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Participatory Tools and Techniques for Assessing Climate Change Impacts and Exploring Adaptation Options



A Community Based Tool Kit for Practitioners

March 2010



Cover Photo: Increased disaster, risky settlements, source RIMS-Nepal

Participatory Tools and Techniques for Assessing Climate Change Impacts and Exploring Adaptation Options

A Community Based Tool Kit for Practitioners

Livelihoods and Forestry Programme

March 2010

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Forward

Climate change is the global challenge of our time. Here in Nepal we are already starting to become aware of recent changes in our climate and the implications this is having for our society and our environment.

So far, although it has been a much-discussed topic at national and international levels, there has been only limited practical action on the ground that can help people to respond and adapt to the effects of climate change. There is now a growing awareness that such actions are urgently needed to ensure a quick response to the emerging climate change threats and to build the resilience of communities in the face of these.

At the Livelihoods and Forestry Programme we are taking a proactive response to climate change through building the capacity of local forest user groups and their member households to adapt. We are particularly concerned that our efforts to support adaptation should be focused on the poorest, most vulnerable members of the community and that adaptation should contribute to reducing their vulnerability.

This tool kit provides a timely and useful resource because it will equip our staff, partners, and the local communities with whom we are working with the necessary techniques and methodologies for analyzing their local situations and subsequently for supporting communities to adapt to climate change through local level actions. It will also help to ensure that climate change adaptation is mainstreamed into all types of development programmes through delivering appropriate actions on the ground and through its integration into existing planning processes.

By enhancing capacity at different levels for climate change adaptation we will be able to maximize the effective use of resources for addressing climate change in a way that contributes to Nepal's wider development goals – particularly for reducing poverty.

I'm sure that this tool kit will prove to be an effective resource for raising local awareness and local adaptation capacity for a wide range of programmes in their response to climate change. The Livelihoods and Forestry Programme is pleased to have been able to play its part in supporting the dissemination of these materials to a wider audience and I have no doubt that this Tool Kit will be widely used and appreciated across Nepal.



Vijay N Shrestha
Programme Manager
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Introduction

Whilst being a global issue, climate change is a major environmental and social challenge for Nepal. Throughout the country the effects are already being felt. Rural communities are seeing changes in rainfall patterns. The monsoon tends to begin later, the rainfall is more irregular and flash floods are more frequent. The winter rains are reduced and some years fail altogether. People are noticing that summers are hotter and winters generally less cold. Mountain communities are receiving less snowfall and seeing glaciers retreat. In the mid-hills water sources are drying up and in the plains people report greater flooding and unexpected cold waves.

These changes all tend to contribute to reduced crop production resulting in either increased prices or shortages of food. Many families attempt to deal with this by migrating to cities or sending members abroad to seek long or short-term employment. This often has a negative impact on family and social cohesion which in turn may make them less able to cope with effects of climate change.

Other impacts of climate change include increased forest fires with the extended dry period, and an increase in pests and diseases of crops, livestock and human populations. Every sector, from forestry and agriculture to energy and health, is feeling the impacts.

Climate change is caused by an increase of certain greenhouse gasses such as carbon dioxide and methane in the atmosphere. It is mainly the wealthy, developed countries that are responsible for these changes, yet they affect every country in the world. The poorest countries, such as Nepal, are likely to suffer most due to limited resources to cope with and adapt to the effects of climate change. Likewise, within Nepal poor and marginalised groups are the most vulnerable.

A key factor of climate change at the local level is the uncertainty. As the overall global mean temperature rises, climate scientists predict a range of changes in

local and regional climatic patterns. The uncertainty of the local climate is what leaves communities vulnerable. Thus, the only effective way to prepare for effects of climate change is to increase capacity to cope with and adapt to change, i.e. to increase resilience.

This tool kit is designed to help communities and planners understand the likely local hazards and risks of climate change and look at the vulnerability of their environment and livelihoods. It helps them to analyse existing methods of coping and adapting and then develop plans to increase resilience.

The kit consists of a range of tools that can be used in various situations. District or VDC (Village Development Committee) level planning teams can use them to make assessments and gain an overview. Community based organisations (such as forest user groups, water management groups or soil conservation groups) can use them to prepare themselves and develop community level adaptation plans.

If local communities have systematically assessed their situation and know clearly what they need to best adapt to climate change impact, they can then effectively contribute to district level plans. These in turn can inform regional and national adaptation plans and programmes.

The tools can be used in various combinations to suit the context. They can be developed and modified by facilitators as appropriate to the local situation. The main concern is to ensure participation is inclusive, that experience is widely shared and that control of the process is in the hands of the participants.

Climate Change Adaptation Terminology

Weather refers to the behavior of the atmosphere on a day-to-day basis in a relatively local area. A description of the weather would include daily temperatures, relative humidity, sunshine, wind and rainfall.

Climate in the narrow sense is usually defined as the ‘average weather’. More rigorously, it is a statistical description of the mean and variability of surface variables such as temperature, precipitation and wind, over a period ranging from months to thousands of years.

Climate change refers to a change in the state of the climate that can be identified statistically and that persists for an extended period, typically decades or longer. Climate change is caused by the accumulation of greenhouse gasses in the lower atmosphere. This can be due to natural or anthropogenic (human) causes. Currently it is being caused by humans releasing greenhouse gasses (mainly carbon dioxide, methane, nitrous oxide and chlorofluorocarbons), many of which stem from the use of fossil fuels.

Climatic hazards are the harmful effects of climate change on livelihoods and ecosystems. They can be caused by gradual climate variability or extreme weather events. Some hazards are continuous phenomena that start slowly, such as the increasing unpredictability of temperatures and rainfall. Others are sudden but relatively discrete events such as heat waves or floods.

Climatic risk is the likelihood that the harmful effects will happen. It is a measure of the probability of harm to life, property and the environment that would occur if a hazard took place. Risk is estimated by combining the probability of events and the consequences (usually seen as losses) that would arise if the events took place.

Climate variability refers to variations in the climate statistics from the long term statistics over a given period of time.

Climate change mitigation refers to strategies and policies that reduce the concentrations of greenhouse gasses in the atmosphere either by reducing their emissions or by increasing their capture.

Climate change adaptation consists of initiatives and measures to reduce the vulnerability of natural and human systems to actual or expected climate change effects. They can be spontaneous or planned responses to actual or expected conditions.

Maladaptation refers to an action or intervention that increases vulnerability to climate change.

Resilience is the amount of change a system can undergo and maintain the same function and structure while retaining options to develop in desired directions. Communities are resilient to climate change if they can withstand climate hazards and rebuild themselves. Resilience can be enhanced by anticipating and planning for the future.

Vulnerability is the degree to which a system (or a household or a community) is susceptible to, and unable to cope with, adverse effects of climate change.

Coping refers to the use of existing resources to achieve desired goals during and immediately after climate-induced hazards.

