World Agroforestry Centre

CCAFS

CGIAR RESEARCH PROGRAM ON Forests, Trees and Agroforestry

CGIAR Research Program on Climate Change, Agriculture and Food Security

The Talking Toolkit

How smallholder farmers and local governments can together adapt to climate change

Simelton E, Dam VB, Finlayson R, Lasco R, eds.
The talking toolkit: how smallholder farmers and local governments can together adapt to climate change.
Hanoi: World Agroforestry Centre (ICRAF) Viet Nam. Online. Available at:
http://worldagroforestry.org/regions/southeast_asia/vietnam/products/tools/talking-toolkit
Last updated: May 1, 2014.

CHAPTER 1

Background

Why?

Extreme weather events and long-term climate change pose risks to smallholding farmers across the world, placing the food supply of hundreds of millions of people in danger. These events are putting agriculture, food security and 'environmental services' (for example, clean and plentiful water and air, diverse animals and plants, productive soils, beautiful landscapes) under increased pressure.

Several Southeast Asian countries currently rank among the most exposed to climatic disasters: for example, the damage to the Philippine agricultural sector after typhoon Bopha in 2012 was estimated at USD 230 million; the 2007–08 cold spell in northern Viet Nam killed 33 000 cattle; in 2011–12, 25% of Thailand's rice harvest was lost to flooding, affecting world food prices. Large areas of these countries have complex topographies where violent rainstorms result in landslides and soil erosion. Temperature extremes put further stress on agriculture and health.

A large proportion of the rural population depends on agriculture for their livelihoods. These people are particularly vulnerable to climate change because they need not only to improve production to escape poverty but now must also be able to recover from losses caused by extreme events. Since many of these farmers are familiar with living in areas prone to natural hazards, their adaptation strategies can be documented and shared.

Around the world, farmers, development workers, government officers and researchers are identifying locally appropriate adaption strategies to make rural communities and farmers' livelihoods more resilient to stresses from extreme weather events and the variability that comes with climate change.

The addition of trees and agroforestry to farming landscapes is one way to help make smallholding farmers resilient to extreme weather events. The right trees in the right place can have many environmental and economic benefits: 1) trees regulate microclimates by providing shade and wind breaks and by stabilising soils; 2) trees also help to reduce carbon-dioxide emissions. Over seven years, one acacia tree can store a total of 30–40 kg of carbon aboveground.[1] This is approximately the same amount of emissions that would be produced by riding 1500 km on a small motorbike.[2] By stabilising the soil where they grow, trees also increase the amount of carbon stored in the soil; 3) trees, crops and grasses planted on slopes can help prevent landslides. They also provide food, animal feed, fuel and fibre that can all generate income; 4) farming communities can benefit from rewards' schemes that support them in maintaining and restoring the environmental functions of their land.

These include 'rewards for environmental services' schemes and carbon markets (emissions trading, which can be incorporated into schemes). Participating in these sorts of schemes can indirectly help reduce farmers' vulnerability to climate change.[3] A recent study from Kenya shows that farmers who planted trees on their farms improved productivity because of more nutritious soils and crops being better protected from droughts and floods.[4] As a result, they also had higher incomes than their neighbours who were not practising agroforestry.

Adaptation is a continuing process that requires constant learning. We need participatory tools that support mutual understanding, confidence and action: practical and straightforward interdisciplinary tools that can be used without the need for experts to be present.

We have created this toolkit to help everyone better understand the exposure of farmers to climate change, what impact it might have on them and food production, and how they can adapt.

The toolkit has been supported by the CGIAR Research Program on Forests, Trees and Agroforestry.

Who?

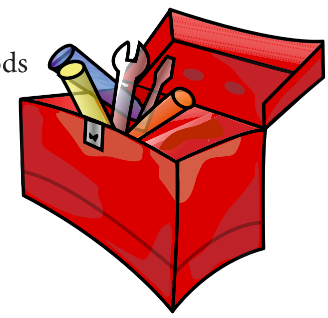
This collection of exercises, which we call 'tools', are designed to draw information from farmers for people who work with farmers: development workers, agricultural organizations and government policy-makers. We assume that you are involved in a research or development project related to climate change and want to learn how to use proven research methods to get the information you need in order to achieve the project's objectives.

What?

The tools have all been designed to help clear and practical communication about climate change and the ways we can start to adapt to our changing environment. They survey the needs and knowledge of farmers, establishing what is the 'baseline' or starting point from which we need to change so that this can be built into land-use plans.

The toolkit has been designed to be downloaded from the internet, with each tool assigned to a separate PDF. The toolkit totals 17 PDFs. The first eight PDFs provide a comprehensive background to the tools.

Tool 1a	Hand-drawn map
Tool 1b	Paper land-use map
Tool 1c	Digital land-use map
Tool 2	Problem tree of factors that limit farming activities and livelihoods
Tool 3	Timeline of village history and hazards
Tool 4	Village hazards map
Tool 5	List of exposure to extreme weather events
Tool 6	Calendar of climate and farming
Tool 7	Table of perceptions of changes in climate and weather patterns
Tool 8	Table of strategies for coping and adaptation
Tool 9	List of losses: vulnerability and support mechanisms
Tool 10	Ranking suitability of trees & crops



Acknowledgements

This project was funded by the CGIAR research programs on Forests, Trees and Agroforestry and Climate Change, Agriculture and Food Security. We are grateful for the invaluable input of colleagues at the World Agroforestry Centre, Sonya Dewi, Robert Finlayson, Rodel Lasco and James Roshetko, to earlier drafts of the toolkit. We thank Eskil Mattson for valuable comments on the glossary. We also thank Tran Thi Minh Ha and Pham Van Tan of the Ministry of Natural Resources and Environment in Viet Nam for their support. We are grateful, too, for the collaboration of the departments of Agriculture and Rural Development in Yen Bai and Ha Tinh provinces, the Farmers' Union in Ha Tinh, as well as villagers, local leaders and extension workers in Luc Yen and Ky Anh districts. Special thanks must go to Laura Noszlopy and Robert Finlayson for their work editing the toolkit.

[1] Vũ TP. 2009. Nghiên cứu định giá rừng tại Việt Nam (Forest valuation in Viet Nam). NXB Khoa học và Kỹ thuật, Hà Nội. (See page 136, in particular.).

[2] There are numerous online tools for calculating carbon footprints, such as http://www.carbonzero.co.nz/EmissionsCalc/tourismeditor.aspx

[3] Van Noordwijk M, Hoang MH, Neufeldt H, Oborn I, Yatich T, eds. 2011. *How trees and people can co-adapt to climate change: reducing vulnerability through multifunctional agroforestry landscapes.* Nairobi: World Agroforestry Centre (ICRAF).

[4] Thorlaksen T, Neufeldt H. 2012. Reducing subsistence farmers' vulnerability to climate change: evaluating the potential contributions of agroforestry in western Kenya. A*griculture & Food Security* 1:15. Available from http://www.agricultureandfoodsecurity.com/content/1/1/15.

CHAPTER 2

What is it and who is it for?

The aim of this resource book (or 'toolkit') is to help farmers and local governments work together to adapt to climate change.

Using the exercises (we call them 'tools') described in these pages will help you understand the role of trees and agroforests in reducing the impact of extreme weather events and long-term climate change.

The toolkit has been devised by researchers for running focus-group discussions with farmers and other village members by development workers, extension workers or others interested in the climate challenges faced by farmers.

These are interdisciplinary and participatory tools that can be used in villages in the early stages of developing adaptation strategies for agriculture, agroforestry and forestry. They include ways of mapping issues in a village, carrying out a household survey, identifying hazards and finding solutions.

In general, the tools can be used to 1) establish a baseline, or starting point, of farmers' exposure to climate risks; 2) understand the climatic, and also the non-climatic, impacts on farmers and their adaptation strategies; and 3) help bring these adaptation strategies into land-use planning in villages and local governments.

Most of the tools can be used independently or in various sequences that suit specific needs. They have already been used in many parts of the world but some of the references and resources herein are specific to Viet Nam or other parts of Southeast Asia.

The toolkit is not yet complete, however: tools for land-use planning will be added as they become available.

We assume that you will want to discuss climate change with farmers so that you can understand their needs and help build them into local plans. And even though we have created this toolkit so that anyone—not just scientists—can use it, we assume that you are following a research process to find out the information you need for the plans. Accordingly, you are expected to be familiar with Participatory Rural Appraisal methods and basic participatory research techniques. Information about these can easily be found online and in various handbooks.[1]

How to use the toolkit

Figure 2.1 below shows how the tools can be used as part of a 'do-it-yourself' research process.

