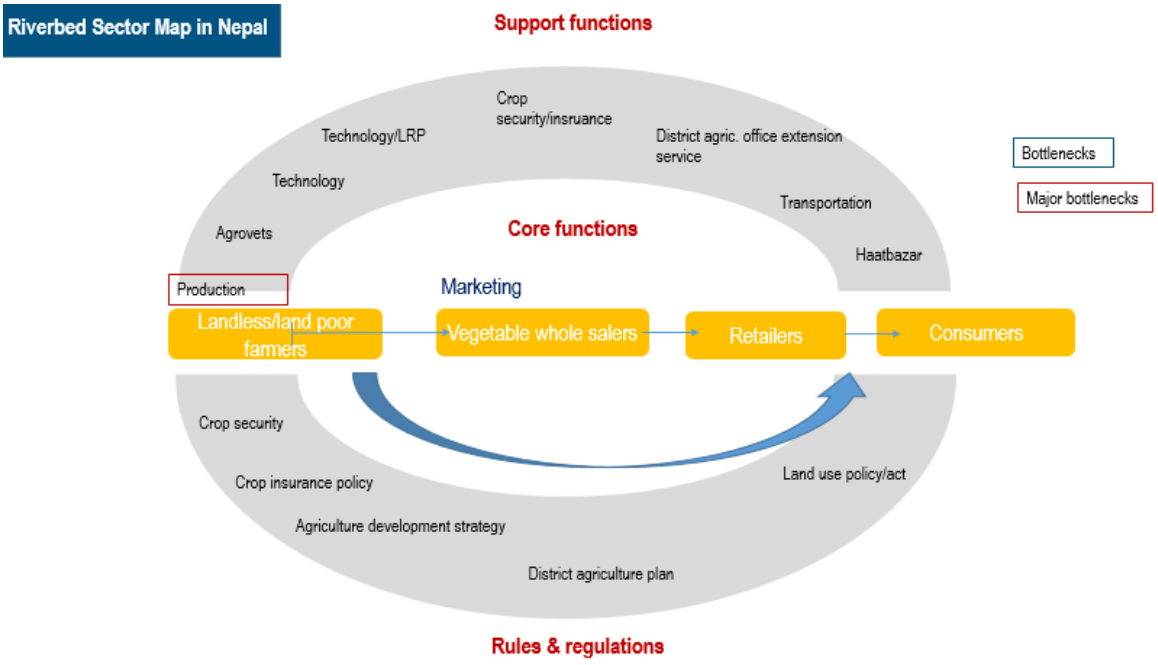
Riverbed Vegetable Sub Sector Assessment - Nepal

Step 1: Map core functions, support functions and rules/regulations in the selected market system

Source: HELVETAS Swiss Intercooperation Nepal

Result: Riverbed vegetable sector map in Nepal (see below)



Source: HELVETAS Swiss Intercooperation

Process: Developed by specialists from HELVETAS Swiss Intercooperation with more than 10 years experience in riverbed farming

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

Result Step 2a: Identification and prioritization of hazards (see below; in **red** prioritized hazards)

Hazard Group	Hazard Sub-Group	Hazard Type	Hazard Sub-Type		Prioritization			
					Author	Group 1	Group 2	Group 3
Natural	Meteorological	Changing temperature	Increase/Decrease			2	2	
			Diurnal variation			1	1	
			Seasonal variation			2	2	
		Changing precipitation	Increase/Decrease			2	2	
			Seasonal variation			2	2	
			Timing			3	3	
		Changing humidity	Increase/Decrease			1	1	
		Storm	Tropical storm			2	2	
			Extra-tropical storm			1	1	
			Convective storm	Derecho		0	0	
				Hail		**2**	**2**	
				Lightning/ thunderstorm		1	1	
				Rain		2	2	
				Tornado		0	0	
				Sand/ dust storm		2	2	
				Winter storm/blizzard		0	0	
				Storm/surge		1	1	
				Wind		**3**	**3**	
		Extreme Temperature	Cold wave			3	3	
			Heat Wave			2	2	
			Severe winter conditions	Snow/ice		0	0	
				Frost/freeze		2	2	
		Fog/dew				0	0	
	Hydrological	Flood	Coastal flood			0	0	
			Riverine flood			3	3	
			Flash flood			0	0	
			Ice jam flood			3	3	