Adaptive capacity refers to the ability of a system or a community to adjust to climate change effects, to moderate potential damages, to take advantage of opportunities, or to cope with the consequences.

Adaptation assessment refers to the practice of identifying options to adapt to climate change effects and evaluating them in terms of criteria such as availability, benefits, costs, effectiveness, efficiency and feasibility.

Adaptation technologies include both scientific and traditional technologies. Most adaptation technology focuses on local innovations, knowledge and practices that have proved effective in adapting to climatic hazards.

National Adaptation Programmes of Actions (NAPAs) are documents currently being prepared by Least Developed Countries like Nepal to communicate priority activities addressing their urgent and immediate needs and concerns relating to adaptation to the adverse effects of climate change. The rationale for developing NAPAs rests on the low adaptive capacity of these countries, which renders them in need of immediate and urgent support to start adapting to current and projected adverse effects of climate change. Activities proposed through NAPAs are those whose further delay could increase vulnerability, or lead to increased costs at a later stage.

Local Adaptation Plan of Actions (LAPAs) will enable communities to understand the uncertainty of future climatic conditions and engage effectively in a process of developing adaptation programmes. They will implement climate resilient plans that are flexible enough to respond to changing climate and vulnerability conditions. They will also inform sectoral programmes and catalyse an integrated response to climate change between sectors. Local level adaptation planning begins at community level, contributes to Village Development Committee level plans, which in turn inform district and national level plans.

Tool 1: Climatic Hazard Mapping

Objectives

Primary objective

- Map local climatic hazards and assess their risk.

Secondary objectives

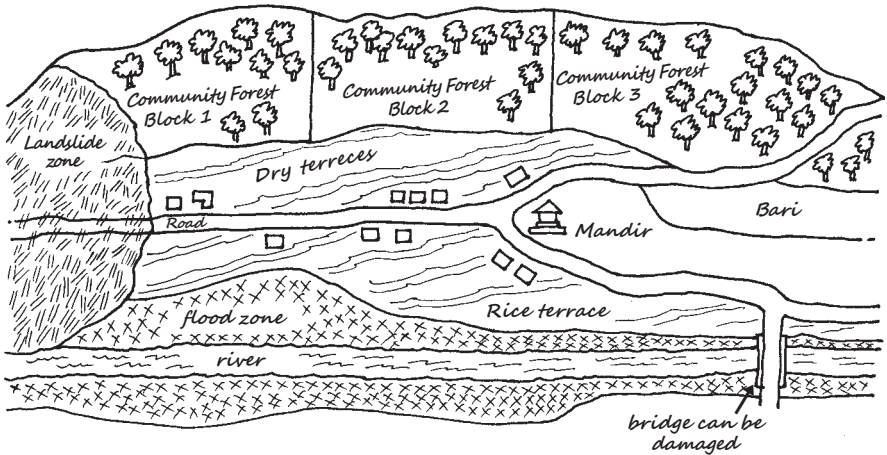
- Clarify the area under consideration in the group discussion.
- Gain a comprehensive understanding of the natural and physical features of the local context.
- Help communities identify the critical hazard types and their impacts.

Process

1. On a large piece of thick paper participants outline the boundaries of the locality under assessment and map the natural and physical features¹. The facilitator guides the discussion while the map is being drawn.
2. Hazard-prone features of the landscape are then identified with a red marker, using different patterns to differentiate different types of danger and impacts. A discussion is facilitated around the current and future risk of each hazard actually happening.
3. Recent changes to the landscape, due to political, socio-economic or environmental factors are also mapped.

¹ These maps can be built upon the disaster, community resource or any other maps that communities have previously prepared.

Example



Guidance notes

Natural features to be identified on the map include rivers, wetlands, forests, barren land, valleys, cliffs and ridges.

Physical features to be identified include houses and other buildings such as schools, health centers and financial and economic support institutions, irrigation channels, storage tanks and cultivated land use types.

Facilitation can lead discussion to cover both visible and invisible impacts of climate change on livelihoods, bio-diversity conservation and ecological services.

Mapping is a time consuming but valuable process. If time is short, conducting the activity in parallel to a focus group discussion can be an efficient way of gaining the mapping information. If it is done separately then the finished map should be presented to the whole group however, to give other group members a chance to discuss, confirm or dispute the representation. If the mapping process is being used as a tool for raising issues and increasing awareness amongst community members then it works well as the focus of a group discussion.

Further questions

- *Where are the key livelihood assets located?*
- *Are the hazards natural or man-made?*
- *Which locations are at risk from health hazards (such as malaria) or socio-political issues (such as conflict or redistribution of land)?*
- *How do people in the community currently cope with the hazards?*
- *Who in the community are most at risk from the different hazards? Why is that?*
- *How has the nature of the hazard changed over the 20 years?*
- *What are the key indicators of each climate change impact?*
- *Are there places in the community that are safe from the hazards? How are these places used to protect people and assets from hazards?*

Strengths	Weaknesses
<ul style="list-style-type: none"> ■ Easy to understand the physical distribution of hazards and their relation to property and resources. ■ Useful at village level for getting everyone involved. 	<ul style="list-style-type: none"> ■ Can provide incomplete data if not used with whole community.

Tool 2: Climatic Hazard Trend Analysis

Objectives

Primary objective

- Gain insight into past climatic hazards and identify trends in their nature, intensity and impacts.

Secondary objectives

- Understand historical community reactions to and coping strategies for climatic hazards.
- Investigate historical institutional support following hazard events.
- Gather insight into socio-economic and political changes in the past.
- Introduce the concept of a changing climate to the community.

Process

1. A long piece of string or other material is stretched across the meeting area to represent the passage of time.
2. Starting with the earliest hazard event anyone can remember, a timeline of the last 30 to 50 years is developed to identify large climatic hazard events. Participants can stand on the line at the appropriate place and describe the event. The facilitator discusses these in the context of local and global climate change.
3. Discussion follows around the impacts of the events, community reaction and coping strategies and institutional support. Paper can be put along the length of the line and all the details recorded in different colours.
4. Other socio-economic and political events are also recorded.

Guidance notes

The trend analysis is an essential tool for introducing communities to the concept of climate change. It helps identify trends in frequency and severity of climatic hazard events and changing patterns of impact. The facilitator should also be careful to say that an increase in extreme events is *likely* to be linked to climate change, but cannot be stated categorically.

The trend analysis is a good exercise to start a participatory session. It is powerfully visual, offers the opportunity for participation of a large group of people, and introduces the fundamental concepts of hazard, impact, change, coping, and institutional support.

The trend analysis can be combined with a seasonal calendar related to the sector in order to link changes in crops, local species, water availability, pests and disease etc.