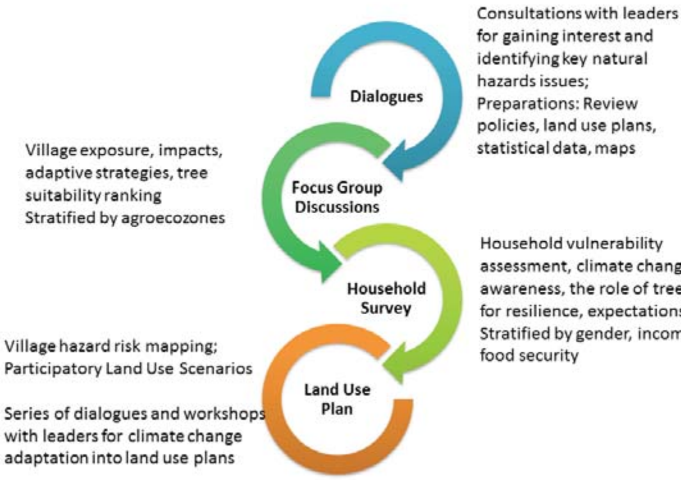


Figure 2.1: The four key stages in the process

The first step is to carry out initial discussions with community leaders to identify the main issues; second, focus-group discussions are held to gain rapid insight into the level of exposure to the impacts of climate change and adaptation strategies in different agro-ecozones and elevations, and for gathering questions for the household survey; then the household survey is carried out to develop an in-depth and stratified assessment of smallholders' resilience; and, finally, the climate-change issues are built into local land-use plans. Feedback sessions take place between each stage.

How to select the villages to be surveyed

Studying samples and then extrapolating the results to a larger scale is a well-established research process. The toolkit will show you how to research a number of selected villages and expand the results to a wider area, through local government plans. This is a proven way of efficiently using time and effort.

We can be pretty sure that each village has its own specific context and character and, consequently, results will vary from village to village. Nevertheless, when you design your study you should try to select villages that are representative of a broader spatial scale from which more general conclusions can be drawn.

We recommend you select at least three sub-districts along a line drawn across a map (a 'transect'). Within each sub-district, select at least three villages along another transect. This simple approach usually captures a range of different situations and helps understand the relationship between villages upstream and those downstream in a watershed.

After holding focus-group discussions, merge the information from the various villages wherever possible. This can include setting minimum and maximum planting windows in the farming calendars, finding the average tree & crop suitability ranking, and comparing adaptation strategies. It is, however, important to note significant differences between the villages. Share the general information with local government and the focus groups, gathering their comments on its validity. Seek explanations for differences and assess whether these could lead to sharing local knowledge between the villages.

Results can also be shared with other villages that are not part of the study in order to strengthen the assumption that the selected villages are representative of the issues in the area. These villages can act as 'controls' or reference points and may also be potential sites for future expansion of the activities that come out of your research.

[1] For example:

Bizikova L, Boardley S, Mead S. 2010. P*articipatory Scenario Development (PSD) approaches for identifying pro-poor adaptation options*. Washington, DC: The World Bank. Available from http://climatechange.worldbank.org/sites/default/files/documents/PSD-Pro-Poor-Adaptation_EACC-Social%20.pdf.

Daze A, Ambrose K, Ehrhart C. 2009. *Climate vulnerability and capacity analysis. Geneva: Care International.* Available from http://www.careclimatechange.org/cvca/CARE_CVCAHandbook.pdf.

Nguyen Q, Hoang MH, Öborn I, van Noordwijk M. 2012. Multipurpose agroforestry as a climate change resiliency option for farmers: an example of local adaptation in Viet Nam. *Climatic Change 117(1-2),241-257*.

Regmi BR, Morcrette A, Paudyal A, Bastakoti R, Pradhan S. 2010. *Participatory tools and techniques for assessing climate change impacts and exploring adaptation options.* Kathmandu: Livelihoods & Forestry Programme Nepal. Available from http://www.forestrynepal.org/images/publications/Final%20CC-Tools.pdf.

Simelton E, Quinn CH, Batisani N, Dougill A, Dyer J, Fraser EDG, Mkwambisi D, Sallu S, Stringer L. 2013. Is rainfall really changing? Farmers' perceptions, meteorological data, and policy implications. *Climate and Development.* Available from http://www.tandfonline.com/doi/abs/10.1080/17565529.2012.751893.

CHAPTER 3

Before you start

Two of the key steps for preparing yourself to talk about climate change with farmers and local governments are 1) ensuring that everyone who has an interest in the matter, particularly the local people themselves, are involved; and 2) analysing the existing information about the subject so that you are as well informed as possible before you start the project proper (see Figure 2.1).

Why you should engage the community?

It's crucial that your research agenda follows what local people need and that their interests are taken into account at every stage of planning and implementation. At the risk of stating the obvious, it's important to always remember that the aim of your research is to help improve their wellbeing.

If you already have information about the area's general needs from other reliable sources, then you are already in a good starting position.

> *For example, during a national adaptation workshop involving policy makers, researchers and field workers we were able to establish the larger, overarching issues and identify many of the common needs. Once we began our research, we were able to keep in regular touch with both national and local policy makers to share knowledge back and forth.*[1]

Similarly, it is important in your project that the results from the focus-group discussions and household surveys are shared amongst everyone involved. Their comments will be valuable and help everyone better understand the issues.

By involving many people—particularly representatives from farmers' groups, local agricultural advisory services (extension) and development organisations—who can be trained as knowledgeable facilitators of the tools in this toolkit, you ensure that local people know what they are doing and why they are doing it and, consequently, they will be much more likely to succeed in making their farming systems more adaptive.

This is very important because there is still very limited experience with building climate-change adaptation strategies into land-use plans, both among field workers and policy makers. Therefore, the World Agroforestry Centre team collaborates with NGOs working on similar issues, including Care, the Centre for Sustainable Rural Development and World Vision. This enables knowledge exchange among the project teams as well as local leaders.

Analyse the existing information

When preparing your project—including the training sessions for facilitators, focus-group discussions and land-use planning exercises—it is important to analyse the existing information before you plan anything else.

A comprehensive approach, of the sort that scientists follow, is listed below. You can do all of it or those parts that are most relevant or achievable. The more information you have analysed before you start your project in the field, the less likely you are to overlook important issues or make the wrong assumptions.

Frame the study: Analyse the theoretical frameworks and approaches that might be best for doing the research. These could include institutional, socioeconomic as well biophysical/environmental frameworks[2] as well as the 'five capitals' model[3] and the 'sustainable livelihoods' framework[4]. If you are unsure how to do this or where to find the information, please contact staff at the World Agroforestry Centre (e.simelton@cgiar.org).

Identify the research and development needs: Search for currently active local research and development projects and online training material from NGOs and universities.

> *For example, the Viet Nam Union of Friendship NGO Resource Centre organises monthly meetings in Hanoi as well as working groups for climate change and disaster management. If you are working in Viet Nam it would be in your best interest to make yourself acquainted with the Union's opportunities for information exchange.[5] You could also take part in organising and/or reviewing proceedings from international, national and local workshops and conferences.*

But if the objective is a preliminary survey to gather data for a larger potential project then it might be useful to make an inventory of stakeholders or existing projects as a way of gathering and analysing information.

Assess the policy context: Learn about national and local policies for disaster risk reduction, adaptation, mitigation and development.

> *For example, in Viet Nam, this would mean reading the National Climate Adaptation Strategy and Climate Change Strategy and, more generally, the Intergovernmental Panel on Climate Change's Special Report on Managing the Risks of Extreme Events.[6] It is also useful to study local development plans, though it is likely that any guidelines for integrating climate change into such plans, if they exist, will be too general to be useful at the local level.[7]*

Conduct meteorological analyses: This involves gathering conventional climate statistics as well as qualitative and quantitative information drawn from the focus-group discussions. Available climate scenarios include official scenarios such as reduced scale, local scenarios that are used by government authorities; and scenarios and ensemble scenarios available from the Intergovernmental Panel on Climate Change Data Distribution Center.[8] Identify the most localised, scaled-down meteorological analyses and climate scenarios, which can be translated to village contexts.