Hazard Group	Hazard Sub-Group	Hazard Type	Hazard Sub-Type	Prioritization			
				Author	Group 1	Group 2	Group 3
		Landslide	Avalanche (snow, debris, mud, rock fall)		0	0	
		Wave action	Rogue wave		0	0	
			Seiche		0	0	
	Climatological	Drought			3	3	
		Glacial Lake outburst			0	0	
		Wildfire	Forest fires		1	1	
			Land fire: Brush, bush, pasture		1	1	
	Biological	Epidemic	Viral diseases		1	1	
			Bacterial diseases		2	2	
			Parasitic diseases		0	0	
			Fungal diseases		2	2	
			Prion diseases		0	0	
		Insect infestation	Other insects- red pumkin beetle, Fruit fly, aphid,		3	3	
		Animals			1	1	

Source: Field work results, HELVETAS Swiss Intercooperation 2017

Explanation:
Prioritization: 0= not relevant; 1= lowest priority; 2= medium priority; 3= highest priority;
C= current; P= potential

Description of Groups:

Group 1: Commercial river bed farmers from Kanchanpur with more than 10 years experience in riverbed farming.

Group 2: Commercial river bed farmers from Kailali with more than 10 years experience in riverbed farming.

Group 3: ***

Result Step 2b: Hazards, impacts and coping strategies

Hazards	Intensity	Frequency	Observed Trends[1]	Future Trends[2] Possible Evolution under climate change	Impacts	Severity[5] (% of project area affected)	Current coping strategies	Is the strategy sustainable ? If not why?
Hail		Annually – during March, April	No trends observed	Not known	Depending on the timing of the hail, it damages flowers, (medium risk) or fruit	Very localized, but can cause major (medium level) damage	• Replanting if early damage	Yes, but still at risk
Wind	Mainly winds early in the season are damaging, not necessarily big wind storms	Generally from **March, April, May ?* onwards; every year	Wind season is observed to have changed. The main months are now March, April, May but now also observed in July, August	Not known	Covers the young plants with sand, also affects flower	Can cause major and wide spread damage	• Early planting so that plants cover the sand • Planting in wind direction • Simple wind breaks- some level thatch grass use as mulching or simple wind break	Yes
Cold wave		Happens every year	No trend observed/ increased then before	As temperature is expected to increase overall, this hazard is expected to decrease (experience less this year)	Damages the young seedlings	Can cause major ad wide spread damage; if planting is done late, price is reduced	• Late planting • Mulching • Plastic cover	Yes (if plastic cover is being reused)
Riverine flood	Generally floods happen in **Mid Feb-Mid Mar?**, mostly small floods that do not reach the upper riverbeds, crops close to the river are more at risk	Floods happen every year, but some at unexpected times (Mid Feb-Mid Mar?**,	Increased then before	More erratic and more extreme weather extremes are predicted	Washes away seedlings and produce – particularly at lower part of riverbed	Can cause major damage particularly in the low lying riverbeds where often the most lucrative crops are grown (cucumber)	• Late planting of crops close to the river • Planting at different locations (higher, lower riverbeds) • Re-seeding	Yes, but still at risk

Hazards	Intensity	Frequency	Observed Trends[1]	Future Trends[2] Possible Evolution under climate change	Impacts	Severity[5] (% of project area affected)	Current coping strategies	Is the strategy sustainable ? If not why?
Drought	Water table reduced in different places; less rainfall observed particularly during winter and spring		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; droughts were not observed; water availability decreased as shown by lowering water tables (in places) and rivers carrying less water during the dry season	Annual precipitation will increase by 4% to 8% (up to 120 mm more per year) by the year 2050; increase in monsoon and post-monsoon precipitation and decrease in winter precipitation	Water is not reaching the higher level riverbeds requiring now irrigation (herewith increasing production costs) or farmers have to move to other riverbeds	Most of the rivers in the Tarai are affected	• Irrigation • Move to other riverbeds (if available) • Early plantation will help plants to produce before reaching very dry period at later part of spring/summer	Yes
Insect infestation	Insects, particularly ***red pumkin beetle, fuit fly, aphid**, affect the riverbed crops	Every season	No trend observed/ red pumkin beetle increased	With increasing temperatures insect occurrence is expected to increase	damage young plant and fruit	red pumpkin beetle observed near to weed cover areas, found more in river bank plantation areas	• Integrated pest management	Yes

Source: Field results, HELVETAS Swiss Intercooperation Nepal 2017

Process: ****

Results Step 2c: Comparison of hazard and crop calendars

Hazard	J	F	M	A	M	J	J	A	S	O	N	D
Hail			x	x	x							
Riverine floods		x	x									
Wind			x	x	x		x	x				
Cold wave	x	x										
Crop	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**
Planting	x	x									x	x
Harvesting			x	x	x							

Local Calendar	P	M	F	C	B	J	A	S	B	A	K	M

Source: ***

Explanation:

