Negotiation-support toolkit for learning landscapes

Editors
MEINE VAN NOORDWIJK
BETHA LUSIANA
BERIA LEIMONA
SONYA DEWI
DIAH WULANDARI

WORLD AGROFORESTRY CENTRE
Southeast Asia Regional Program

Dewi S, Martini E and Janudianto. 2013. Tree and farming system resilience to climate change and market fluctuations (Treesilience). *In:* van Noordwijk M, Lusiana B, Leimona B, Dewi S, Wulandari D (eds). *Negotiation-support toolkit for learning landscapes*. Bogor, Indonesia. World Agroforestry Centre (ICRAF) Southeast Asia Regional Program. P.83-89.

12 | Tree and farming system resilience to climate change and market fluctuations (Treesilience)

Sonya Dewi, Endri Martini and Janudianto

Two of the biggest external sources of uncertainties in farmers' livelihoods are 1) impacts of changes in the mean and fluctuations of annual rainfall and shifts in seasons; and 2) market fluctuations of agricultural products. Tree and Farming System Resilience to Climate Change and Market Fluctuations (Treesilience)[1] uses focus-group discussions to encourage farmers to 1) identify the fluctuations that cause shocks to their livelihoods in a guided process thinking though the shocks-exposure-responses-capacity chain; 2) reveal the impacts of the shocks to their farming systems; 3) characterize the impacts of the shocks on dominant tree species; and 4) semi-quantitatively assess the price fluctuations of dominant tree products.

Introduction

Global warming does not only alter the mean annual rainfall but also the fluctuations and seasons, which have major impact on ecological processes; hazards such as floods, landslides, fire, erosion and sedimentation; and the productivity of trees and annual crops. Apart from low and fluctuating productivity per unit areas of land managed by farmers in developing countries and fluctuations owing to climate-related uncertainties, market uncertainties are huge in developing countries for tree and agricultural products. A basic pattern of boom followed by bust is repeated, with sudden increases in process owing to disasters (drought, civil war, frost) elsewhere.

These two issues have a huge influence on farmers' incomes but since conceptually they are not easily grasped, addressing the problems is not easy. Most farmers are unaware of the roots of the problems, what impacts the shocks can bring, how to respond, what capacities are needed and which are available.

A preventive, long-term strategy—rather than a survival strategy after a shock—is most cost effective. The majority of aid, however, addresses the latter, while strengthening capacity to increase resilience and the adaptive capacity of farmers in shock-prone, poor areas is crucial. Such aid is effective in helping in emergencies immediately after incidence of a big shock but accumulative impacts of smaller shocks become a latent problem that is left unaddressed. Further, the sustainability of such aid usually is not considered.

[1] The term Treesilience was first coined by Mary Njenga, Jan de Leeuw, Miyuki Iiyama, Jeremias Mowo and, Ramni Jamnadass: http://worldagroforestry.org/sites/default/files/Need%20to%20Build%20Resilience%20ICRAF%20Seminar%2015%20November%202013.pdf

Awareness of shocks-exposure-responses-capacities are necessary as part of local knowledge to address uncertainties. Further, it is imperative for the farmers to have strengthened capacities in 1) identifying resilience of tree and farming systems to climate-related factors; 2) resilience of tree products to market fluctuations.

Objectives

- Identify fluctuations in 1) climate-related factors that have an impact on tree and agricultural products; 2) price and other factors that have an impact on the production system and marketing
- Reveal the impacts of shocks to farming systems
- Characterize the impacts of shocks on dominant tree species
- Semi-quantitatively assess price fluctuations of dominant tree products
- Guide the thinking process through the shocks-exposure-responses-capacities chain to identify gaps in capacities in order to increase farmers' resilience

Steps

Before the focus-group discussion, facilitators are recommended to:

- collect rainfall data for the past 10 years and identify any anomalies, for example, droughts, extreme humidity, high fluctuations;
- discuss with key informants in the village the climate- and market-related factors and others that create shocks to tree and agricultural products and to farmers' livelihoods;
- identify any unusual events stimulated by external factors that might have an impact on the majority of farmers in the village; and
- discuss with key informants the distinct characteristics of farmers in the village that possibly causes different levels of vulnerabilities, different responses to shocks etc and use this to decide ways to organize the focus-group discussions, for example, by gender or place of origin.

The focus-group discussion is divided into six steps. Steps 3 and 6 have been modified from Quan et al (2012).

