

# Assessing Climate Risks and Vulnerabilities in Market Systems An Example of Mainstreaming CC/DRM in the Coffee sector in Nepal

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**Mainstreaming CC, E &  
DRR - How to walk the  
talk?**

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# Rationale (Learning Journey)



*Climate change is the greatest and widest-ranging market failure ever seen, as in most markets, the effect of this market dysfunction falls most on those least able to take action to escape its consequences (Stern Report).*

- **Secure development gains** in market system projects.
- **Loss in yields** due to climate variability/change.
- **First experience:** risk and vulnerability assessments in MSD projects (Armenia, Georgia and Honduras).
- **Growing interest** for addressing climate risks and vulnerabilities in market systems in a **systematic way including all steps within a market system** (value chain).



# The Guideline for Mainstreaming CC/DRM in Market Systems (i)



## Key Features

- **Demand-driven:** Guideline based on first hands-on experience in ongoing market system projects.
- **Joint-effort:** Experts at the Advisory Service Department and the country programme of Nepal.
- **Not a new tool, builds on existing approaches:** Support practitioners bringing the two approaches – MS and CC – together.
- **Flexible:** Allows practitioners to apply and adjust the Guideline to their local context and needs.



### Guideline - Assessing Climate Risks and Vulnerabilities in Market Systems

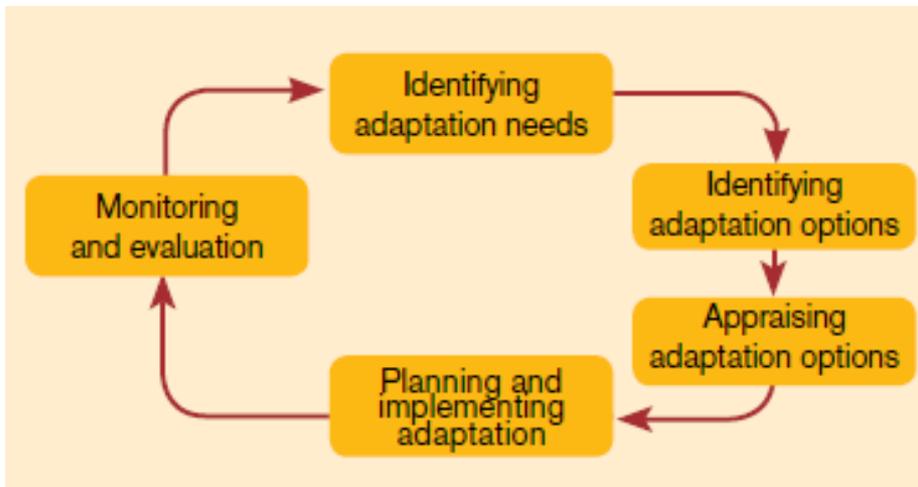


Kathmandu and Zurich  