> *In Viet Nam, daily meteorological data is available (recorded at least since the 1980s) and can be purchased from the Institute of Meteorology, Hydrology and Environment.[9] However, as there are only between three-to-six meteorological stations per province these do not fully represent geographically diverse areas. Localised scenarios that have been statistically reduced in scale do exist but are not readily available for public use. Regional and national scenarios are being developed.[10]*

Use census data: Agricultural and household census data (national, provincial and sub-provincial, if available) and reports from local government departments can be used to estimate 'normal' production ranges, inter-annual variability and exceptions owing to extreme weather events. It is also useful to correlate agricultural yields with meteorological variables (rainfall and temperature), if feasible.

> *In Viet Nam, census data needs to be obtained from provincial or district units. Online statistical yearbook data covers very limited time periods and is only available at the provincial level.[11]*

Use maps: Land-use and topographical maps are used for highlighting areas prone to weather and climatic risks and for drafting new land-use scenarios. Reproducing village maps for risk assessment and land-use scenarios will be easier if they are based on existing sub-district maps. Sub-district maps usually also show the geographical context of villages, such as upstream–downstream characteristics and major land-use changes occurring outside villages. For orientation, the satellite layer in Google Maps or Google Earth can be used. If the resolution is good and no other maps are available, these maps can also be considered for developing land-use scenarios.[12]

---

[1] In Viet Nam, the meetings involved the Ministry of Agriculture and Rural Development, Ministry of Natural Resources and Environment and the Institute of Meteorology, Hydrology and Environment, and the Ministry of Science and Technology as well as more frequent meetings with the corresponding leaders and planners at provincial, district and sub-district levels.

[2] Fraser, EDG 2007. Travelling in antique lands: using past famines to develop an adaptability/resilience framework to identify food systems vulnerable to climate change. Climatic Change 83 (4) 495-514.

[3] See http://www.forumforthefuture.org/sites/default/files/project/downloads/five-capitals-model.pdf

[4] Scoones, I. 2005. Sustainable rural livelihoods: a framework for analysis. IDS Working Paper 72. Institute of Development Studies. UK. http://www.sarpn.org/documents/d0001493/P1833-Sustainable-rural-livelihoods_IDS-paper72.pdf

[5] See http://www.ngocentre.org.vn/.

[6] See http://ipcc-wg2.gov/SREX/.

[7] In Viet Nam, see Ministry of Natural Resources and the Environment: http://www.cbcc.org.vn/documents/technical-guidance-for-integrating-climate-change-into-socio-economic-development-strategies-planning-processes-and-plans.

[8] See http://www.ipcc-data.org/

[9] See http://www.imh.ac.vn/a_gioi_thieu?set_language=en&cl=en

[10] Regional projects instead tend to develop their own scenarios. See, for example, http://www.mekongarcc.net/. Scenarios at 10 km resolution for the whole country are being developed in a collaboration between Viet Nam and Australia. See http://www.imh.ac.vn/b_tintuc_sukien/hoptac_imhen_csiro/ and http://www.csiro.au/en/Organisation-Structure/Flagships/Climate-Adaptation-Flagship/Viet Nam-Climate-Projections-Project.aspx.

[11] See General Statistical Office of Viet Nam: www.gso.gov.vn.

[12] In Viet Nam, high resolution commune maps were produced in 2010 by the planning section of the commune (sub-district) Department of Agriculture and Rural Development to support the planning of the New Rural Policy. However, obtaining copies may prove difficult.

CHAPTER 4

What do climate-change terms mean?

Many people talk about climate change without understanding what the terms actually mean. Before using the toolkit, trainers and facilitators should understand the main terms, which are explained below.[1]

Adaptation: Adaptation is the process of modifying a structure or system to improve its resilience to climate impacts. Adaptation strategies are based on the idea that the climate is already changing and impacts are already being experienced so it is necessary to adapt our systems and structures to cope with them better. Examples of adaptation strategies include mulching to avoid drought, installing solar panels to reduce reliance on a potentially vulnerable power grid or changing the planting season to adapt to changing rainfall patterns or avoid new risks. If sensitivity increases during this process, instead of resilience, then it could be a case of maladaptation. Policies and land-use plans that promote crops and trees that are unsuitable for the current or coming climate can result in maladaptation.

Agroforestry: A form of combined agriculture and forestry that incorporates trees and crops on the same plot. Strategies for successful agroforestry are typically based on mixing trees and crops at the landscape level. This results in a cultivation mosaic with plots of annual crops among other plots with perennial plants and trees and often uses permaculture techniques, such as contour planting and intercropping. An agroforestry system should provide better yields and generate more positive economic and environmental effects than would be achieved by cultivating each component crop individually. Resources on agroforestry are available online at the websites of the World Agroforestry Centre and the Southeast Asian Network for Agroforestry Education.

Air and atmosphere: The atmosphere consists of air that surrounds the earth up to a height of about 17 km at the equator and 7 km at the poles. However, three-quarters of all air exists between the land surface and 11 km up because air gets thinner with altitude. Dry air consists of 78% nitrogen (N), nearly 21% oxygen (O) and almost 1% argon (Ar), with very small concentrations of other gases, including the 'greenhouse gases' that play an important role in climate change. Air also contains a variable amount of water vapour.

Climate change and global warming: Global warming is the increase in the average temperature of the Earth's atmosphere caused by increased concentrations of greenhouse gases in the atmosphere. Climate change is a term for the disruptive effects that global warming has on climate patterns, including changes in the frequency and intensity of storms and other extreme weather events, shifts in the pattern of rainy and dry seasons, and less regular and predictable seasons.

Climate-smart agriculture: This is a range of sustainable farming practices that increase productivity, contribute to food security, are adapted for climate impacts, and mitigate climate change. Agroforestry is an example of climate-smart agriculture[2].

Climate variability: A distinction is often made between variations in the climate caused by natural events and those caused directly by human actions. Natural variations in weather and climate occur in timescales ranging from millions of years to just a few years. Some variations depend on incoming sunlight, the angle at which the Earth tilts towards the Sun, the Earth's location in its orbit around the Sun, or the effects of sunspot activity. The most extreme variations have resulted in large areas of the globe becoming covered in ice. The most recent glacial period or 'ice age' ended about 12 500 years ago. An example of a variation that lasts just a few years is the El Niño/La Niña Southern Oscillation or ENSO (see below). Tectonic movements, particularly volcanic eruptions, reduce global temperatures in the 1–2 years following an event because ash particles remain in the air and block sunlight from entering the Earth's atmosphere. After the eruption of Mount Pinatubo in the Philippines in 1991, global temperatures fell by an average of 0.5 °C.

In addition to this natural variability, climate varies in irregular ways owing to human impact on the environment. Dam construction and irrigation changes the hydrological cycle in a catchment and sometimes over larger areas when the changes alter where and how water evaporates into the air. Deforestation often causes the soil to dry out as there is no vegetation to shade the soil and hold the water. The dry soil and lack of vegetation changes the wind patterns and wind erosion occurs, creating soil dust clouds. Dust (and other particles from pollution) can cause rain clouds to form and may cause drizzle or rainfall in places where it never rained before. When farmers say, 'We used to know when rainfall would come but now it comes a little earlier [a little later/much later/not at all]', it is important for us to find out what exactly in their environment may have changed. Sometimes localised climatic variations can be linked directly to changes in the local area, such as deforestation and land-use changes. However, the complexity and scale of the global climate means that the causes of locally recorded climate change might have occurred on the other side of the world years earlier.

Cold and hot spells: Periods of abnormally low or high temperatures. As for 'drought', the definition depends on what is 'normal' in each location both in terms of the minimum or maximum temperature and the duration of that temperature. Cold and hot spells are not associated with a particular level of precipitation and can be dry or rainy.

Drought: A simple definition of a drought is a prolonged period of abnormally low precipitation. Other, more specific, definitions include meteorological droughts, agronomic droughts and technical droughts. Meteorological droughts are defined by rainfall quantity and/or number of rain-free days; agronomic droughts by soil moisture; and technical droughts are events caused by management failures of reservoirs or irrigation systems. Droughts are not defined by temperature and can occur during any season, but as evaporation increases with higher temperatures the conditions that are defined as a drought vary with the seasons.

> *For example, Ha Tinh in Viet Nam has a meteorological winter drought if the total rainfall between November and February is below 10 mm and a summer drought if the total rainfall between May and August is below 50 mm.*[3]

El Niño/La Niña Southern Oscillation (ENSO): ENSO is a naturally occurring interaction of ocean currents and air pressure across the Pacific Ocean that affects the weather patterns across the world, especially winds, air and sea surface temperatures and rainfall. The La Niña phase often brings lower temperatures and more rainfall across Southeast Asia. During the El Niño phase, northern parts of Southeast Asia are warmer, especially in the winters, while southern Southeast Asia is warm and dry. The cycles can be between 2 and 12 years long and the peaks last 9–24 months. Improved predictions of ENSO could help agricultural production planning.[4]

Exposure: Exposure refers to the nature and degree to which an ecosystem or a community is exposed to climatic variation. It is an assessment of how frequently and severely climatic variation occurs in a particular location and it can vary considerably between locations that are within a few hundred metres of each other. As an example, farmers along a river plain are likely to be more exposed to floods than farmers on a hill slope; the farmers on the river plain will experience flooding more often than the hill farmers.