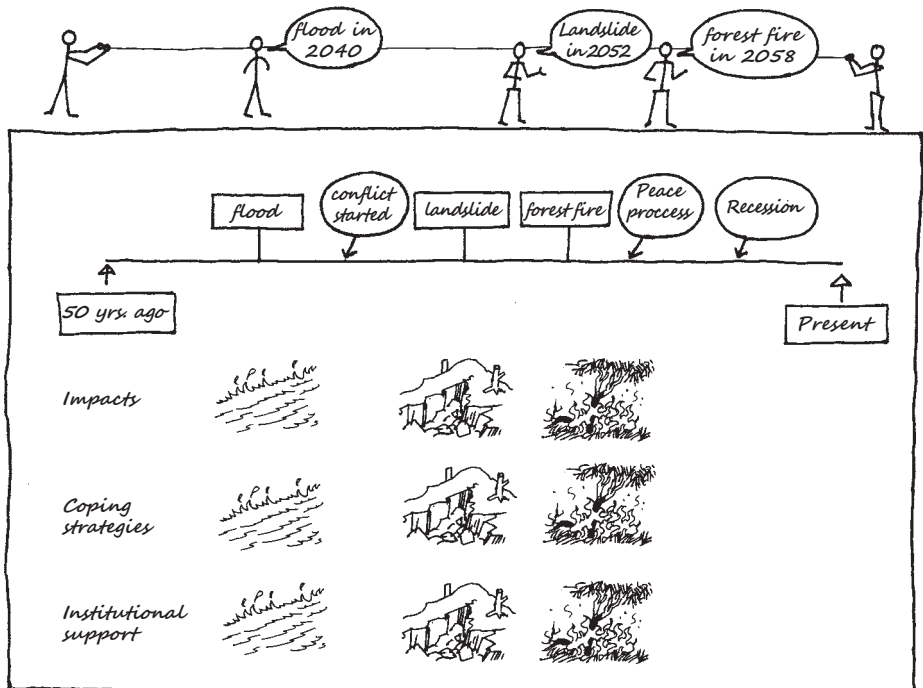
The documentation of other socio-economic and political changes is an important part of the exercise, offering insight into other drivers of change in the community which need to be taken into account during the assessment.

Further questions

- *What changes have there been in livelihoods strategies over the period of the timeline?*
- *What changes have there been in biodiversity and the availability of forest products?*
- *How have coping strategies changed with the the changing frequency of events?*
- *How are the existing coping strategies working?*
- *What events do you expect to occur in the future?*
- *How does this expectation of likely events affect your plans for the future?*

Strengths	Weaknesses
<ul style="list-style-type: none"> Easy to visualise and understand the major climate induced hazards. Emphasises the need to plan preventative and adaptive interventions 	<ul style="list-style-type: none"> Availability Knowledgeable of person who can provide historical insight.

Example



Tool 3: Climatic Hazard Ranking

Objectives

Primary objective

- Compare and prioritise the most critical local climatic hazards.

Secondary objectives

- Differentiate between climate change induced and other natural hazards. Understand how communities perceive and evaluate local hazards.

Process

1. Participants name the climatic hazards to which their area is prone. Discussion clarifies which can be said to be probably caused by climate change.
2. Climatic hazards are arranged as both the row and column headings of a square table, as below.
3. The participants consider every pair of hazards in turn and decide by consensus which is the most critical. They enter this into the box. When the table is complete, the number of times each hazard was chosen is added up. These scores then suggest which hazards are the greatest priority.

Example

	landslide	flood	drought	forest fire	malaria
landslide	X	flood	drought	forest fire	malaria
flood	X	X	flood	forest fire	flood
drought	X	X	X	forest fire	drought
forest fire	X	X	X	X	forest fire
malaria	X	X	X	X	X

Priority ranking: 1st forest fire (4), 2nd flood (3), 3rd drought (2), 4th malaria (1), 5th landslide (0)

Guidance notes

If the participants cannot decide easily between two particular hazards, the facilitator asks which most affects the poor and vulnerable members of the community. This enables participants to agree more easily on a ranking.

This tool works well after the impacts of the hazards have been thoroughly explored (eg through the impact assessment tool.)

Further questions

- *Which of the hazards is likely to pose the greatest risk in 5 years' time?*
- *How might the risk of each hazard happening change over the next few years?*
- *How do the hazards affect one another?*

Strengths	Weaknesses
<ul style="list-style-type: none">■ Helps identify which hazards are most critical for community members.■ Helps communities prioritise addressing the hazards.	<ul style="list-style-type: none">■ Needs good facilitation and explanation before use.

Tool 4: Climatic Hazard Impact Assessment

Objectives

Primary objective

- Identify the most likely impacts of local climatic hazards.

Secondary objective

- Increase understanding of the uncertainty that is likely to increase with climate change and the importance of assessing the risk of climatic hazards happening.

















Process

1. A table is prepared on a large sheet of thick paper, as in the example below. Hazards can be taken from the *Trend Analysis* or the *Hazard Mapping* tools above.
2. Through widespread discussion, the details of the actual or likely impacts are added to the table by the group with support from the facilitator where necessary.
3. The facilitator leads a discussion around the causes of the hazards and current risk of the hazards happening. From there an assessment is made of future risk and given a rating as below.

Rating system:

- 1 – Low risk
- 2 – Medium risk
- 3 – High risk
- 4 – Very high risk

Example

Hazard	Risk of hazard happening	Impact of the hazard locally	Risk of hazard induced impact happening
River floods 	Very high 	 <i>rice crop flooded and rots</i>  <i>rice terraces covered in sand</i>  <i>home destroyed</i>	  
Landslide 	Low 	 <i>home destroyed</i>  <i>death</i>  <i>terraces</i>	  

Guidance notes

This tool is straightforward and best used after the *Trend Analysis* or *Hazard Mapping* to focus the discussion. It can be adapted to respond to the dynamics of the particular group discussion and can be useful to encourage participation and open discussion if the group is quiet.

Participants need to be clear about the difference between hazard (the harmful event) and risk (the chance of that harmful event happening). They then need to consider the scale of the event. It should be noted that even if the event is likely to occur on a small scale it might be devastating to those concerned so it is important to cover this in the discussion.

The impacts vary from place to place and among different groups so it is important to include representatives from among different ethnic and wealth groups. Impacts that are visible across various time scales are important to consider during discussion.

The understanding of the climate induced hazards and risks will be deepened by all stakeholders doing a transect walk around the village and affected areas. It will validate the information and give opportunities to discuss the hazards and the potential impacts in situ.

Further questions

- *How frequently does the climatic hazard occur in the area?*
- *What are the chances of it occurring this year? Over the next 5 years?*
- *How serious are the potential impacts of the climate change hazards?*
- *What are the chances of the impacts happening?*
- *Which villages and communities are most affected? Amongst them, which individuals?*

Strengths	Weaknesses
<ul style="list-style-type: none"> ■ Simple and flexible. ■ Leads into discussion on specific impacts. 	<ul style="list-style-type: none"> ■ May be difficult to get a consensus opinion. ■ Excludes illiterate people.