Version 1, May 2017

# Methodology: Two approaches



## Adaptation to climate change



### Tools for risk assessments

**CRiSTAL** (Community-based Risk Screening Tool, Adaptation & Livelihoods)

**CEDRIG** (Climate, Environment and Disaster Risk Reduction Integration Guideline)

**PROVIA'** Guideline on Assessing Vulnerability, Impacts and Adaptation

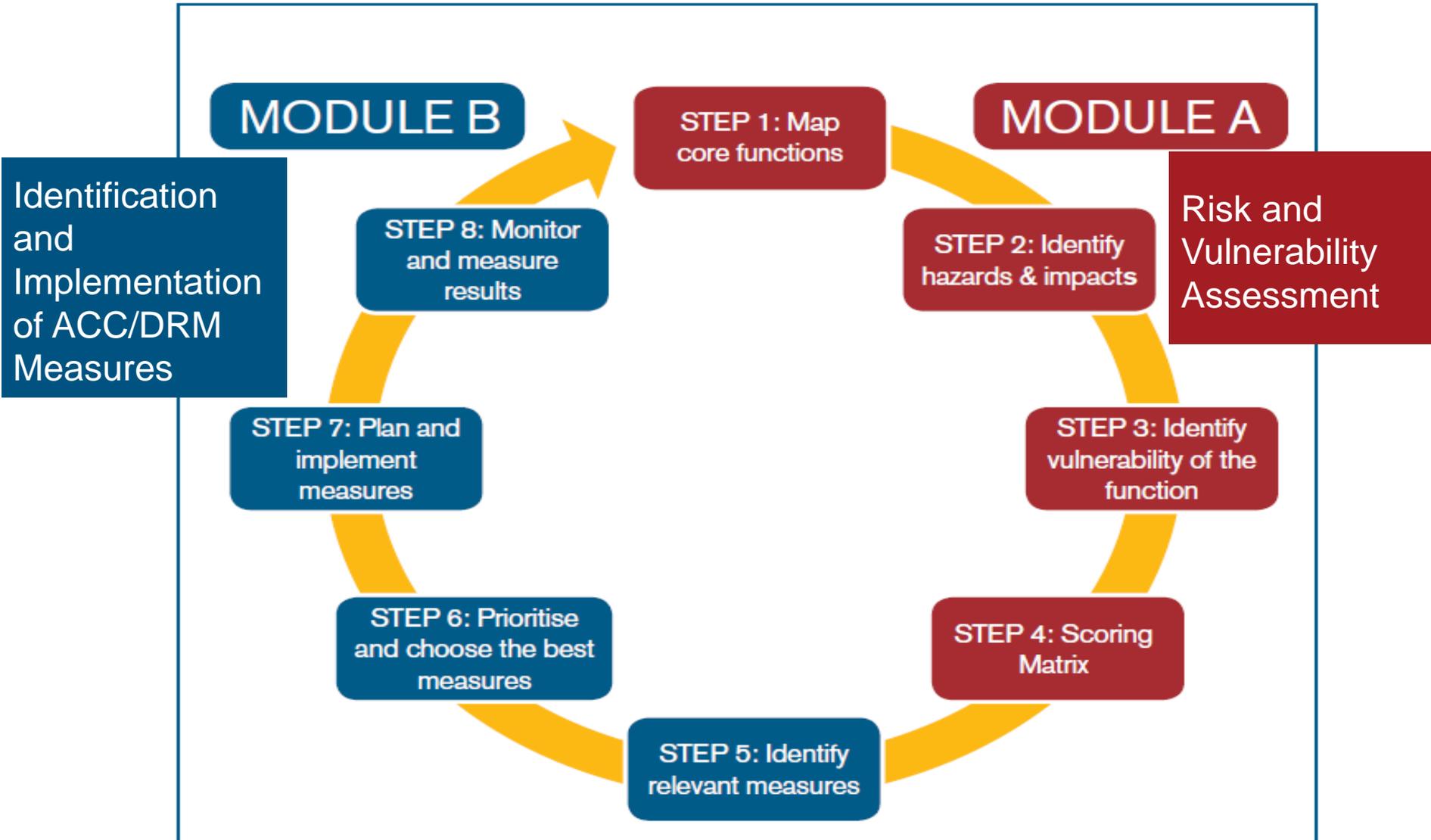
**Participatory Appraisal Tools**

## Market systems development project cycle



The Operational Guide for the Making Markets Work for the Poor Approach (The Springfield Centre, 2015)

# 8-Step Approach



# Relevance and Target Audience



**Overall objective:** To identify the most **climate resilient sub-sectors** in a given context and to **determine the potential impacts and relevant measures** in the field of ACC and DRM to further increase resilience in the market system.

## Application (not exclusive)

- Actors identify the **best options for the selection of the most resilient** sub-sectors.
- Actors **adapt their involvement** in a market system based on climate risk resilience.
- Actors **determine options** to make a sub-sector more climate resilient.
- Actors **understand the impacts** of climate change on natural resource based sub-sectors in the short (1 to 5 years) and mid-term (6-15 years).

The Guideline shall **help businesses** (private and public) in:

- **better understanding climate risks and opportunities in their sub-sector;**
- identifying where **emerging market opportunities** exist; and
- **developing** a comprehensive **Climate Risk Management Approach** (part of the enterprise).