Extreme weather event: Extreme weather is defined as weather conditions that are at the extremes of the range of weather conditions experienced in the past. The definition depends on the area: a drought in northwestern Viet Nam is different from a drought in the Mekong or the Philippines. The definition is based on what deviates from 'normal' in a particular area for a particular period at a particular time.

Statistical analyses are needed because the limits defined as 'extreme' can be rather arbitrary. People now talk about extreme weather events happening more often, e.g. the number of storms or the number of days with temperatures above 40 °C have increased.

For example, Ha Tinh in Viet Nam is hit on average by one typhoon per year, which is 'normal'; if this increased to five per year it would be 'extreme'.

Flash flood: A flash flood is a rapid flooding of low-lying areas. Flash floods can be caused by heavy rain, especially if it falls on ground that is already saturated (full of water). They can also occur when natural or engineered dams burst. Flash floods are distinguished from other types of flooding by their short duration, which is typically less than six hours.

General circulation and global climate models (GCM): Computer models are used to simulate reality in a simplified form. There are numerous models that simulate possible global climates. The main differences among them are the physical descriptions (equations) of the atmospheric pressure patterns. These models are based on particular assumptions about greenhouse gas concentrations (from emissions) and different land uses. They create scenarios that demonstrate the effects of the various assumptions on global air and ocean temperatures, pressure patterns and hydrological cycles. Each scenario includes information about population and economic and technical development around the world because these are closely related to emission rates and the extent to which technical solutions can reduce emissions. The scenarios are projections, not forecasts. The simulated meteorological data that comes out of a global climate model can be used in other models, such as computer models of crops that study the impacts of climate change on yields.

Greenhouse gases: Greenhouse gases are gases in the atmosphere that can absorb and emit heat (infra-red radiation) that would otherwise be lost to space and thereby cause the Earth's atmosphere to become warmer. Some greenhouse gases—such as water vapour (H2O), carbon dioxide (CO2), methane (CH4), nitrous oxides (N2O, NO2) and ozone (O3) —occur naturally but the concentration of these in the atmosphere has increased as a result of agriculture, deforestation and burning fossil fuels. Others are totally synthetic industrial gases (CFC, HCFC, CF4, C2F6, SF6, NF3). Smallholding farmers in developing countries can do little to control these, other than choosing not to use products that contain them. These gas molecules can stay in the atmosphere and affect the climate for up to 50 000 years before they dissolve.

In May 2013, the concentration of carbon dioxide in the atmosphere passed 0.04% or 400 ppmv. This is 40% higher than the concentration before the industrial revolution in the 1700s, when it was about 280 ppmv, and almost 25% higher than the concentration in 1960, when it was just below 320 ppmv . The current concentration of methane is about 1.79 ppmv (0.00017%) and nitrous oxide 0.345 ppmv.

Greenhouse gases' concentration and global warming potential: The global-warming effect caused by specific greenhouse gases (such as carbon dioxide) is caused by the concentration (the amount) of the gas in the atmosphere and by its particular 'global warming potential' (GWP) or how effective that gas is at absorbing and emitting heat. For example, the atmosphere holds many times more carbon dioxide than methane because carbon dioxide lasts 30–95 years compared to approximately 12 years for methane. However, methane has a much greater GWP. One molecule of methane can cause as much warming as 72 molecules of carbon dioxide over a 20-year period. Also, the rate of methane emissions has increased much faster than that of other emissions (by 160% since the 1700s compared to 40% for carbon dioxide) and methane compounds dissolve into other greenhouse gases, such as carbon dioxide and water vapour.

Greenhouse gas emissions from agriculture and forestry: The main gas emissions from agriculture and forestry are methane from decomposing plants—such as paddy rice, the digestive systems of ruminants, manure—nitrous oxides from fertilisers, carbon dioxide from deforestation, ploughing and land-use changes that reduce the capacity of soils and plants to capture and store carbon. Other sources are fuels in agriculture machinery, fertiliser production, irrigation and the use of plastic (produced from oil) for mulching, containers and bags. Planting trees and land management that reduces soil erosion through no-tillage techniques, cover crops, green mulching and contour planting can both reduce emissions and absorb carbon dioxide.

In 2000, the Ministry of Natural Resources and Environment of Viet Nam estimated that agriculture and forestry caused 80 million tonnes of greenhouse gas emissions (CO2 equivalent), which was over 50% of the nation's total emissions.[7]

Impact: The consequences of climatic variations in terms of the direct and indirect changes caused. Impacts are often considered in terms of effects on infrastructure, property, agricultural productivity, local economy, health and ecology.

Consider this: two neighbouring maize farmers on a floodplain might have the same exposure to climatic variation (rainfall and/or temperature changes) but the impact of a flood on their farming systems might vary: one has a crop failure and the other has a productivity gain. This could depend on the sensitivity of their maize varieties to water stress or the clay content of their soils. The farmers' adaptive capacity can vary depending on their access to weather forecasts, to the right maize variety for their soil type or to tools to drain the water from their fields. Their resilience may depend on economic buffers: how important is one lost harvest to their whole livelihood? It may also depend on environmental buffers: how long does it take to drain the soil and plant another crop? Or it may depend on social buffers: are family members available and able to drain fields and clear up debris?

Landslides: Landslides or land slips are a type of geological phenomenon that involve a substantial movement of the ground down a slope. There are several types of landslides that differ in terms of the depth of soil that moves and the speed of movement, which may be very rapid or happen over many days. Landslides can be caused by a build up of ground water, by reduced slope stability following a loss of vegetation cover, land erosion by rivers or the ocean, volcanic activity and earthquakes. Human activities can also cause landslides through deforestation, vibrations from machinery and traffic, blasting and construction work affecting slope stability.

Mitigation: Mitigation refers to activities to reduce greenhouse gas emissions and/or concentrations to halt the progress of climate change. The main mitigation activities that Southeast Asian smallholding farmers will be involved in are reforestation, forest enrichment, forest protection and System of Rice Intensification paddy cultivation. Some mitigation projects link farmers with carbon-offset markets, compensating them for protecting or planting forests. As part of the deal, they may get improved cooking stoves that reduce their need for fuel wood from forests or anaerobic digesters that convert the methane from manure and organic waste into biogas that can be used for cooking or electricity generation.

Monsoon: Monsoons are characterised by winds and rainfall. They are large-scale seasonal movements of air driven by differences in temperature and atmospheric pressure between land and sea. During the summer the land heats up faster and becomes warmer than the sea. The dry air above the land becomes correspondingly warmer causing the air pressure over the land to become lower than the air pressure above the ocean. This difference in air pressure causes cool moist air from the ocean to move inland, creating precipitation as it condenses. During the winter, the land cools faster and the process is reversed: the air flows from the cooler land towards the warmer ocean, causing drier conditions inland and precipitation over the ocean.

The East Asian monsoon travels northwards in May over Indochina towards Korea and returns in August, bringing sporadic summer rainfall. The Indo-Australian Monsoon transports cold air across the equator from the northern to the southern hemisphere, tailing the hottest temperatures in Viet Nam

(September), Philippines (October), Indonesia (November) to Australia (December).

Natural hazard and natural disaster: A natural hazard is the risk of a naturally occurring event damaging people or the environment.If it caused damage it is a natural disaster. Droughts, heat waves, tornadoes and cyclonic storms (typhoons, cyclones, hurricanes) are all natural hazards when they are potential risks and natural disasters when they occur as destructive events.

Prediction, forecast, projection and scenario: All of these words denote best guesses about the future. Weather events in the near future can often be predicted with greater certainty than those further away. On a range from high-to-low certainty, 'prediction' denotes what is most likely; 'forecast' predicts the weather in the very near future, usually up to 7–10 days, though seasonal forecasts also exist; 'projection' is a long-term outlook for decades or centuries that depends on assumptions about future emission scenarios[8]. An emission 'scenario' describesone possible future depending on demography, economic and technical development and how these factors affect the use of fossil fuels. Climate scenarios are computer simulations (see global circulation model above) based on the emission scenarios.

