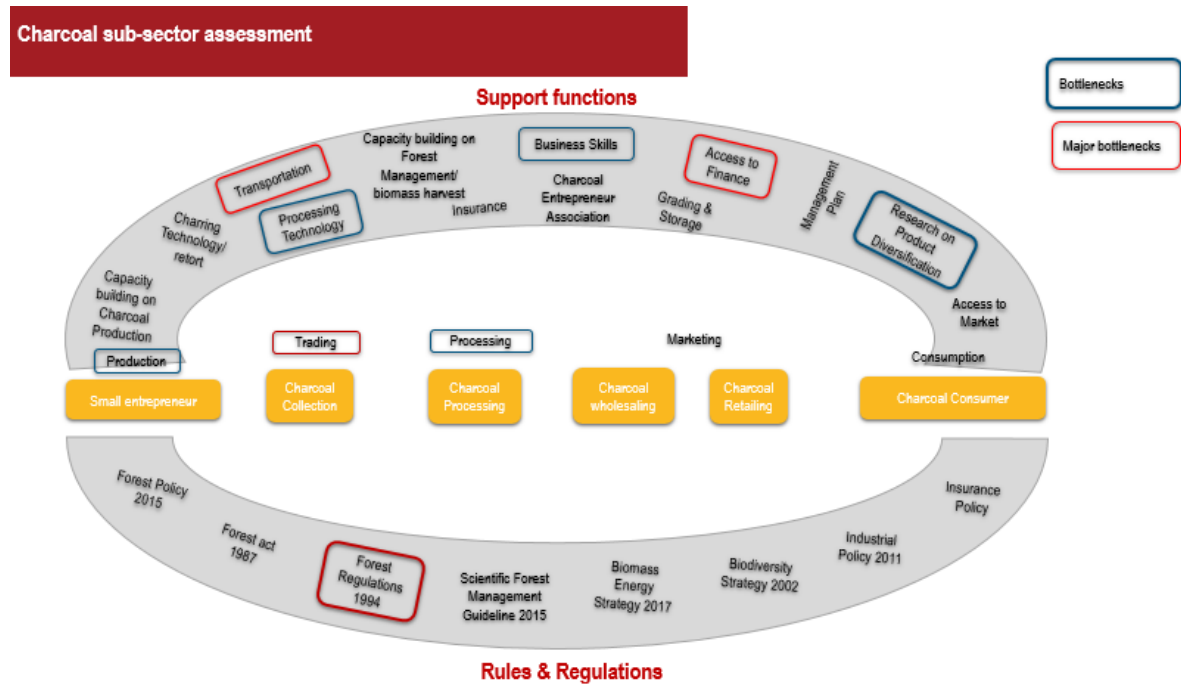


# Charcoal Sub Sector Assessment - Nepal

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



Source: HELVETAS Swiss Intercooperation Nepal



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

Hazard Type	Hazard Subtype	Specific hazard		Prioritization					
				Facilitator	Group 1	Group 2	Group 3		
Natural	Meteorological	Changing temperature	<b>Increase/Decrease</b>		2	3	3		
			Diurnal variation		0	0	0		
			<b>Seasonal variation</b>		2	3	2		
		Changing precipitation	<b>Increase/Decrease</b>		2	1	2		
			<b>Seasonal variation</b>		3	3	3		
			Timing		0	0	0		
		Changing humidity	Increase/Decrease		0	0	0		
		Storm	Tropical storm			0	0	0	
						0	0	0	
						0	0	0	
			Convective storm	Derecho			0	0	0
				Hail			0	0	0
				Lightning/thunderstorm			0	0	0
				Rain			0	0	0
				Tornado			0	0	0
				Sand/ dust storm			0	0	0
				Winter storm/blizzard			0	0	0
				Storm/surge			0	0	0
		<b>Wind</b>			<b>3</b>	<b>0</b>	<b>2</b>		
	Extreme Temperature	Cold wave			0	0	0		
					0	0	0		
		Heat Wave			0	0	0		
					0	0	0		
	Severe winter conditions	Snow/ice			0	0	0		
		Frost/freeze			0	0	0		
	<b>Fog</b>				<b>0</b>	<b>3</b>	<b>2</b>		
	Hydrological	Flood	Coastal flood			0	0	0	
			Riverine flood			0	0	0	
			Flash flood			0	0	0	
			Ice jam flood			0	0	0	
		Landslide	Avalanche (snow, debris, mudflow, rock fall)				0	0	0
			Wave action	Rogue wave			0	0	0
Seiche					0	0	0		
Climatological	Drought	<b>Drought</b>			<b>2</b>	0	0		
	Glacial Lake outburst				0	0	0		
	Wildfire	<b>Forest fires</b>			<b>3</b>	<b>3</b>	<b>3</b>		
Land fire: Brush, bush, pasture				0	0	0			
Biological	Epidemic	Viral diseases			0	0	0		
		Bacterial diseases			0	0	0		
		Parasitic diseases			0	0	0		