Nepali Calendar: Poush, Magh, Falgun, Chaitra, Baisakh, Asaadh, Shrawan, Bhada, Asoj, Kartik, Mangshir
x = “normal”; xx= very strong

Step 3: Identify each function's vulnerability to climate risks

Result: Market functions and climate risks (see below)

Functions (see Step 1)		Climate risk impact	Relevant climate risks (see Step 2)	Remarks on impacts
Core	Production	Loss of production through damaged flowers or fruits	**Hail**	Increased costs due to double planting
		Crop loss through damaged seedlings	**Wind**	Increased cost due to mulching and simple wind break (dry thatch)
		Crop loss through damaged seedlings	**Cold wave**	Increased costs due to double planting and costs of mulching material
		Crop loss through washed away seedlings	**Riverine flood**	Increased costs due to double planting
		Productivity loss through water stress	**Drought**	Increased costs for irrigation; increased time requirements
		Loss of production	**Insect infestation**	Increased cost for bio-pesticide
Support	-			
Rules/ Regulations	-	Loss of crop from flood, wind	Crop security/crop insurance	

Source: ****

Process: ***

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

Result: Climate relevant market functions (see below)

Category	Criteria	Weighting	Sub-sectors		Remarks
			****	*****	
Poverty Reduction Potential	Number of households engaged in the sector				
	Severity of poverty facing those engaged in the sector				
	Potential for participation of women in the sector				
	Potential for participation of youth in the sector				
	Possibility for the target group to improve income / access to jobs				
Economic Growth Potential	Previous growth trajectory (last 5 years)				
	Forecast for growth in the next 5-10 years				
	Import substitution potential				
	Export potential				
	Level of competitiveness				
Potential to facilitate systemic change	Level of consistency with public/national priorities, government interest				
	Private sector interest				
	Presence of potential lead firms				
	Availability of partners/champions with leverage				
	Availability and capacity of service providers				
Climate change	Negative impacts of future climate trends				
	Positive impacts of future climate trends				
	Likely investment costs in risk reduction relative to actors' annual income and capital stock				
	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?				
	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)				
Further considerations					
TOTALS					

Step 5: Identify possible adaptation to climate change and disaster risk management measures

Result: Possible adaptation to climate change and disaster risk management measures

Functions (see Step 1)		Climate risk impact	Relevant climate risks (see Step 2)	Remarks on impacts	Adaptation to climate change and disaster risk management measures
Core	Production	Loss of production through damaged flowers or fruits	**Hail**	Increased costs due to double planting	• Crop insurance
		Crop loss through damaged seedlings	**Wind**		• Crop insurance • Simple Wind break • Proper planting with the wind • Early plantation
		Crop loss through damaged seedlings	**Cold wave**	Increased costs due to double planting and costs of mulching material/plastic	• Crop insurance • Mulching • Plastic cover
		Crop loss through washed away seedlings	**Riverine flood**	Increased costs due to double planting	• Crop insurance • Reseeding/ late plantation at lower part of riverbed
		Productivity loss through water stress	**Drought**	Increased costs for irrigation; increased time requirements	• Irrigation technology • Early plantation to harvest before reaching to later part of spring/summer
		Loss of production	**Insect infestation**		• Integrated pest management
Support	-				
Rules/ Regulations	-				

Source: ***

Process: ****

Step 6: Prioritize and choose the best/most appropriate measures

Result: Possible adaptation to climate change and disaster risk management measures

Market functions	Adaptation to climate change and disaster risk management measures	Effectiveness in enhancing resilience	Cost	Feasibility	Sustainability	Further criterion?	Overall evaluation (total)
	Transferred from the Step 5 → Possible adaptation and risk management options	*Explain how effective the option is enhancing resilience and score with (0) not effective, (1) effective, (2) very effective*	*Explain how costly the option is and score with high costs (0), medium costs (1), low costs (2)*	*Explain how feasible the option is to implement and score with not feasible (0), feasible (1), very feasible (2)*	*Explain how sustainable the option is and score with e.g. low (0), medium (1), high (2)*	*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*
Production							
Pulping							
Storage							
Seedling production							

Source: Test results, HELVETAS Swiss Intercooperation Nepal 2016

Process: The scoring was conducted in consultation with the Coffee Promotion Programme expert team

Step 7: Plan and implement selected measures

Result: Sustainability matrix with prioritized adaptation measures

Functions	Activities to implement adaptation to climate change and disaster risk management measures	Immediate		Longterm		Necessary interventions (including actors)
		Who will do it?	Who will pay?	Who will do it?	Who will pay?	
Production						
Pulping						
Storage						
Seedling production						

Source: ****

Process: ***

Step 8: Monitor and measure results