Resilience: Resilience is in many ways the opposite of sensitivity. Resilience describes the capacity of a household, community, farming system or another type of 'system' to cope and recover from the effects during and after some form of stress, such as climatic variations or a natural disaster. Indicators of a highly resilient system are when functions and structures (such as food production, economic activity, infrastructure and services) continue to operate during the stressful event or are restored quickly afterwards.

Sea-level rise: Global warming is causing the sea level to rise for several reasons. As water warms it expands, so, as ocean temperatures rise and the seawater expands the sea level rises. Global warming is causing terrestrial ice caps and glaciers to shrink year after year; the water from melting ice reaches the ocean and causes the sea level to rise. For example, if the entire Greenland ice cap melted it would cause a sea level rise of about 6 metres.

> *Over the past 50 years sea levels along Viet Nam's coast have risen on average by about 12–15 cm. It has been estimated that if sea levels rise by 100 cm, 90% of the Mekong River Delta may be flooded every year.*

Sensitivity: Sensitivity is an expression of how vulnerable something is to climate change. Farming systems, crop varieties and ecosystems can all be considered in terms of sensitivity. Something with a high sensitivity to climatic variations is likely going to be severely affected by climate change . Changes in sensitivity within a farming system can be caused by adopting new practices. For example, shifting from local varieties to drought-resistant hybrid varieties can cause a farming system to become more sensitive to flooding. This can wrongly be interpreted as an impact of climate change while it is actually the farming system that has changed. Sensitivity can also be assessed as a change in yield of a particular crop, or productivity of a tree, for each degree of increase in temperature.

Tropical cyclone, typhoon, hurricane, storm: Typhoons and hurricanes are different names for tropical cyclones. A tropical cyclone is a very large storm system with a core of low-pressure air that is warmer than the surrounding air. Tropical cyclones can be over 1600 km across and cause extremely high wind speeds, very heavy rainfall, flooding and storm surges. Tropical cyclones form over large areas of warm sea water and can continue to grow in size and intensity as long as they are positioned over the ocean. When a tropical cyclone crosses from the ocean and moves over land it quickly loses energy and begins to dissipate. This is why islands and coastal areas experience the most destructive impacts of tropical cyclones. Tropical cyclones that develop in the northwestern Pacific Ocean and hit Southeast Asia (especially the Philippines) are called typhoons. Tropical cyclones that form in the northeastern Pacific and the North Atlantic are called hurricanes. Tropical storms are classified by wind speed. A tropical storm has wind speeds between 35 km/h and 63 km/h while a typhoon has wind speeds between 64 km/h and 130 km/h. Storms with wind speeds above 130 km/h are classified as super-typhoons and have the greatest destructive impact.

Watershed: An area or ridge of land that physically separates waters flowing to different rivers, basins, or seas or an area or region drained by a river, river system or other body of water.

Weather and climate: The terms 'weather' and 'climate' are both used to describe conditions in the atmosphere. Weather is what occurs outside at any given moment: the atmospheric conditions (rain, wind, sunshine, temperature) that occur over a short period of time. Climate is the trends and patterns in the weather that occur over a much longer period of time (30 years or more). Because of climate, we recognise the seasons of the year. For example, in central Viet Nam the average annual temperature is 29 °C (climate) while daily temperatures vary depending on the season and from midnight through midday (weather).

---

[1] More technical descriptions can be found in UNDP's Development glossary in English and Vietnamese, available from http://www.corenarm.org.vn/shareupload/Development%20GLOSSARY_UNDP.pdf. For in-depth discussion of climate change in English, see the Intergovernmental Panel for Climate Change (www.ipcc.ch) and the United Nations Framework Convention on Climate Change (www.unfccc.int).

[2] See http://www.climatesmartagriculture.org/en/

[3] Institute of Strategy and Policy on Natural Resources and Environment. 2009. Ha Tinh assessment report on climate change. Hanoi: Institute of Strategy and Policy on Natural Resources and Environment.

[4] Follow the current ENSO phase at NOAA's website: http://www.esrl.noaa.gov/psd/enso/mei/ and links to more details for Viet Nam (in Vietnamese) at http://www.vnbaolut.com/index_uni.html.

[5] This refers to ozone near the ground, a chemical reaction resulting from incomplete combustion and sunlight; not to be confused with the ozone layer that protects us from dangerous sunlight (UV light).

[6] See National Oceanic and Atmospheric Administration: http://www.esrl.noaa.gov/gmd/ccgg/trends/.

[7] United Nations Framework Convention on Climate Change national reports from non-Annex I countries are found at http://unfccc.int/national_reports/non-annex_i_natcom/items/2979.php and Viet Nam's Second Communication to the UN-FCCC 2010 at http://unfccc.int/resource/docs/natc/vnmnc02.pdf.

[8] Weather forecasts for Viet Nam can be found at http://www.vnbaolut.com/index_uni.html.

CHAPTER 5

Example of a plan for using the tools with discussion groups

Before you use any of the tools, you will need to carefully analyse the objectives of your project and apply the tools in an order that suits.

This section gives an example of how the toolkit was used with one particular series of focus groups.

Start with a checklist of materials you will need

If you are facilitating a focus group, you are responsible for bringing the various material you will need. A list of useful items is provided below.

Materials	*For participants*	*For the facilitator*
• Flip chart paper (more than one piece of paper per tool) • Filter pens, at least 3 different colours • Tape (wide) • 'Post-it' sticky notes • Prepared materials: development plans, land-use plans, scenarios, maps	• Drinks and snacks • Information material about the project or associated organisations, if available	• Notebook and pens • Camera • Table for listing participants' names • Print-outs of the tool descriptions

Select participants for the focus group

The criteria for selecting focus-group participants or key informants will be different for each group and will depend on your objectives.

If you want to know the history of the village and traditional knowledge, you should invite village elders who have lived there for many years. Similarly, it is important to invite the most experienced farmers to discussions about agricultural activities and adaptation to extreme weather events.

> *In a study of ours in Viet Nam, the groups consisted of 5–6 representatives from each village involved with the project, including the village leaders, knowledgeable men and women from farming households, and village elders. To provide a general overview, the results of the discussions were compared between three villages per sub-district and three villages per relative elevation. The focus-group discussions were followed by household surveys that recorded gender, age, how long the participant had lived in the village and other points relevant to the project such as farm inventory, weather impacts, support and adaptation strategies.*

Ideally, three focus groups, each with 5–12 participants, should be conducted simultaneously in each village. These can be further divided into at least three types of group so that the results can be differentiated by gender and/or age variables:

Group A: men only; various ages
Group B: women only; various ages
Group C: mixed 50/50% men and women; various ages

Ideally, participants should represent an equal distribution across the age ranges, for example 18–30; 31–50; 50+. Depending on your focus, it may be useful with a separate youth group. Ethnic background or livelihoods could be other type of focus groups. Usually, the three focus groups tend to confirm each other's results or generate interesting differences.

Some of the tools can be used in only one group in order to save time. For example, Tool 3, the village history and hazard timeline, can easily be completed with a single group.

Team leader

The team leader coordinates the activities and assigns responsibilities to focus-group facilitators. The team leader may either facilitate group discussions directly or offer support to other facilitators during group discussions particularly if there are large groups or several groups running simultaneously. The team leader then convenes the results. The team leader should guide facilitators on what type of information will be required for them to take notes of in order to analyse all focus-groups' results and complete subsequent reports. Our experience is that 'more is better': complete sentences answering 'who, where, when, what, how, why'. If facilitators are beginners, the team leader can provide prepared forms and go through 'good' and 'bad' example statements during training.

Figure 5.1: Team leader training a team of focus-group facilitators in Viet Nam
Photo: World Agroforestry Centre Viet Nam

Local resource person

At least one local resource person should accompany the team. This could be a representative of a local government, farmer's association or NGO. The resource person may also be a facilitator if they have already completed the training or they might be a key informant with in-depth knowledge of local agriculture and/or forestry.

Facilitators

Each focus-group discussion is led by one facilitator. We recommend the facilitator follows the order of tools and approximate timings shown in Table 5.1 below but these can also be adjusted to fit the needs of different projects.

The role of the facilitator is to encourage all the participants in the group and to ensure that their ideas and opinions are heard. The facilitator must remain objective and neutral in their attitude towards all participants and their contributions. If group pressure or influential group members prevent some participants from contributing fully, the facilitator needs to sensitively resolve the situation by politely intervening, by providing structured opportunities for participation or, as a last resort, by splitting the group into smaller units.