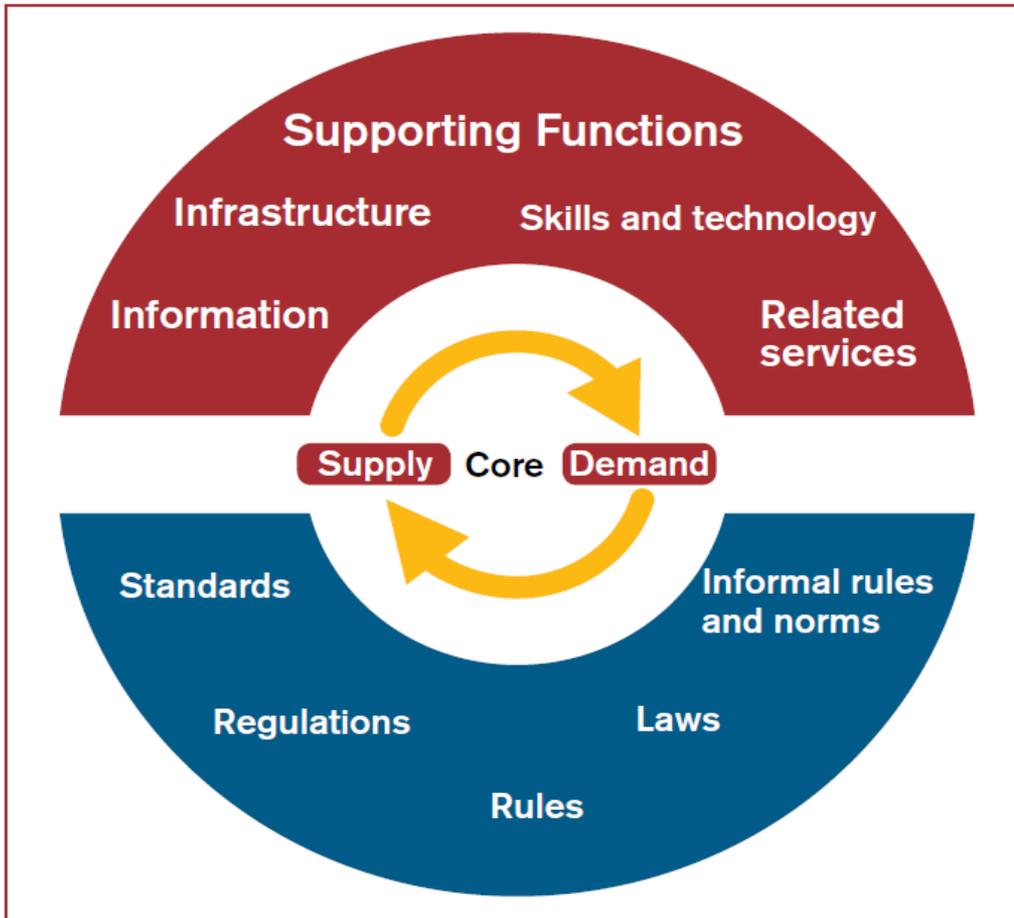
# Mainstreaming CC/DRM in the coffee sector in Nepal