1. List and rank, based on the perceived importance, the dominant farming systems and the most common tree species that are managed by farmers in the area.
2. Identify the years of shocks during the past 15 years, describe the causes and the impact, ranked from the most severe to the least. Choose the first three highest ranked and label those years with the type of shocks, for example, '2002: extremely wet year; 2007: long drought'. Choose the most recent year that is considered to be a normal year and use this as the base year.
3. For each of the three years of shocks, guide the causal thinking process of shocks-exposure-responses-capacity and the identification of necessary capacities to act in response to the shocks and the impacts of shocks, in real time and for the long term (Figure 12.1). Starting with identified shocks, invite participants to nominate the causes, followed by what they are exposed to as impact. List the immediate responses that they had during that year of shock, and the long-term responses to reduce exposure in the future (increased resilience), both those that have been done already or are perceived to be important to do. Lastly, list perceptions of the necessary actions. The findings can help government and aid agencies develop an adaptation program.

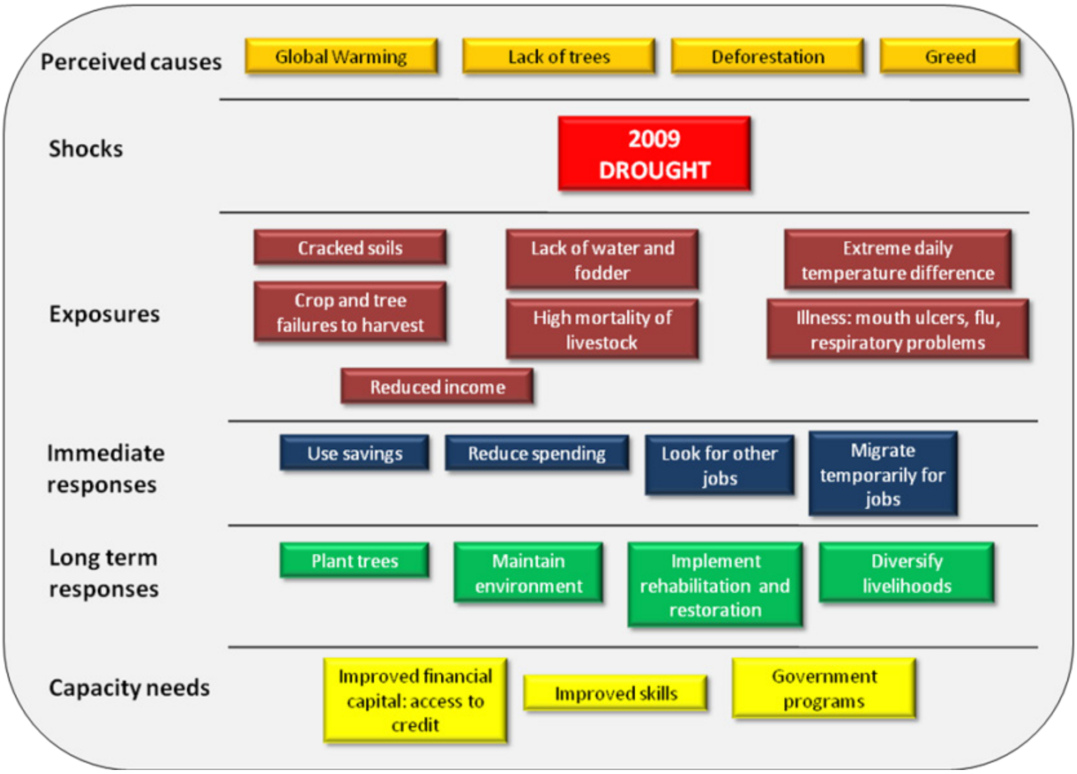

Figure 12.1. Example of a result from a guided thinking process for identifying shock-exposure-responses-capacities in one village in Sulawesi

4. Establish relative monthly rainfall calendar for the base year and the activities for each dominant farming and tree management system. Develop similar calendars for the three years of shocks (Table 12.1). Compare the activity calendars across the multiple years to identify farming systems and commodities affected by each shock and how farmers alter their labour allocation accordingly.

Table 12.1. Example of results from an activity calendar during the base year in a male group in a village in Sulawesi

Farming system	Com-modity		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual productiv-ity per ha
Annual crop	Maize	Planting													2–2.5 tons
		Managing													
		Harvesting													
	Ground nuts	Planting													1 ton
		Managing													
		Harvesting													
Agro-forestry	Fruit–maize–yam	Planting													30 trees (approxi-mately 1 ton)
		Managing													
		Harvesting													
Mono-culture tree crop	Cashew	Planting													50 trees (approxi-mately 0.3 ton)
		Managing													
		Harvesting													
	Teak	Planting													Harvest only in 20–30 years
		Managing													
		Harvesting													
Other activities															
Max. rainfall															
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	

5. Based on the list produced in Step 1, select 5–10 dominant tree species. Record the prices, price fluctuation within certain period of time, and within certain radius of areas, for example, the minimum and maximum price per unit during the past two years within the surrounding villages.
6. Copy the list of the 5–10 dominant tree species from Step 5. Discuss and fill for each tree species, the impact of droughts, extreme rainfall, pests and diseases, shift in seasons, fires, strong wind, lack of fertilizer, lack of management such as pruning, and other climate-related factors that frequently occur, and have an impact on trees and tree products in the area. The impacts are further differentiated between young trees and mature, producing trees, in terms of mortality rate, growth and productivity.