The facilitator does not need to be an expert on climate change, agriculture or forestry. Interpersonal skills, systematic thinking and a questioning mind are worth far more than technical expertise; the participants (usually farmers) are already experts on what they do and what they see changing in their environment. Researchers and experts can be consulted at other stages of your project.

The facilitator can ask probing questions to help participants understand complicated questions or to answer more comprehensively but they should not influence the group's opinions by making suggestions or posing questions in such a way that the participants give an answer that the facilitator wants. If possible, the facilitator should only explain the layout of the tables and write a few sample answers to illustrate what the participants are required to do. They should then hand the pens to the participants.

The group does not need to reach consensus. If not all the participants agree, the facilitator should simply make a note of how many agree on a particular statement. For example, 'Temperatures are getting warmer (4/12)' would denote that 4 out of 12 participants in the group thought that temperatures were increasing (it can also be useful to note how many of the remaining eight disagreed or did not have an opinion). Following these methods should result in full and clearly recorded data.

One important role of the facilitator is to add explanatory notes to the flipchart paper and in a separate notebook if needed. Use complete sentences; it is helpful to keep in mind 'who, where, when, what, how, why'. This is important so that the nuances of the discussions are kept in memory and make sense to others later. After a couple of focus groups the dialogues begin to blend into each other, so do take notes immediately, don't wait until later'. In particular, the notes will be useful when the team leader has synthesized the focus-groups' results for reports and no longer has access to the facilitators.

Figure 5.2: Facilitators practise the tools before being allocated to their respective groups
Photo: World Agroforestry Centre Viet Nam

Timing

The duration shown for each tool in Table 5.1 below is the absolute minimum time required, based on our experience. The actual time taken can vary considerably depending on the make-up of the groups and the experience of the facilitators. Sometimes a half day can be spent on just one tool, depending on the depth of the information and complexity of the topics discussed.

It is important to be aware, however, that spending a very long time on one particular tool can slow down progress: the conversation can go in circles, resulting in exhausted or confused participants.

The trade-off between the number of topics covered (quantity) and the depth of understanding (quality) should be discussed carefully within the team of facilitators at the preparation stage.

There should also be a list prioritising which tools are essential and which can be omitted if there is insufficient time. It is better to skip one tool in its entirety than to rush through the whole set in the quest for quick results.

Note: The numbering of the tools does not necessarily represent the chronological order in which they should be presented. They are listed here in a way that gradually builds up information.

Preparing the facilitators

The team leader should prepare the facilitators by 1) explaining the objectives and expected outcomes of the project and from each of the tools; 2) clarifying the roles of the facilitators and assigning them to groups; 3) practising the various tools; 4) providing a format for taking notes, encoding data and reporting results; and 5) providing a checklist of material that the facilitators should bring to their groups.

Facilitators should prepare themselves by 1) familiarising themselves with the tools, deciding on the order in which they will presented (see Table 5.1 below) and practising how they will be introduced (a facilitator can rephrase questions in a way that feels more natural for them); 2) checking they have brought all the materials on the checklist, including a notebook or prepared sheet for recording additional comments made during the discussions (separate note-taking will help to keep the group notes on the flip chart clear and will make it easier to write the final report). It is very important that the notes are clear and easily understood by others than the facilitator.

Focus on understanding and clarifying the key issues, for example, extreme weather events, their impact and current and potential adaptation strategies (see Chapter 4)

Based on the issues discussed, further questions can be raised in a subsequent household survey or during a scenario and land-use planning workshop. Farmers' perceptions of climatic changes and variability should be noted and reported at a subsequent feedback session.

Feedback sessions

After completing the focus-group discussions theinformation should be encoded and analysed. The main conclusions will then be reported back to the group participants for feedback and confirmation. This feedback session can integrate analysed results from household surveys and expert assessments with the locally collected information and data (such as local land-use plans and specific policies that concern your project's activities). Careful attention should be given to analyse key points.

1) Farmers' perceptions of changes in rainfall, temperature, sunlight and winds will be used deductively and inductively in combination with meteorological data. Deduction: what

conventional climate statistics reflect the changes perceived by farmers? Induction: where conventional climate statistics don't reflect perceived changes, can farmers' perceptions nonetheless inform the definition of a new indicator, analysed using meteorological data?

(2) Were common misperceptions encountered during the study, for example, when facilitators have asked the group about climate (exposure) and farmers have talked about years with crop failures (impact) that might be due to change of crops (sensitivity)?

(3) Types of coping and adaptation strategies: are there lessons to be shared between one village and another? Are responses generally reactive, bring a loss to the farm and do not avoid future damage (for example, replanting, early harvests) or proactive, relatively low cost that reduce the risks for future damage to that particular weather event (change variety, multistorey tree plantations, change planting density)?

Table 5.1. This table shows a step-by-step introduction to the tools, their key outputs, and the approximate time allocated for discussion of each tool

Step	Objective/Expected output	Tool	Output	Duration (min.)	Group
1	*Base map for land-use plan, resource map of agricultural production located in and near the villages*	*Tool 1a–c*	*Village map*	*45*	*Outdoors; 5 key informants only*
2	*Welcome, introductions*	-		*15*	*Plenary (all)*
3	*Main challenges to farming activities; the role of weather, and other factors*	*Tool 2*	*Problem tree*	*30*	*3 groups*
4a	*Temporal scale of village history and hazards*	*Tool 3*	*Village timeline*	*40–60*	*Group A + 50% of Group C*
4b	*Spatial scale of hazards, identifying risk zones for land-use plan*	*Tool 4*	*Hazard map (builds on village map (Tool 1))*	*60*	*Group B + 50% of Group C*
5	*Inventory of exposures; role of trees & crops for adaptation option*	*Tool 5* *Tool 10*	*Exposures* *Tree & crop-suitability ranking*	*10* *50*	*3 groups*
6	*Responses before, during and after hazards*	*Tool 8*	*Coping mechanisms (builds on exposure list (Tool 5))*	*30*	*3 groups*
7	*Identifying perceived risks and safety nets*	*Tool 9*	*Vulnerability and Support (builds on exposure list (Tool 5))*	*30*	*3 groups*
8	*Farming season for key crops and trees; shift in focus from extreme weather to climate change*	*Tool 6*	*Climate and farming calendar*	*40*	*Group 1: Crops* *Group 2: Trees*
9	*Perceptions of change; note 'local definitions' for meteorological analyses*	*Tool 7*	*Perceptions of climatic changes*	*50-60*	*3 groups*
10	*Summarize results; plenary discussions of key differences and similarities, next steps*	-	*Results posted on walls*	*60*	*Plenary*

Note: All the tools are covered in each of the three focus groups, except for the Village History and Hazards Timeline (Tool 3) and Village Hazards Map (Tool 4). These two tools can be used in larger groups because they are similar in format and there is usually only one village map to work with. Split the mixed group C so that the women of group C join the men-only group A, and the men of Group C join the women-only group B.

CHAPTER 6

Running a focus-group discussion

Opening the discussion

The facilitator's role is to encourage full and free participation in the discussion. It is important to support the group without interfering with the content of the discussion.

The facilitator welcomes the group and asks the participants to introduce themselves by name. The facilitator explains why the focus group is being held and outlines the main objectives.

Try to minimise discussion of climate changes, variability and extreme weather events at this early stage. It's important to avoid influencing the participants' answers and, particularly, the focus of the problem-tree analysis (see Tool 2).

If your project is a survey to find out if a development project is feasible in the area, you should be prepared for the possibility that weather and climate change are not the main challenge as far as farmers and local leaders are concerned; they will probably have other priorities.

> *In our case, we ensured a neutral introduction to the discussion by arranging meetings beforehand with local leaders to introduce the project's objectives, including climate-change adaptation, and to select villages. Then, at the group discussion, our introduction focussed on 'the role of trees' and 'how to better understand how farmers cope with challenges and changes in their environments'. Finally, the weather and climate-change adaptation objective was highlighted at the conclusion of the problem-tree exercise, when the challenges associated with weather variability had been confirmed. Although focus-group participants were likely to have been informed about the climate-change objectives via local leaders when they were invited to join the group, we wanted the discussions to be approached with an open mind.*

Participation is of course voluntary but group members should stay for the duration of the discussion.

Questions are presented to the whole group but each individual answer is considered to be equally important. Request all participants to respect each other's opinions.

The facilitator should finalise the list of participants at the first meeting and use this to confirm participation at subsequent meetings.