## Module A

Risk and Vulnerability  
Assessment in  
Subsectors and their  
Prioritization



# STEP 1: Map core functions, support functions and roles/regulations in the selected market system



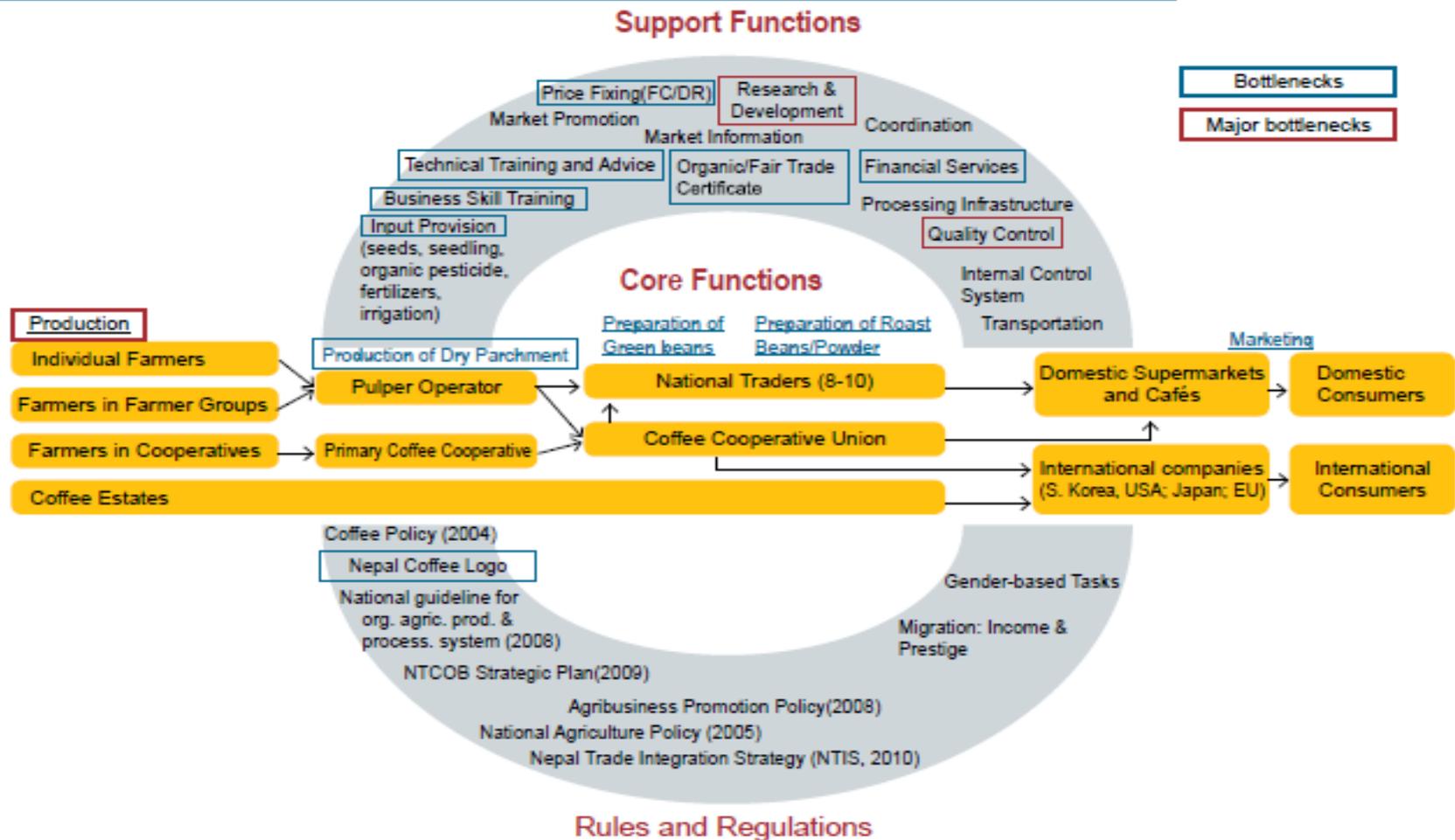
## Objective

- To map and understand the relevant functions in a market system.
- To understand how the system is working.

# STEP 1: Coffee sector map in Nepal



## Coffee Sector Map in Nepal



## STEP 2: Identify current and potential future hazards, impacts and current coping strategies



**Objective:** To identify current and future **hazards, impacts** and current **coping strategies** jointly with the producers and the communities.

STEP 2 consists of different activities:

- 2a) Identification of current and future hazards including its prioritization
- 2b) Detailed climate risk analysis
- 2c) Hazard and crop seasonal calendar



A particular hazard might not yet have negative impacts today and is assessed as 'irrelevant', but can have significant impacts in the future.

# Step 2: Identify current and potential future hazards, impacts and current coping strategies



## 2a) Identification of current and future hazards including its prioritization

Hazard Type	Hazard Sub Type	Specific Hazard	Prioritisation						
			Facilitator	Group 1	Group 2	Group 3			
Natural	Meteorological	Changing temperature							
		Changing humidity							
		Tropical	Tropical storm		0				
			Extra-tropical storm		0				
			E	Derecho		0			
				Hail			2	1	1
				Lightning/thunderstorm			1	1	1
		C	Winter storm/blizzard		0				
			Storm surge		0				
			Wind			1	1	1	
			Extreme Temperature	Cold wave			1	1	1
				Heat Wave			1c/2p	1	1
		Severe winter conditions		Snow/ice		0			
			Frost/freeze			2	3	1	
		Fog							
	Hydrological	Flood	Coastal flood		0				
			Riverine flood			1	1	1	
			Flash flood			1	1	1	