Tool 5: Livelihood Resources Assessment

Objectives

Primary objective

- Identify and categorise local livelihood assets and resources.











Secondary objective

- Identify aspects of the environment not perceived as directly beneficial to communities but deemed worth conserving, such as ecosystem sustainability and bio-diversity.

Process

1. Participants call out the different livelihood strategies within the community and they are written up randomly on cards or a sheet of paper. If the discussion is happening in a large group, they can split into groups with common livelihoods strategies.
2. Participants discuss the resources they use to secure their livelihoods. The facilitator ensures participants consider resources in the widest sense of the five capitals of the sustainable livelihoods framework (see notes below).

Example

Livelihood resources or assets				
1	Forest		6	Labour ox and youth 
2	Streams		7	Dalit support group 
3	Irrigational channels		8	Loan for seed from co-operative 
4	Roads		9	Micro-enterprise training 
5	FUG marketing network		10	Water management group 

Guidance notes

It is useful for the facilitator to ensure that participants consider all five types of capital, but no need to mention them as such. If the information gathered is to be used by district or national planners it can be arranged later according to the five capitals.

- **Natural capital** comprises the goods and services provided directly from the environment such as timber, firewood, river water, ground water, land types and foraged goods. Under this heading can be included aspects of the environment that are perhaps not directly seen as beneficial to communities but which are deemed of value such as ecosystem sustainability and bio-diversity.
- **Physical capital** comprises man-made structures and private value-adding physical possessions such as transport infrastructure (roads and bridges); communication infrastructure (phone cables and mobile network masts); other infrastructure (electricity cables and irrigation channels); buildings of all types; storage structures; working livestock; and equipment.
- **Financial capital** comprises stocks and flow of liquidity such as saleable assets including livestock, remittances flows, savings, and income from various sources.
- **Human capital** comprises factors that add value to the individuals beyond their pure physical labour worth such as skills and knowledge through formal and informal education; good health through access to formal and informal health and welfare services.
- **Social capital** is the resource derived by an individual from participation in society such as relationships of all forms: civic, political, professional, gender-based, class-based, age-based or caste-based.

For this tool to draw out detailed information about livelihood dynamics and success, it can be helpful to distinguish between **capital assets** and **access to capital**. A capital asset is an asset over which an individual has some form of ownership, formal or informal, private or communal. However often community members make use of resources which are not strictly their assets. Effective *access* to some kinds of capital can be enough for that capital to play an essential role in livelihood strategies. This is often the case with public capital, especially forms of natural, physical and social capital. Field experience suggests that team facilitators should put as much emphasis on *access to capital* as *capital assets*.

Note: this is not a stand-alone tool – but it has been entered separately to emphasis the importance of discussing resources thoroughly. It links directly with the next tool.

Further questions

- *How do the livelihood resources differ between different ethnic/caste/wealth groups?*
- *How does access to assets differ? And how does that effect livelihoods?*
- *Why is it worth discussing which livelihood assets are important in the climate change context?*

Strengths	Weaknesses
<ul style="list-style-type: none"> ■ Provides a detailed picture of the specific resources on which individuals rely. ■ Can offer insight into the complex interactions of different types of resources which constitute livelihood strategies 	<ul style="list-style-type: none"> ■ Can feel incomplete without reference to climate change. ■ In their use in livelihood strategies, capital resources often interact in complex ways which can take time to understand.

Tool 6: Livelihood Resource Vulnerability Assessment

Objectives

Primary objective

- Assess the intensity of impact of climatic hazards on livelihood resources.

Secondary objectives

- Characterise and compare how a range of livelihood assets are affected by climate-induced hazards.
- Assess the intensity of impact of climatic hazards on wider aspects of the environment such as ecosystem sustainability and bio-diversity.


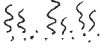
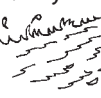


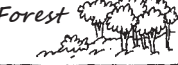

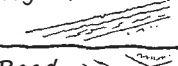

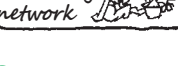
Process

1. Using the capital resources identified in the *Assessment of Livelihood Resources* and the climatic hazards identified by the *Trend Analysis*, *Hazard Mapping* and *Impact Assessment* tools, a table is drawn up as in the example below.
2. Participants rate the impact severity of the climatic hazards on the different resources. Widespread discussion and debate are encouraged by the facilitator and scores are decided by consensus.

Rating system:

- 0 – No impact on the resource
- 1 – Low impact on the resource
- 2 – Medium impact on the resource
- 3 – High impact on the resource
- 4 – Very high impact on the resource

Example

Livelihood resource/asset	no rain 	increased summer heat 	river floods 	illness in the family 	forest fire 
Forest 	○			○	○ ○ ○
Stream 	○○	○			
Irrig. channel 	○○		○ ○ ○	○	
Road 			○ ○ ○		
FUG marketing network 				○	

Guidance notes

Consideration should also be taken of the impact that hazards have on both *access to capital* and *capital assets*. See the notes in tool 5 for suggestions of how to emphasise both of these aspects of resource use.

Climatic hazards can be broken down into more specific hazards. For example 'no winter rains' can become 'no winter rains for winter crops', 'no winter rains for groundwater recharge' and 'no winter rains for forest plantation'.

Further questions

- *What trends can be seen in the severity of the impact of climate-induced hazards on each livelihood asset?*
- *Which assets are most affected and why?*
- *Are there resources that are highly resistant to climatic hazards?*
- *Are there any useful resources created by climatic hazards?*

Strengths	Weaknesses
<ul style="list-style-type: none">■ Establishes a detailed view of the source of vulnerability by assessing risk to specific livelihood resources.	<ul style="list-style-type: none">■ If the process is not clear, it takes time for people to understand and it can be difficult to engage them.

Tool 7: Assessing Climatic Hazard Impacts on Livelihoods

Objectives

Primary objective

- Compare and contrast the impacts of major climatic hazards on livelihoods of the community.

Secondary objectives

- Distil broad areas of impact from specific hazard impacts.
- Encourage wide participation and free flowing debate and knowledge sharing.

Process












1. The climatic hazards identified in the *Trend Analysis*, *Hazard Mapping* and *Impact Assessment* exercises are listed in the left column of a table on a large sheet of paper as in the example below.
2. The climatic hazards are also written down on small pieces of card which are laid face down on the floor.
3. Volunteers take turns picking three cards which they hold up for the group to consider the similarities and differences between the three hazards.
4. The participants choose the 'odd one out' amongst the three hazards. This allows the similarity of the other two to be noted. This similarity will constitute a broad impact area, which is written as the heading of one of the table columns. Broad impact areas could include economic loss, reduced biodiversity or threat to infrastructure.
5. The process is repeated until every combination of hazards has been drawn, and no new impact areas are identified.

6. The table is then completed by rating the severity of each climatic hazard in each impact area. In-depth discussion is encouraged by the facilitator and scores are agreed by consensus.