Confidentiality is important. Participants' names must not be revealed to outsiders or mentioned in any reports or other publications. The facilitator should ask permission to take pictures and, if permitted, whether the pictures can be used in publications. If somebody does not wish to be photographed, make sure team members know not to take pictures of them. If someone is photographed in error, delete these images immediately from the camera memory and any other storage devices to which they were copied.

The active participation of villagers is crucial. Without their input, the local government staff will not be able to improve their understanding of how farmers cope with climatic challenges nor what role trees and agroforestry systems play on farms in their area.

Conducting the discussion

The facilitators should make sure that they work through the tools with their respective groups in parallel so that there can be a short debriefing session, bringing all the groups together, after each tool has been discussed. This creates natural breaks between the discussions and helps to keep energy levels high. Debriefing sessions can also be useful for comparing unexpected results across the different groups.

Ask one of the participants (in advance) to summarise the discussions at the end of each session to recount the key points to the group.

Closing the discussion

When all the discussions are finished, the facilitator should briefly summarise the main outcomes of the day and explain what will happen next.

The team leader can then close the session by responding to the summary, again explaining how the information will be used and what will happen next.

CHAPTER 8

The village map

Prepare an appropriate map, or maps, depending on your starting situation. Choose from one or more of the tools below.

Tool 1a Hand-drawn map

Purpose **This tool is used when there are no maps of the village available or if you want to redraw an existing one in order to be better understand the village.**
The purpose of the Base Map tool is to produce a common point of reference for participants and the facilitator. For example, it can be used for pointing out the location of common natural hazards (see Tools 3 and 4). This map will form the basis for risk mapping, the participatory scenarios and land-use plans.

Output A village map showing boundaries with neighbouring villages, major roads, rivers, lakes, mountains, and fields with their local names and current land uses (agriculture, forestry, agroforestry), as well as other features important to the residents.

Prerequisites No prior knowledge needed of any other tool.

Materials Flipchart with A0 paper (or a whiteboard and pens; or sand and a stick); pencils, GPS.

Duration 60–90 minutes, depending on the size of the group and the village.
It is often necessary to redraw the map, so allow time for a quick draft plus a more detailed copy.

	Steps	Suggested commentary	Remarks
1	Mark **where you are** or some other common reference point (such as the village leader's house) with a movable marker (a stone, whiteboard pen or pencil). Mark a **north arrow** to fix orientation. Outline the **village boundaries** (with removable medium like pencil or sand) so that they all fit. Add the names of neighbouring villages.	'We are going to draw a village map so we all know where everything is and who is doing what. Let's start with the boundaries of the village. If this stone is the house where we are now, where do we need to put the stone so that the entire village fits on this paper?' Let's decide which direction is north.	Try to accurately position the **north arrow** on the map. Take a GPS position of one common reference point.
2	Add other fixed lines and points such as major **roads**, **watercourses** (rivers, lakes, irrigation; draw an arrow to show the direction of the water flow), **mountains, houses**.	'Where is the road from town X to town Y?' 'Where does the river start from?'	

3	Draw lines around field boundaries and mark current land uses: forests, fallow fields, maize fields, paddy fields, industrial land uses, or mining. Name the fields so that it is easier to refer to them in later discussions about land-use planning and during the household survey.	'What do you call this field, does it have a local name?' 'What do you grow in field X now?'	Does anyone in the group cultivate fields in other villages? Are any of the fields on the map cultivated by people from other villages?
4	Afterwards, if Google Earth or Google Maps have a map of the village with an acceptable resolution you can download the image. You can add the detailed information directly to the Google map or save a Google Earth image of the village and add layers in MS PowerPoint or illustration software.		

Notes

To save time, the village map can be drawn with just a few people before the main meeting. We have found that a group of 3–4 people is the most efficient size. It is important to include people who have been to most places in the village and the neighbouring villages, who might have recently worked with cadastral officers doing land allocation and mapping activities, are leaders or members of community organisations and/or village elders.

The map can be re-used when adding the natural hazard risk zones.

Maps drawn in sand are easy to change and they allow larger groups of people to participate in drawing them. However, the lines may be difficult to see (and photograph),people may accidentally step on them and they will disappear with rain. Whiteboards are a better option, if they are available.

Once the maps are drawn on either sand or whiteboard the information has to be transferred to paper.

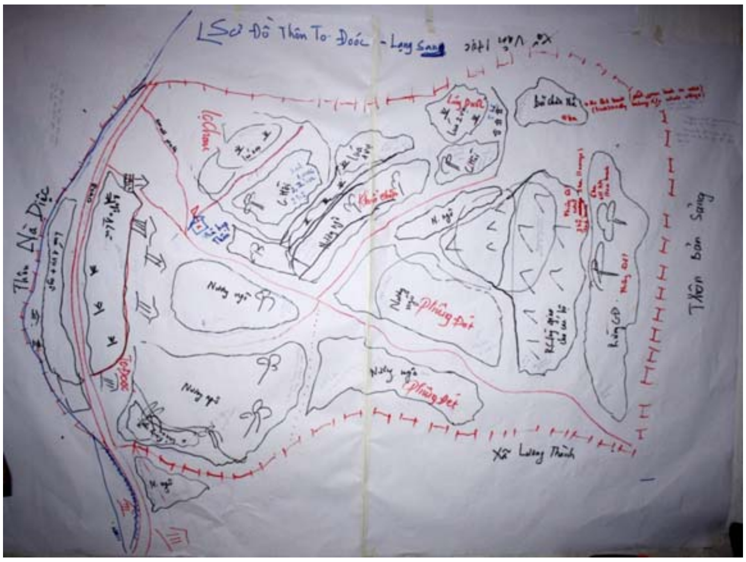


Figure 8.1: Example of a village map on paper

Note: Village boundaries, neighbouring villages, roads, river, houses, names of fields and land uses are all marked on the map. Important notes are also written on it.

Tool 1b Paper land-use map (redrawn, based on other paper maps)

Purpose Used when existing village maps can be redrawn or copied (enlarged) to an A0 format. The purpose of the tool is to create a common point of reference for the participants and facilitator when identifying the location of natural hazards (Tools 3 and 4). This map will form the basis for mapping risks, the participatory scenarios and land-use plans.

Output A village map on paper showing boundaries with neighbouring villages, major roads, rivers, lakes, mountains, and fields with their local names and current land uses (agri culture, forestry, agroforestry), as well as other features important to the residents.

Prerequisites A paper copy of a previously made village map.

Materials Paper copy of village map reprinted in A0 format; flipchart A0 paper; pencils; pens, GPS.

Duration 30–45 minutes.

	Steps	Suggested commentary	Remarks
1	Mark **a common reference point** and **north arrow**. Outline the **village boundaries** and write names of neighbouring villages.	'This is the road from X to Y; where are we now?'	Try to accurately position the **north arrow** on the map. Take the GPS position of a reference point.
2	Confirm fixed lines and points such as major **roads**, **watercourses** (rivers, lakes, irrigation; draw an arrow to show the direction of the water flow), **mountains, houses**.	'Where does the river start?'	Look for land uses upstream that could affect the flow of water. Ensure that the map reflects actual boundaries and entities.
3	Draw lines around field boundaries and mark current land uses: forests, fallow fields, maize fields, paddy fields, industrial land uses, or mining. Name the fields so that it is easier to refer to them in later discussions about land-use planning and during the household survey.	'What do you call this field; does it have a local name?' 'What do you grow in field X now?'	Does anyone in the group cultivate fields in other villages? Are any of the fields on the map cultivated by people from other villages?
4	Afterwards, upload a photograph of the basic village map and use MS PowerPoint or illustration software to add the new layers of detail.		

Notes

To save time, the village map can be drawn with just a few people before the main meeting. We have found that a group of 3–4 people is the most efficient size. It is important to include people who have been to most places in the village and the neighbouring villages, who might have recently worked with cadastral officers doing land allocation and mapping activities, are leaders or members of community organisations and/or village elders.

The map can be re-used when adding the natural hazard risk zones.

CHAPTER 9

Problem tree of factors that limit farming and livelihoods

Tool 2 Problem tree

Purpose To understand the impact of climate, weather and other stresses on farmers' livelihoods.

Output A 'problem tree' or flowchart (the stages of its development are shown in figures 9.1, 9.2 and 9.3, below), which presents as causes and effects the factors that limit farmers' livelihoods. This helps to put weather and climatic impacts into a clear visual format.

Prerequisites No prior knowledge needed of any other tool.

Materials Sticky note paper; at least two sheets of A0 flipchart paper; pens.

Duration 30–60 minutes.