**Priorization of the hazards with the highest score**

# Step 2: Identify current and potential future hazards, impacts and current coping strategies



## 2b) Detailed climate risk analysis

Hazards	Intensity <sup>1</sup>	Frequency <sup>2</sup>	Observed Trends <sup>3</sup>	Future Trends <sup>4</sup> Possible Evolution Under Climate Change	Impacts	Severity <sup>5</sup> (expressed in % and indicating which part of the market system is affected)	Current Coping Strategies	Is the strategy sustainable? If not, why?
Increasing temperature	Maximum temperature increasing at 0.05° C/year (1976-2005); minimum temperature at 0.03° C / year).		Coffee farmers observed increasing temperature since their childhood; based on data analyses a general increasing trend in temperature has been found; farmers in many areas observed increasing temperatures based on observations of plants and animals	Average annual temperature will increase by 1.7°C to 2.6°C by the year 2050; higher increments in Western and Central Nepal than in Eastern Nepal	Higher humidity, coffee less suitable in lower areas/ more suitable in higher areas ( altitude shift); requires change in management	100%; particularly in lower lying areas (about 25%) (below 1 000 meters)	<ul style="list-style-type: none"> <li>Provision of shade with shade plants and their proper management</li> <li>Mulching/ moisture management practices</li> <li>Proper plantation planning (slope, orientation, elevation)</li> </ul>	Yes
Changes in precipitation (decrease and drought)	Increased precipitation in most of the country (except Western development Region)		Coffee farmers observed decreasing precipitation since their childhood; Eastern, central, western and far western regions showed an increasing trend in annual precipitation while most of the Mid Western Development Region observed a decreasing annual precipitation trend;	Annual precipitation will increase by 4% to 8% (up to 1 20 mm more per year) by the year 2050; increase in monsoon and post-monsoon precipitation and decrease in winter precipitation	Loss in production; increased occurrence of insect pests	100%; particularly south facing slopes; earlier and more affected	<ul style="list-style-type: none"> <li>Provision of shade with proper species of shade plants and their proper management</li> <li>Irrigation/ moisture management practices e.g. cradle pits</li> <li>Water harvesting</li> <li>Mulching</li> <li>Discourage</li> </ul>	Yes

## Step 2: Identify current and potential future hazards, impacts and current coping strategies



### 2c) Hazard and crop seasonal calendar

#### Explanation

x = "normal"

xx= very strong

Results STEP 2c (Table 3): Comparison of Hazard and Crop Calendars

Hazard	J	F	M	A	M	J	J	A	S	O	N	D
	Local Calendar											
	P	M	F	C	B	J	A	S	B	A	K	M
Precipitation – High amounts				X	X	X	XX	X	X	X		
Precipitation – Low amounts	XX	XX	X								X	XX
Temperature - High				X	XX	XX	X	X	X			
Temperature - Low	XX	X										XX
Insect infestation				X	XX				X	XX		
Fungal diseases			X	X			X	X				
Crop	J	F	M	A	M	J	J	A	S	O	N	D
	Local Calendar											
	P	M	F	C	B	J	A	S	B	A	K	M
Seeding in nursery		X	X									
Planting of seedlings						X	X					
Harvesting	X	X	X									X
Pulping	X	X	X									X
Hulling			X	X	X							

Source: Results, HELVETAS Swiss Intercooperation (2016)

## STEP 3: Identify each function's vulnerability to climate risks



Climate Risk Relevant Market Functions (see STEP 1)		Relevant Climate Risk (hazard) (see STEP 2)	Remarks on Impact
Core			
Support			
Rules/ Regulations			

**Objective:** To understand the potential impact of anticipated climate risk on a market system.

→ Each function will be evaluated on its vulnerability to climate risks (merge of Step 1 and 2).

# STEP 3: Example Coffee



Climate Risk Relevant Market Functions (see STEP 1)		Relevant Climate Risk (hazard) (see STEP 2)	Remarks on Impacts
Core	Production	Increased temperature; decreased precipitation and drought; increased humidity; fungal diseases; insect infestation	Reduced yield per plant; increased mortality of plants; lower quality of fresh cherries  Shift in production area: shifting altitudinal belt; overall expected reduction in production area
	Pulping	Increased temperature; increased humidity; fungal diseases; insect infestation	Changed processing management
	Storage	Increased temperature; increased humidity; fungal diseases	Increased chances of fungal diseases (mould)
Support	Seedling production	Increased temperature; decreased precipitation and drought; increased humidity; fungal diseases; insect infestation	Increased mortality of seedlings
Rules/ Regulations	-	-	-

## STEP 4: Identify most climate resilient value chains based on a scoring matrix



The scoring matrix gives you clarity

- which sub-sectors are most sound both from an **economic** and a **climate perspective**.
- on the **different impacts** each subsector has on poverty reduction, economic outcomes, achieving systemic change.