Rating system:

- 0 – No impact on the impact area
- 1 – Low impact on the impact area
- 2 – Medium impact on the impact area
- 3 – High impact on the impact area
- 4 – Very high impact on the impact area

Example

Hazards	Impact areas			
	Economic loss 	Threat to biodiversity 	Threat to life 	More burden to woman 
reduce irrigation from snow melt 				
New pests and diseases 				
New human illnesses 				

Guidance notes

Where further analysis of the information would be useful the computer programme RepGrid is available at <http://repgrid.com/SAS/>. Hazards (options),

impact areas (characteristics) and ratings can be entered and the programme prepares a cluster analysis and a principal component analysis.

There are other tools which might be useful to support this analysis such as using participatory video.

Further questions

- *Which hazards tend to affect which impact areas?*
- *Why do some hazards have more impact on one area than another?*

Strengths	Weaknesses
<ul style="list-style-type: none"> ■ The computer analysis is easily accepted by academics and useful for convincing policy makers and key actors. 	<ul style="list-style-type: none"> ■ The tool is often difficult to use in a rural context. ■ Needs good facilitation and interpretation.

Tool 8: Vulnerability Assessment

Objectives

Primary objectives

- Differentiate vulnerability to climatic hazards across different sectors and social groups.
- Identify the most vulnerable people and groups within a community and the most vulnerable sectors.

Secondary objectives

- Encourage people to consider the different vulnerability of social groups within their community and how the adaptive capacity of all groups can be increased.
- Empower socially marginalized people to describe their vulnerability and how they believe they can be best helped to increase their resilience.

Process

1. Ensure different social groups are well represented and all feel comfortable to speak up.
2. Hazards from the *Trend Analysis*, *Hazard Mapping* and *Impact Assessment* tools are listed along one side of a grid, as below.
3. Different social groups (age, gender, ethnic, caste groups) or different sectors (forestry, agriculture, water, soil conservation etc) are listed on the other axis.
4. Participants discuss the vulnerability of each sector and social group to each climatic hazard and consensually agree a rating as below.

Rating system:

- 0 – Not vulnerable to the hazard
- 1 – Low vulnerability to the hazard
- 2 – Medium vulnerability to the hazard
- 3 – High vulnerability to the hazard
- 4 – Very high vulnerability to the hazard

Example

Social groups		Climatic Hazard			
		Flood	Drought	Forest Fire	Landslide
Age differentiation	Young				
	Adult				
	Elderly				
Gender different'n	Male				
	Female				
Class differentiation	Poor				
	Middle				
	Well off				
Culture/caste different'n	Dalit				
	Janajati				
	Chhetri				
	Brahmin				
Sector		Climatic Hazard			
		Flood	Drought	Forest fire	Landslide
Agriculture	rain fed				
	irrigated				
	high altitude				
Forestry mgt	community				
	government				
	leasehold				
Ecology type	tropical				
	subtropical				
	temperate				
	alpine				
etc					

Guidance notes

In order to fully understand vulnerability and plan to reduce it, participants need to understand the difference between hazard (the harmful event) and risk (the chance of that harmful event happening). This then needs to be linked with the scale of the event.

The social categories given in the table above are only examples. Beyond differentiated vulnerability across age and gender, other social groups will vary from place to place. Other possible lines include origin, religion, family and location of settlement. The categories to be considered can be identified by the facilitation team before the meeting begins or at the start of the discussion to help everyone feel included.

Hazards may need to be broken down – for example instead of just ‘flood’ the community might need to separate ‘siltation of rice terraces’, ‘destruction of homes’, or ‘damage to irrigation structures’.

Experience shows that this tool often produces lively and friendly debate and that socially marginalized people feel able to speak up. It is also an exercise which encourages participants to think about the experiences of others, and it is surprising how easily, after some good natured argument, consensus is often reached. It is essential that the facilitator ensures inclusion of all groups as some social groups can be under-represented (often the poorest, or most excluded castes), if they cannot afford the time to attend the meetings.

Assessing sector vulnerability

The following formula can be used to score sector vulnerability.

Frequency + Area Impact x Potential Damage Magnitude = vulnerability score

The frequency, area impact, and potential damage magnitude values are defined by a scale from 1 to 5, where 1= low and 5= high

Sector and hazard it is vulnerable to	Frequency +	Area impact x	Magnitude=	Vulnerability score
Forest vulnerable to flood	2	4	2	12
Irrigated land to flood	4	3	3	21
Biodiversity to flood	3	5	1	8

Further questions

- *Why are some groups particularly vulnerable/resilient to a particular climatic hazard?*
- *Why is this group more vulnerable to climatic hazard 1 than to climatic hazard 2?*
- *What impacts are specific to this social group or sector?*
- *Is this group dependent on another group to secure its livelihood/resilience?*
- *What are the differences between the livelihood resource uses of these different groups?*
- *Are there other social lines on which this community is divided that have not been considered?*

Strengths	Weaknesses
<ul style="list-style-type: none"> ■ Empowers marginalized groups to have a voice and increase adaptive capacity. ■ Encourages participants to think about the experiences of other social groups within the community. 	<ul style="list-style-type: none"> ■ In rare instances lively debate can degenerate into hostility. ■ Difficult to include the most marginalized if they are unable to attend. ■ Certain cultural-religious and social taboos prevent vulnerability being discussed completely openly.

Tool 9: Vulnerability Matrix

Objectives

Primary objective

- Gain an overview and quantify climatic hazard risk and resilience capacity of local communities.

Secondary objectives

- Identify the roles of different types of resources in increasing vulnerability and enhancing resilience.
- Encourage participants to consider how different types of resources are affected by climatic hazards and what resources are drawn on to cope with impacts.

Process

1. Climatic hazards from the *Trend Analysis*, *Hazard Mapping* and *Impact Assessment* tools are listed down the side of a matrix.
2. Participants assess the degree to which natural resources are affected by each hazard (as in tool 6) and enter a score 1-4 in column 2.
3. Participants assess the degree to which physical resources are affected by each hazard (as in tool 6) and enter a score 1-4 in column 3.
4. Based on the discussions above participants assess the socio-economic impact of each hazard in column 4.
5. Based on their experience they then give a rating for the frequency of the hazard happening in column 5.
6. A value for the risk is given by multiplying columns 4 and 5 and entered in column 6.

7. The availability of economic resources, human capital and social and institutional capacity to cope with impacts are considered and given a score of 1- 4 and entered in columns 7, 8 and 9.
8. By calculating the average of columns 7, 8 and 9, a resilience capacity score is entered into column 10. The facilitator ensures everyone has followed the process and leads a discussion on the findings.