Hazard Type	Hazard Subtype	Specific hazard		Prioritization			
				Facilitator	Group 1	Group 2	Group 3
			Fungal diseases		0	0	0
			Prion diseases		0	0	0
		Insect infestation	Locust/Grasshopper/Other insects		0	0	0
		Animal accident			0	0	0

Source: HELVETAS Swiss Intercooperation based on disaster classification adapted from <http://www.emdat.be/guidelines>

**Explanation:**

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

**Group 1:** Biomass collectors, primary char coal producers in Chitwan

**Group 2:** Char coal processors and traders in Chitwan

**Group 3:** BioEnergy staff

**Table 2:** Hazards, impacts and coping strategies

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 indicated which part of the market system is affected)	Current coping strategies	Is the strategy sustainable? If not why?
<b>Changing temperature, increase and seasonal variation</b>	Maximum temperature increasing at 0.06° C/year (1976-2005); minimum temperature at 0.04° C /year). (NAPA 2010)	-	Char coal actors have perceived an increase in temperature over the years; based on data analyses a general increasing trend in temperature has been found; entrepreneurs in many areas observed increasing temperatures based on observations on 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	<ul style="list-style-type: none"> <li>- Faster growth of biomass</li> <li>- Faster drying of standing and cut biomass</li> <li>- Biomass dies faster and drops the leaves</li> <li>- Higher chances of forest fires</li> <li>- Reduced marketability of the char coal product</li> </ul>	<p>All production areas are affected; changes result both in positive as well as negative impacts for char coal production; less leafy material improves the quality of the char coal as less ash content in the char coal means higher density and therefore longer burning.</p> <p>The firing process needs to be carefully managed and supervised to reduce the change of forest fires.</p> <p>On the market side, increased temperatures reduce the market for heating material.</p>	<ul style="list-style-type: none"> <li>• Adjustment of cutting and char coal production depending on dryness of the biomass</li> <li>• Attempt to diversify the char coal use</li> </ul>	Yes

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 indicated which part of the market system is affected)	Current coping strategies	Is the strategy sustainable? If not why?
<b>Changing precipitation, decrease/ Drought</b>	Less rainfall observed	-	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;	Annual precipitation will increase by 4% to 8% (up to 120 mm more per year) by the year 2090; increase in monsoon and post-monsoon precipitation and decrease in winter precipitation	<ul style="list-style-type: none"> <li>• Faster drying of standing and cut biomass</li> <li>• Biomass dies faster and drops the leaves (less ash content in the char coal)</li> <li>• Higher chances of forest fires</li> </ul>	All production areas are affected; changes result both in positive as well as negative impacts for char coal production; less leafy material improves the quality of the char coal as less ash content in the char coal means higher density and therefore longer burning. The firing process needs to be carefully managed and supervised to reduce the change of forest fires.	<ul style="list-style-type: none"> <li>• Adjustment of cutting and char coal production depending on dryness of the biomass</li> </ul>	Yes
<b>Changing precipitation, seasonal variation</b>			Farmers observed a later onset of the rains during the monsoon season and low rainfall during the monsoon season	Precipitation during the monsoon season is expected to increase; no change in monsoon season start observed by the data	<ul style="list-style-type: none"> <li>• Reduces season for char coal production</li> </ul>	All production areas are affected; has a major impact in the economic viability of the sector incl. the involved actors interest to engage in the sector	<ul style="list-style-type: none"> <li>• Adjustment of working season</li> </ul>	No, as it reduces the viability of the sector and the interest of the involved actors
<b>Fog</b>	Fog episodes normally last from a few days to just over a week; prolonged episodes of thick fog covering large parts of the North India plains last up to one month	Episodes of fog occur annual during the winter months;	Prolonged fog episodes seems to have increased since 20 years	Not known	<ul style="list-style-type: none"> <li>• Slower drying of cut biomass</li> <li>• Difficulties in charring of biomass to produce charcoal</li> <li>• Slower/difficult drying of charcoal products</li> <li>•</li> </ul>	Reduce quantity and quality (more ash content) of charcoal due to high moisture	<ul style="list-style-type: none"> <li>• Adjustment of cutting and char coal production depending on dryness of the biomass</li> <li>• Use of drier for drying of charcoal products</li> </ul>	Yes

