of fuelwood trees in parkland agroforests		FANR of 1000 <i>Guliera senegalensis</i> trees	<ul style="list-style-type: none"> Prune trees before planting cereal crop (specify number of stems to leave) Use cut stems for fuelwood 		

Members of the committee should then record the actual activities conducted in a similar table

Factors that prevented the achievement of any planned activity in a given year of the action plan should be recorded in a table (see Table 9). This information will help the rural communities and other stakeholders to anticipate potential problems the next time that the activity is planned, and take appropriate corrective measures to ensure that the activity is achieved the next time.

[illegible][illegible]

Table 9. Factors that prevented achievement of planned activities during the first year of the action plan

Factors that prevented achievement	Activity	Month (January – December)											
		J	F	M	A	M	J	J	A	S	O	N	D
Fire	Practise farmer-assisted natural regeneration					X							
Parasites of tree's fruits and seeds	Collect seeds of trees for nursery production					X							
Drought	Plant trees in parkland agroforests						X	X					
Parasites in cereal crop	Conservation agriculture with trees									X	X		

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Our vision is a rural transformation in the developing world as smallholder households increase their use of trees in agricultural landscapes to improve food security, nutrition, income, health, shelter, social cohesion, energy resources and environmental sustainability.

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