Rating

For columns 2, 3 and 4	For column 5	For columns 7, 8 and 9
1 – Low or no effect 2 – Moderate effect 3 – Severe effect 4 – Very severe effect	1 – Low frequency 2 – Moderate frequency 3 – High frequency	1 – Low to no availability 2 – Medium availability 3 – High availability 4 – Very high availability

Example

10	<i>Total resilience capacity</i> (7 + 8 + 9) / 3 Average of 7, 8 and 9								
7	Types of livelihood resources available to cope with impacts			8	9	Availability of social and institutional capacity to cope with impacts Rating of availability / (1 – 4)	Availability of human capital to cope with impacts Rating of availability / (1 – 4)	Availability of economic resources to cope with impacts Rating of availability / (1 – 4)	
6	<i>Total risk</i> 4 x 5 (4 multiplied by 5)								
5	Frequency of hazard event Rating of frequency (1 – 3)								
4	Socio-economic impact severity based on 2 and 3 Rating of severity (1 – 4)								
3	Types of livelihood resources affected	Extent of physical capital affected Rating of extent (1 – 4)							
2		Extent of natural capital affected Rating of extent (1 – 4)							
1	Hazard context			Climatic hazard 1	Climatic hazard 2	Climatic hazard 3			

Guidance notes

Because different social groups within the community use different resources for their livelihoods, and have access to different resources when faced with a hazard, it is important that this exercise is carried out with participants from all social group categories. This will give scores for the community as a whole, which can be useful if the community is homogeneous or if an overview is required. Where there is great variation in wealth and power, it may be more useful to do the process with different groups.

The process of the Vulnerability Matrix is not complicated, but does involve some basic calculations. These should be explained to the group and the results should be presented back so that the participants can benefit from the findings.

In column 7, **economic resources** refer to financial capital as defined in the *Assessment of Livelihood Resources* but also include other resources that play a part in economic production. Therefore, natural and physical capital that is resilient to hazard impacts such as elevated land (in the case of flood hazard), stored seeds and livestock are also included.

In column 9, **social and institutional capacity** broadly refers to social capital. It is important to consider both formal (explicit civic, private and public) and informal (implicit social norms of behaviour) institutions.

Further questions

- *What is the relative severity of one hazard compared with another?*
- *How do individuals in the community cope with each particular hazard?
What resources are available to draw on?*
- *What would happen if a particular hazard occurred twice as frequently?
How would this affect individuals in the community?*
- *How can these findings be used to help reduce vulnerability?*

Strengths	Weaknesses
<ul style="list-style-type: none">■ Allows disaggregation of community vulnerability with regard to livelihood resources and ability to respond.■ Easier to see which village, hamlet or group is more vulnerable.	<ul style="list-style-type: none">■ Complex and needs educated and knowledgeable people for it to be effective.■ Can be difficult to interpret since it involves calculations.■ Needs sufficient supporting data to be it effective.

Tool 10: Coping and Adaptation Strategies Assessment

Objectives

Primary objective

- Identify and assess the effectiveness of the current coping mechanisms practiced by communities to secure and improve their livelihoods and conserve ecosystem bio-diversity in the context of climate change.

Secondary objective

- Shift focus group discussion into a more positive mode, looking at resilience rather than vulnerability.

Process

1. The climatic hazards identified in the *Trend Analysis*, *Hazard Mapping* and *Impact Assessment* tools are transferred to a large sheet of thick paper. Then a column is added for coping and adaptive strategies and another one for sustainability and effectiveness.
2. Widespread discussion and debate are encouraged by the facilitator to compile a complete list of existing strategies.
3. Agreement is then reached about the level of sustainability and effectiveness of each strategy and is rated as below.

Rating system:

- 1 – Low coping and adaptation effectiveness and sustainability.
- 2 – Moderate coping and adaptation effectiveness and sustainability.
- 3 – High coping and adaptation effectiveness and sustainability.
- 4 – Very high coping and adaptation effectiveness and sustainability.

Example

Hazard context	Impacts [Can be copied from previous tool]	Coping and adaptation strategies (capability in terms of physical, economic and social assets)	Sustainability and effectiveness
Climatic hazard 1 Eg glacial lake flood	Homes destroyed	go to relatives stay in the school go to red cross	2 1 2
	Loss of livestock	get a loan to replace LS start different income activity	4 4
	Loss of cultivated land	share crop others' land work as labourers locally move away to new area	3 2 2
	Injury and loss of life		
Climatic risk 2 Eg Reduction of melt water for irrigation			

Guidance notes

The rating given will vary greatly with different socio-economic groups. An overview can be useful for a rapid assessment of a local situation, However care needs to be taken to ensure that groups and individuals with very low coping and adaptation ratings do not get further marginalised by the process of finding an average by consensus.

It might be useful to categorise strategies by having participants cluster the methods of coping and adapting. Alternatively, community coping and adaptation strategies can be grouped according to Halstead and O'Shea (1989) as follows:

Mobility: strategies using space to overcome difficulties, e.g. moving valuable assets to safe ground, temporary and permanent migration.

Storage: strategies using time to overcome difficulties, e.g. stockpiling saleable assets and consumables, savings.

Diversification: strategies reducing risk by spreading time and effort across livelihood activities with different risk profiles, e.g. cultivating a mixture of high yield and high resilience crops, earning income from non-agriculture work.

Communal pooling: strategies using social capital to spread risk across households with different risk profiles, e.g. informal insurance, asset sharing in times of need.

Market exchange: Strategies using the market to increase access to a variety of resources, e.g. buying and selling goods and services.

Further questions

- *Are the strategies reactive or proactive? Are they private or public? Do they use soft or hard technologies? Are they integrated into wider institutional or private livelihood activities, or targeted?*
- *Are they mobility, storage, diversification, communal pooling or market exchange strategies?*
- *Are the strategies designed to reduce risk, cope in the short term or adapt for the long term?*
- *How is local biodiversity used in coping and adaptive strategies?*
- *Are strategies used widely in the community, or only by a few? Why is that?*
- *Do external strategies reach the intended beneficiaries?*
- *How do coping and adaptive strategies affect ecosystems and biodiversity?*
- *What resources are used to help cope and adapt? How resilient are they?*
- *Do the strategies work as well as they could? How could they be improved? Are there alternative strategies that might work better than those presently used?*
- *What are the constraints to adopting these new or alternative strategies?*

Strengths	Weaknesses
<ul style="list-style-type: none"> ■ Helps identify and value local responses and measures such as local knowledge and practices to deal with climate change impacts. ■ Helps identify innovative community members practicing adaptation and coping measures. 	<ul style="list-style-type: none"> ■ Needs good facilitation to ensure communities and households are clear about the difference between coping and adaptation.

Tool 11: Assessing the Effectiveness of Coping and Adaptation Strategies

Objectives

Primary objective

- Analyse effectiveness of existing coping and adaptation strategies against the severity of climatic hazards.

Secondary objective

- Identify the gaps in existing strategies and refocus input according to priorities.