Table 12.2. Example from subset of results of Step 6 from Sulawesi

Tree species	Annual production per ha during base year	Extreme rainfall					Drought				
		Effects on young plants	Score	Effect on mature plants	Score	Effect on productivity (% from base year)	Effects on young plants	Score	Effect on mature plants	Score	Effect on productivity (% from base year)
Cashew	100 kg/tree	Good	3	Fruits are damaged	3	10	Do not grow well	3	Fruits are of bad quality	3	85
Clove	100–200 litres	Good	3	Flowers fall	3	60	Mortality is high	5	Leave fall	3	70
Cocoa	500 kg	Good	2	Fruits are damaged due to pests and diseases	5	60	Leaf disease, mortality is high	5	Leaf fall	5	50
Langsat	150 kg/tree	Good	1	Some do not produce fruit	3	50	Mortality is high	3	Do not produce fruit	3	60
Candle nut	100 kg/tree	Good	1	Flowers fall	2	70	Good	1	Low productivity	3	25
Durian	100/tree	Died		Productivity decrease		60	Leaves fall	1	Low productivity	1	75
Rambutan	4200 kg/tree	Good		Fruits fall	3	50			Flowers fall	3	75

Example of application

The full range application of the tool has just been successfully conducted in 10 clusters of 40 villages in South and Southeast Sulawesi provinces, Indonesia. Figure 12.2 shows one result, drawn from the information collected in steps 5 and 6. Resilience of tree species to fluctuations in climate-related factors are calculated from the effect of extreme rainfall (either low or high) on productivity. The less productivity of one particular tree species is affected by extreme weather, the more resilient that tree species is. This applies similarly for resilience to fluctuations in price. Four main types of tree species were identified. In Sulawesi, Type 1 tree species (low resilience to climate-related factors, high resilience to price fluctuations) are dominated by export commodities such as cloves and cocoa. The results can further be used to help identifying the intervention or support that can be provided in increasing the resilience of particular tree species to fluctuations in climate-related factors and/or in price and therefore increasing farmers' resilience to both types of fluctuations that are specific to tree species.

Application of steps 3 and 6 in Viet Nam, which were adapted for Treesilence, can be found in Quan et al (2012).

Figure 12.2. Example of findings derived from information collected in steps 5 and 6

Key references

Hoang MH, Namirembe S, van Noordwijk M, Catacutan D, Öborn I, Perez-Teran AS, Nguyen HQ, Dumas-Johansen MK [in press] Farmer portfolios, strategic diversity management and climate change adaptation : implications for policy in Viet Nam and Kenya. *Climate and Development*. DOI: 10.1080/17565529.2013.857588.

Nguyen Q, Hoang MH, Öborn I, van Noordwijk M, 2013. Multipurpose agroforestry as a climate change adaptation option for farmers: an example of local adaptation in Vietnam. *Climatic Change* 117:241–257.

The talking toolkit: how smallholding farmers and local governments can together adapt to climate change

Elisabeth Simelton, Dam Viet Bach, Rodel Lasco and Robert Finlayson

Download: http://worldagroforestrycentre.org/regions/southeast_asia/vietnam/products/tools/talking-toolkit.

The landscape scale is a meeting point for bottom–up local initiatives to secure and improve livelihoods from agriculture, agroforestry and forest management, and top–down concerns and incentives related to planetary boundaries to human resource use.

Sustainable development goals require a substantial change of direction from the past when economic growth was usually accompanied by environmental degradation, with the increase of atmospheric greenhouse gasses as a symptom, but also as an issue that needs to be managed as such.

In landscapes around the world, active learning takes place with experiments that involve changes in technology, farming systems, value chains, livelihoods' strategies and institutions. An overarching hypothesis that is being tested is:

> Investment in institutionalising rewards for the environmental services that are provided by multifunctional landscapes with trees is a cost-effective and fair way to reduce vulnerability of rural livelihoods to climate change and to avoid larger costs of specific 'adaptation' while enhancing carbon stocks in the landscape.

Such changes can't come overnight. A complex process of negotiations among stakeholders is usually needed. The divergence of knowledge and claims to knowledge is a major hurdle in the negotiation process.

The collection of tools—methods, approaches and computer models—presented here was shaped by over a decade of involvement in supporting such negotiations in landscapes where a lot is at stake. The tools are meant to support further learning and effectively sharing experience towards smarter landscape management.

World Agroforestry Centre
ASB Partnership for the Tropical Forest Margins
AARD
Federal Ministry for Economic Cooperation and Development
Norad
IFAD
Enabling poor rural people to overcome poverty
CGIAR
Research Program on Forests, Trees, and Agroforestry