### Categories

- Poverty Reduction Potential
- Economic growth potential
- Potential to facilitate systemic change
- Climate change

### Objective:

To identify the most climate resilient sub-sectors → **Scoring Matrix**

**A set of criteria per category**

# STEP 4: Example Coffee



Category	Criteria	Weighting	Sub-Sectors		Remarks
			Coffee	Banana	
Poverty Reduction Potential	Number of households engaged in the sector		1	2	Commercial farmers only
	Severity of poverty facing those engaged in the sector		2	1	Short production cycle enables poor people to produce on leased land
	Potential for participation of women in the sector		1	2	Banana is more labour intensive
	Potential for participation of youth in the sector		2	1	Due to short production cycle banana is more investment friendly
	Possibility for the target group to improve income / access to jobs		2	1	
Climate change	Investment horizon: by when are the climate impacts expected to be felt? By when should the risk reduction or adaptation investments be made? How long are the benefits expected to last?		2	1	Banana provides return after 15 months while coffee returns take 4-5 years
	Flexibility: Is the option flexible ? (does it allow for switching to other options that might be preferable in the future once more is known about the changing climate)		2	1	
Further considerations					
<b>TOTALS</b>			<b>29</b>	<b>27</b>	

# Module B

Identification and implementation of adaptation and disaster risk management measures



# STEP 5: Identify possible ACC and DRM



Climate risk relevant market functions (see Step 1)		Relevant climate risks (see Step 2)	Remarks on impacts	ACC and DRM measures
Core	<i>Transferred from Step 3</i>			•
				•
				•
Support				•
Rules/ Regulations				

**Objective:** To identify all options for adapting to climate change and for DRM

# STEP 5: Example Coffee



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Climate Risk Relevant Market Functions (see STEP 1)		Relevant Climate Risks (see STEP 2)	Remarks on Impacts	Adaptation to Climate Change and Disaster Risk Management Measures
Core	Production	Increased temperature; decreased precipitation and drought; increased humidity; fungal diseases; insect infestation	Reduced yield per plant; increased mortality of plants; lower quality of fresh cherries  Shift in production area: shifting altitudinal belt; overall expected reduction in production area	<ul style="list-style-type: none"> <li>Varietal selection and research</li> <li>Intercropping</li> <li>Proper shade tree management/shade tree plantation</li> <li>Moisture management/ rain water harvesting</li> <li>Altitude shift (above 1000 meters)</li> </ul>
	Pulping	Increased temperature; increased humidity; fungal diseases	Changed processing management; decreased fermentation duration, Increased chances of fungal diseases (mould)	<ul style="list-style-type: none"> <li>Improved pulping facilities such as clean water for washing</li> <li>Improve drying system with clean drying yard: drying table</li> <li>Appropriate storage facility (i.e. well ventilated room, prevent dampness and odour)</li> </ul>
	Storage	Increased temperature; increased humidity; fungal diseases	Increased chances of fungal diseases (mould)	<ul style="list-style-type: none"> <li>Appropriate storage facility (i.e. well ventilated room, prevent dampness and odour)</li> </ul>
Support	Seedling production	Increased temperature; decreased precipitation and drought; increased humidity; fungal diseases; insect infestation	Increased mortality of seedlings	<ul style="list-style-type: none"> <li>Priority to onsite nursery development</li> <li>Shift in altitude (above 1000 meters)</li> </ul>
Rules/ Regulations	-	-	-	-

# STEP 6: Prioritize and choose the best/most appropriate measures



	Effectiveness in Enhancing Resilience	Cost	Feasibility	Sustainability	Further Criterion?	Overall Evaluation (total)
Transferred from STEP 5 Possible adaptation and risk management options	Explain how effective the option is in enhancing resilience and score with: (0) not effective, (1) effective, (2) very effective	Explain how costly the option is and score with: (0) high cost (1) medium cost (2) low cost	Explain how feasible the option is to implement and score with: (0) not feasible (1) feasible (2) very feasible	Explain how sustainable the option is and score with: (0) low, (1) medium (2) high	Explain and score the options to the criterion of your choice accordingly	Make an overall assessment of the option with regard to the outcome of the criteria scoring. Cost/benefit considerations shall be taken into account.
Varietal selection and research	2	0	1	2	1 This option definitely needs to be taken up in the medium to long run, but may face major hurdles in terms of financing	Sum: 6, Priority if finance resource can be identified
Intercropping	1	2	2	2	2 Farmer can easily adopt the practice.	Sum: 9 , Priority for CoPP
Proper shade tree management/shade tree plantation	2	2	2	2	2 Shade management has been a major thrust for years and needs continuation	Sum: 10, Priority for CoPP
Moisture management/rain water harvesting	1	1	2	2	2 Coffee has generally been promoted on marginal land, which often does not have access to irrigation water. In-situ moisture management and water harvesting technologies need to be further promoted through technical service providers	Sum: 8, Priority for CoPP in collaboration with the Integrated Water Resources Programme