Process

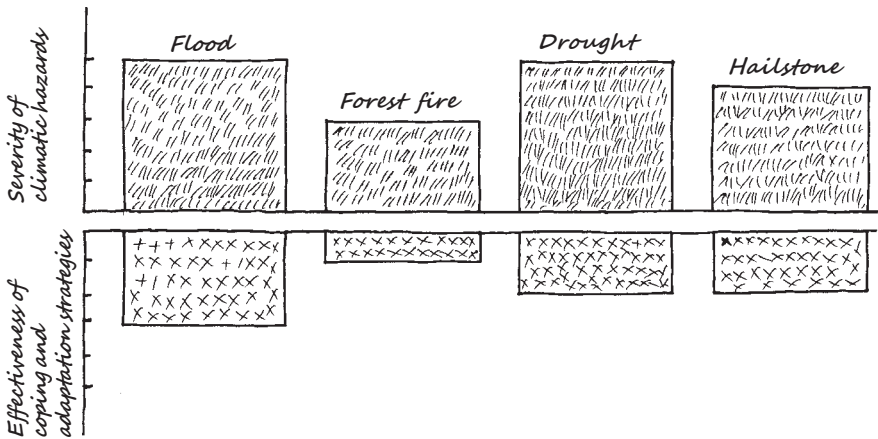
1. Participants agree by consensus on the severity of the climatic hazards identified in the *Trend Analysis*, *Hazard Mapping* and *Impact Assessment* tools. This can be determined in part by the severity of the hazards on particular impact areas, as assessed by the tool that *Compares Hazard Impacts on Livelihoods* (no.7). The severity is rated according to the scale below.
2. Participants identify adaptation measures which counteract each impact, optionally drawing on the *Coping and Adaptation Strategies Assessment* tool (no.10).
3. The effectiveness of the aggregated resilience built up by these strategies is rated for each climatic hazard using the rating below.
4. The severity of impact and the effectiveness of strategies are drawn as a field of positive and negative forces as in the example below.
5. Discussion follows around the match of the severity of the impact and the relative effectiveness of strategies for coping and adapting to the effects of the impact.

6. Discussion progresses into planning activities to redress the gaps.

Rating system:

- 1 – Low severity/effective coping and adaptation
- 2 – Low to moderate severity/effective coping and adaptation
- 3 – Moderate severity/effective coping and adaptation
- 4 – High severity/effective coping and adaptation
- 5 – Very high severity/effective coping and adaptation

Example



Guidance Notes

This tool can draw on a number of others if they have already been carried out with the same group. In particular, the identification and assessment of impact areas can provide the basis for the severity assessment of each climatic hazard. The information from the *Assessment of Coping and Adaptation Strategies* can provide the basis for assessing the aggregate effectiveness of the counteracting practices.

Coping and adaptation practice effectiveness should not be rated higher than the severity of the hazard it is counteracting. If it does, the hazard should not arise in the discussion. Since all hazards considered in this exercise have previously been identified as problems, it is clear that existing coping and adaptation practices do not completely mitigate the problem.

The tool illustrates clearly the shortcomings of existing coping and adaptation strategies, and identifies where the net risk is highest. Since the tool can be quite confusing for those seeing it for the first time, the facilitator must ensure that interpretation of the exercise is well communicated to participants.

Further questions

- *How effective are the coping and adaptation strategies? Why are some more so than others?*
- *What are the current gaps? Why have they occurred?*
- *How could the gaps be addressed?*
- *What would be the priorities for potential interventions to address the hazards?*

Strengths	Weaknesses
<ul style="list-style-type: none"> ■ Visually compares the severity of hazards with the adequacy of coping and adaptation strategies. ■ Provides a rationale for future capacity-building assistance. ■ Provides a positive socio-centric view of hazards, where they can be mitigated by appropriate adaptation activities. 	<ul style="list-style-type: none"> ■ At times appears artificial in its ratings, given that coping and adaptive strategies should not be rated higher than hazard severity. ■ If other tools such as assessment of hazard impacts on livelihoods and assessment of coping and adaptation strategies have not been conducted, then this analysis involves considerable background participatory research.

Tool 12: Mapping Adaptation Partnerships

Objectives

Primary objective

- Explore the institutional context in which the community operates and identify appropriate institutional partners for adaptation.

Secondary objective

- Assess the feasibility of particular adaptation options given the existing institutions which operate in the area.

Process

1. Participants identify all the organisations (governmental and non-governmental, private service providers, cooperatives and community based organisation) which operate in the community or district. Alongside each is noted the community's understanding of their primary functions. This can be mapped out visually with Venn diagrams on a large sheet of paper and only later incorporated into the table below.
2. Based on previous discussions about hazards, risks, adaptation strategies, resources within the community and gaps, participants identify what role each organization/institution could play in helping them adapt to climate change.
3. Participants indicate what action needs to be taken to access that support and who will do it.

Example

Institution	Role	Potential adaptation support	Action to gain support, where by whome
A.B.S. NGO	Social mobilisation loans to poor training	help people be aware of rights and speak up (get help in disaster)	Ask them to help prepare adaptation plan
District soil conservation office	start small groups seedlings gabions	bio-engineering and gabions and tree planting to reduce landslide risk	Go to office and ask for materials, by FUG chairman next week.

Guidance notes

If participants have an incomplete understanding of all the roles and function of the institutions it is worth asking staff of the institutions what they feel they have to offer in terms of supporting the development of adaptive capacity as well as there expectation on the gain from it.

Further questions

- *How well do the organisations play their roles?*
- *What support could they additionally provide to help adapt to climatic hazards?*
- *What expectation they have?*
- *How does access to the services and goods provided by these institutions differ across the different social groups of the community?*
- *What type of partnerships and co-management arrangements already exist in the area of climate change action? How could they be improved to increase adaptive capacity?*
- *What is the institutional context of different sectors?*

Strengths	Weaknesses
<ul style="list-style-type: none"> ■ Provides the institutional context in which livelihood and conservation strategies are framed. ■ Provides an indication of the feasibility of proposed adaptation strategies. ■ Suggest routes capacity-building interventions could take, and potential institutional partners. 	<ul style="list-style-type: none"> ■ If not linked to previous tools it is a time-consuming exercise and difficult to achieve completeness. ■ Institutions, or roles and functions of institutions, that are invisible to the local community will not be reported.

Tool 13: Community based Adaptation Planning

Objectives

Primary objectives

- Develop urgent and immediate short term and long term adaptation priorities for district, regional and national level planning.
- Develop community level plans of action which will help them become more resilient to effects of climate change.

Secondary objective

- Integrate all the information from tools and discussions above in to the development of well-prepared and inclusive plans of action.