	Steps	Suggested commentary	Remarks
1	Start the discussion. Participants (or the facilitator) writes the limiting factors on the sticky notes and puts them on the flipchart.	What are the main factors that limit a good harvest in this village [NOTE: *not* individual farms]?	Encourage participants to write in full sentences rather than just noting a problem. Push them to explain the details. Note the difference between: 'low prices' and 'prices of cassava are low because the quality of tubers is so poor that they can only be used for animal feed'. The latter gives far more information.
2	When the list is exhausted, the facilitator should **cluster** the factors according to cause (weather, health, physical access and market, information and knowledge, agricultural inputs such as fertilizer etc). Next, do a **problem-tree analysis**, identifying the root (direct) causes and chain (indirect) causes of the problems.	Are there links between climate and weather and any of the clusters? Ask specific questions: 'Are the brown leaf-rollers more common during or after certain types of weather?' 'If so, what causes this?' If participants say, 'Prices are low or fluctuating', ask them exactly which prices they mean: are they prices achieved from buying or selling in markets, by contract or through middlemen? To determine root causes, ask them to clarify at what stage in the marketing process the prices changed.*	See the example flowchart below. Clustering the factors helps participants see causal connections. For example, 1) cold spells kill livestock; 2) humid summers increase pests, which results in 3) difficulties selling the blighted produce. In other cases, causes and effects may be less obvious. For example, is there a link between 1) droughts and poor irrigation facilities (technical equipment); and 2) poor harvests that; 3) are difficult to sell?
3	After the list of limiting factors is complete: a) ask each participant to rank the top 3 factors that making farming difficult for them; or b) do 'pairwise ranking' (see righthand column), for comparing two variables.		'Pairwise ranking' is a useful quantitative method but it is time consuming if there are several variables to consider. It is done by ranking all the variables in pairs and finding which variable most often is top of the ranking. The results of a pairwise ranking (alternative b) may

Notes

Remind participants that they represent the entire village rather than just their individual households. So they should concentrate on factors affecting the entire village. Don't delete contradictory answers but, rather, try to discover the details of the differing positions. Are answers influenced by the participants' own experiences relating to particular crops or locations in the village? Or are they genuinely village-wide perspectives? The facilitator should ask these types of questions while helping the group find connections between the various factors they have written on the notes.

Moving the notes about when making the problem tree can help participants to visualise the causal connections between different issues that have an impact on their livelihoods. Ranking can be done by each participant selecting their personal, top-three limiting factors then calculating the average for the group. Sometimes, it is useful to use beans or other freely available material: participants put three beans to represent the most limiting factor ('the worst'); two beans for something slightly less limiting; and one bean for the least limiting of the three. The factor with the most beans is the top ranked. Alternatively, the ranking can simply be done with pen and paper.

* If prices fluctuate a lot during throughout the production cycle this may need to be clarified using a separate timeline tool that can be used either simultaneously or after a full household survey (with more household economic information) has been done. The price timeline can be done similarly to the farming calendar with months on the x-axis and price per kg on the y-axis and factors affecting the price.

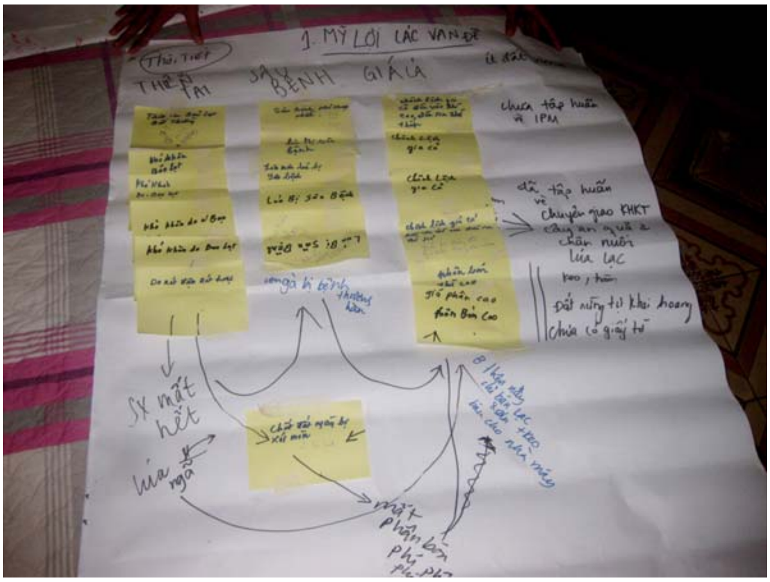


Figure 9.1: Working model of a problem tree that shows the factors that limit agriculture in a village

Note: The limiting factors are written on sticky notes clustered under headings. The arrows show the directional flow of causes and effects. The data can be refined and reanalysed later (see below).

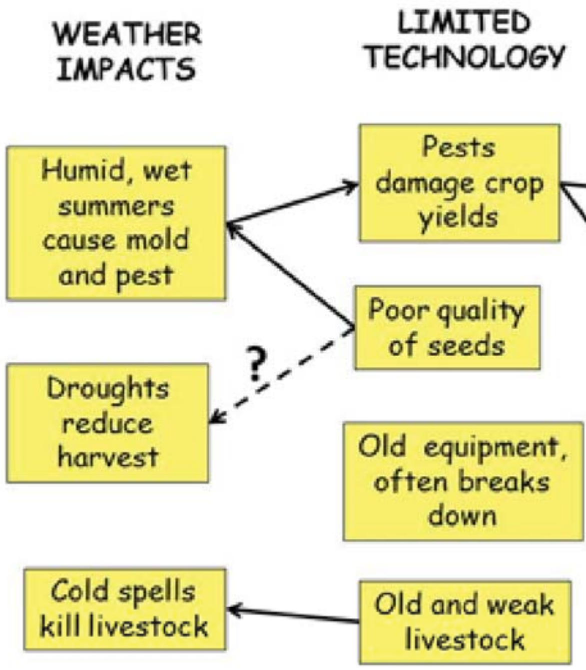


Figure 9.2: Simplified model of the problem tree with challenges (yellow boxes) regrouped into three main clusters.

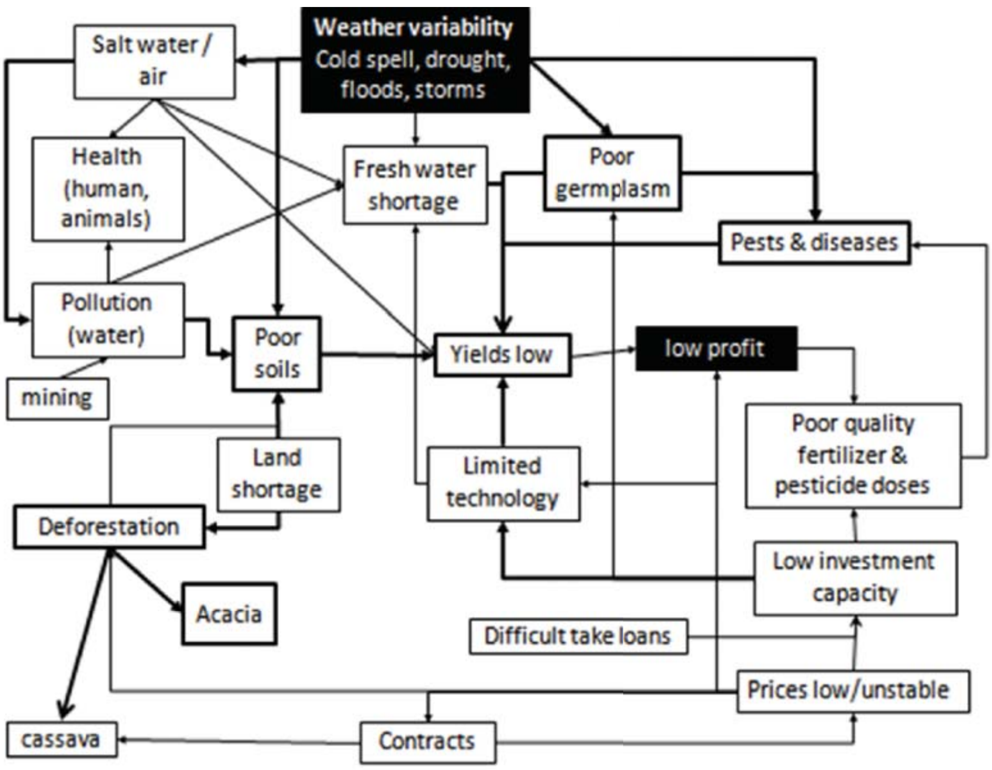


Figure 9.3: A refined problem tree showing limiting factors, identified in group discussions, and the connections between them