**Objective:** Select the best/most appropriate measures in ACC and DRM based on a set of criteria and an analysis in the market system

## STEP 7: Plan and implement selected measures



**Action plan  
(Sustainability Matrix) →**  
How to implement the  
selected measures →  
**Who does what and who  
pays.**

### **Objective**

To get agreement on the roles and responsibility for the identified measures in ACC and DRM



- Agreement on **roles and responsibilities** is key and fundamental for successful implementation.
- Complete **understanding of incentives** to implement the measures to foster **long-term sustainability**.

# STEP 7: Example Coffee



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Functions	Activities to Implement Adaptation to Climate Change and Disaster Risk Management Measures	Immediate		Long-term		Necessary Interventions (including actors)
		Who will do it?	Who will pay?	Who will do it?	Who will pay?	
Production	Implement varietal selection and research	NARC	TPSD/GoN/ NARDF	NARC	GoN /NTCDB	Development of a research plan (NARC); Implementation of research plan (NARC and NTCDB)
	Promotion of intercropping	Technical service providers	NTCDB	Technical service providers	Primary coffee cooperatives Estates	Documentation of potential technologies (CoPP/ NTCDB/DADO/CTDS);
	Promotion of proper shade tree management/shade tree plantation	Technical service providers	NTCDB	Technical service providers	Primary coffee cooperatives Estates	Mobile phone based extension system development (CoPP);  Capacity development of technical service providers (CoPP/TPSD/NTCDB/ CTDS)
	Promotion of moisture management/rain water harvesting technologies	Technical service providers	Primary coffee cooperatives Estates	Technical service providers	Primary coffee cooperative Estates	Circulation of guidelines for (mandatory) shift in coffee plantation (NTCDB)
	Altitude shift (above 1000 meters)	Primary coffee cooperatives from technical service providers Estates with support from technical service providers	Primary coffee cooperatives with subsidies from NTCDB Estates	Primary coffee cooperatives Estates with support from technical service providers	Primary coffee cooperatives Estates	Circulation of guidelines for (mandatory) shift in coffee plantation (NTCDB)  Reorientation of technical service providers (NTCDB)

# Concluding remarks



- **Challenge of cultivating coffee** in Nepal: Below 1,000 m becomes/will become more critical in the future due to increasing temperature/higher humidity → coffee shall rather be promoted in Nepal above 1,000 m in the future.
- Analysis **confirms farmers** observations (quality decrease in lower altitude due to increased temperature and lack of water availability).
- Analysis has given a **wide range of possible measures** to intensify and reduce negative effects caused by the changing climate → immediate benefits for coffee producers.
- Identified measures are implemented to **provide benefits and reduce the adverse impacts** in the **short-term**. **Longer-term perspectives** requires more incremental and transformative changes.
- **Application of different measures simultaneously** is key to diversify and minimize risks in a specific market system.
- **No one size fits all approach**, measures change from location to location, but also throughout time (adjustment).

# Lessons learned in the mainstreaming process



- Common agreement about the importance of CC/DRM mainstreaming, but the **how is the challenge**.

→ *Actors need to be supported in the process.*

- 
- **Mainstreaming process as an opportunity for moving towards a proactive attitude with major actors involved!**



- Measures identified and **implemented by market actors** (projects only facilitates)

→ *Local ownership of the mainstreaming process is key.*

→ *Key condition for successful mainstreaming?*

actor.  
/ for  
ed

# Other experiences



## Nepal

Sweet oranges, banana, charcoal, coffee, macadamia, riverbed vegetables and walnut.



## Madagascar

- Analysis of cotton, artemisia and lima vean (pois du cap) in the southwest of Madagascar.
- Analysis of cacao in the northwest of Madagascar (Lindt & Sprüngli Farming Program).



**Mainstreaming of CC/DRM is a direct demand due to the adverse impacts on the different subsectors.**



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Thank you !