Process

Whether working at district, VDC or community level the preparation of adaptation plans is often the end point of many of the previous tools. They can contribute to a complete participatory planning processes as suggested below:

1. Identify the hazards and asses the risk of them happening [can use tools 1 (hazard ranking), 2 (trend analysis), 3 (hazard mapping).]
2. Asses the impacts of those hazards [can use tools 4 (hazard impact assessment), 5 (livelihoods resource assessment) with 6 (livelihoods vulnerability assessment), 7 (hazard impacts on livelihoods).]
3. Prioritise hazards based on severity of impact and vulnerability of resources and people [can use tools 1 (hazard ranking), 8 (vulnerability assessment), 9 (vulnerability matrix).]
4. Identify and assess existing capacity/assets to cope with and adapt to existing and future hazards [can use tools 5 (livelihoods resource assessment), 10 (coping and adaptation strategies assessment), 11 (effectiveness of coping and adaptation strategies).]

5. Identify the gaps.
6. Assess how existing resources can be used to fill the gaps and list actions [can use tool 5 (livelihoods resource assessment).]
7. Assess how remaining gaps can be filled by external partnerships [can use tool 12 (adaptation partnership mapping).]
8. Prepare a plan of action based on prioritized risk of hazards, detailing actions that can be taken at community, VDC or district level and the available external support. The plan should be very specific about what will be done, where, when and by whom.

Alternatively use can be made of the following adaptation planning process which is taken from Local Options for Communities to Adapt and Technologies to Enhance Capacity (LOCATE). It provides a systematic approach to designing community based adaptation based on SSNAPP (South South North Adaptation Projects Protocol). It can be used to identify and prioritize adaptation needs and activities along with potential partners and stakeholders. The entry point of LOCATE is specifically community based adaptation to climate change rather than a review existing projects to make them climate resilient or take benefits for adaptation to climate change. It uses key concepts and elements of the Sustainable Livelihoods Framework. However, it gives emphasis to relationships between different income streams of different communities and impacts of climate change on those streams while assessing vulnerability and adaptation needs. The four phases suggested in the framework support the generic steps suggested in the third assessment report of the IPCC (IPCC, 2001).

Phase I: Finding Vulnerability “Hot-spots”

Communities and field level practitioners and facilitators jointly identify the risk related to climate change in their daily lives and identify which sectors are vulnerable and who among them is most greatly impacted².

² Vulnerability hotspots can also be identified in each sector and nation wide using various parameters such as Human Development Index (HDI), National data on climate induced disasters, National data on sectoral issues (food sufficiency, forest degradation), and others. GIS Mapping could be done at different scales based on the data available.

Key Questions:

- What is the vulnerability context?
- What are the vulnerable sectors?
- Where do the most poor and marginalised communities live?
- Who are the most vulnerable and why?

Phase II. Development of adaptation plans

Communities and practitioners develop local level solutions to the challenges identified. The plans offer an opportunity to explore the future prospects of climate change mainstreaming.

Key Questions:

- Which physical vulnerability context will be addressed (e.g. flood, cyclone, salinity, drought)
- Which vulnerable groups and sector will be addressed (e.g. agriculture, water, fisheries, energy)?
- How to reduce exposure of the sector and communities to the problems?
- How to reduce sensitivity of the sector and communities to the problems?
- How to improve adaptive capacity of communities?
- What are the overall strategies to improve the situation?

Phase III. Prioritization of adaptation plans³

Communities and practitioners can do this through cost benefit analysis and multi-criteria analysis. The multi-criteria analysis involves several criteria



³ The prioritization is entirely based on the local context and it is useful to use local and national criteria to reach a conclusion.

identified by communities (feasibility, cost effectiveness, impact, time etc). Activities can then be ranked and agreement made as to the top priorities.

Key questions:

- What is the best way of prioritising adaptation activities?
- How best to prioritize and rank the problems or integrate activities?
- Which activities are urgent and immediate and which are long term?

Example of a matrix for ranking key hazards by magnitude and impact

<i>What Action</i>	<i>Details</i>	<i>Where</i>	<i>When</i>	<i>Help from</i>	<i>Who</i>
<i>Gabions</i> 	<i>24</i>	<i>below Dil Bahadur Land</i>	<i>Winter</i>	<i>DSCO</i>	<i>Ram Dai</i>
<i>Tree planting</i> 	<i>Uti's 1000</i>	<i>along East river bank</i>	<i>Spring</i>	<i>FUG nursery</i>	<i>All FUG members</i>

Phase IV. Identifying the implementation mechanism

It is important that communities identify the mechanisms through which the practical action takes place so as to ensure timely intervention and to quickly benefit the most vulnerable and poor groups/communities. Support of all stakeholders is essential if the adaptation plan is to be well implemented.

Key questions:

- Who are potential project partners? Who is doing what and who knows what?
- Who is implementing what types of development, livelihood, and disaster management activities on the ground?
- Is there interest in working on climate change adaptation?

- What are the main roles and responsibilities of key actors and communities?
- How can institutional capacity be improved?
- What are the sources of funding? What can be done at community level and what additional external support is needed?
- What kind of monitoring mechanism is needed?
- How can learning and good practices be institutionalized and scaled up?

Tasks

1. Identification and mapping of the physical vulnerability context
2. Mapping distribution of income poverty
3. Overlaying vulnerability and poverty database
4. Prioritize adaptation activities and partners based on criteria
5. Discuss institutional and financial modalities
6. Discuss ways forward

Additional activities include: Selection criteria with communities and stakeholders; Brainstorming among team members; Sharing proposed adaptation activities with potential NGOs and CBOs for their feedback; Stakeholder mapping using Social Analysis System (SAS) tools; Cost benefit and multi criteria or any other prioritization tools; and SWOT analysis for activities and benefits.

Adaptation priorities	Prioritisation criteria used by communities		
	Cost effectiveness	Feasibility	Impact
Short term adaptation priorities:			
- Promotion of drought resistant local crops and species through community based nursery	++	+++	+++
- Plantation of broom grass in degraded and erosion prone areas	+++	+++	+++
- Sharing of information on climate induced disasters through existing networks	+++	+++	+++
- Promotion of local seed exchange system to conserve the environmentally stressed varieties	+++	++	+++
Long term adaptation priorities:			
- Land zonation and rehabilitation	++	++	+++
- Establishing early warning systems	++	++	++
- Establishing seed banks to preserve seeds when crops fail	++	+++	+++
- Introducing technologies to address production stresses	++	++	+++

Communities also identified sources of funding and institutional mechanism to deliver the short term adaptation priorities. (Bhorle and Ramche VDCs of Rasuwa district; RIMS/WWF Study, 2009)

Strengths	Weaknesses
<ul style="list-style-type: none"> ■ Allows mainstreaming of local planning with the district and national planning processes. ■ Empowers communities to lead a process of identifying their adaptation needs and planning how to address them. ■ Provides communities direct access to planning process and fund flow mechanisms. 	<ul style="list-style-type: none"> ■ If done in isolation the process takes time and it can be difficult to achieve completeness. If it is the end point of many of the other tools then it is feasible. ■ Important to keep the plan realistic and not raise expectations of communities if there is no financial commitment and resources to support the identified priorities.

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