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 indicated which part of the market system is affected)	Current coping strategies	Is the strategy sustainable? If not why?
<b>Wind</b>	Shift of storms by 3 months	Wind storms occur every year. About 1 to 2 major storms with the potential to damage have to be expected	Farmers have seen a temporal shift of wind storms from March/April/May to July/August/September	Not known	<ul style="list-style-type: none"> <li>Reduces season for char coal production</li> <li>Higher chances/risks of forest fires</li> </ul>	Affects the entire production area and reduces the economic viability of the sector	<ul style="list-style-type: none"> <li>Adjustment of working season</li> <li>Proper management and supervision of firing process</li> </ul>	No, as it reduces the viability of the sector and the interest of the involved actors
<b>Forest fires</b>	Forest fires occur annually, during January to June; most fires occur in mountain areas, particularly at risk is the mid-/far west	Annually, but not at the same location	<p>An increasing trend of forest fires is observed</p> <p>Forest managed through charcoal production have now reported no/less forest fire</p>	<p>Because of increased temperature, reduced precipitation (particularly during the dry season) the risk of forest fires is expected to increase</p> <p>However, by removing the invasive species from Forest to make Charcoal there will be less chance of forest fire too</p>	<ul style="list-style-type: none"> <li>Reduces biomass availability</li> </ul>	Very location specific, most of the fires are localized issues, however, they can affect large parts of the forest, particularly when there is large amounts of dry biomass	<ul style="list-style-type: none"> <li>collection of biomass scientifically</li> <li>Proper management and supervision of firing process</li> </ul>	<p>Yes</p> <p>An alternate strategy for sustainability will be: use of agri. residue such as wheat stalk, sugarcane bagasse etc.</p>

Source: modified by HELVETAS Swiss Intercooperation from CRISTAL

**Explanation:**

<sup>1</sup>**Frequency:** How often a hazard occurs (e.g. once or more a year, every 2-4 years, every 10 years, less frequent)

<sup>2</sup>**Intensity:** How “strong” the hazard is when it occurs (e.g. low, medium, high, very high)

<sup>3</sup>**Observed Trends:** Do the community members observe a change? Is there a trend?

<sup>4</sup>**Future trends:** Is there a trend in observations? Since community members are most likely not aware of new and changing future trends, it is recommended that you gather this information from scientific sources.

<sup>5</sup>**Severity** can be determined considering the criteria like type of impact and degree of losses, % of district affected, damage of physical facilities, damage by geographical coverage, social impact due to disaster/hazards etc.

**Table 3: Hazard and Charcoal production seasonal calendar**

<b>Hazard</b>	<b>J</b>	<b>F</b>	<b>M</b>	<b>A</b>	<b>M</b>	<b>J</b>	<b>J</b>	<b>A</b>	<b>S</b>	<b>O</b>	<b>N</b>	<b>D</b>	
<i>Local calendar</i>	<b>P</b>	<b>M</b>	<b>F</b>	<b>C</b>	<b>B</b>	<b>J</b>	<b>A</b>	<b>S</b>	<b>B</b>	<b>A</b>	<b>K</b>	<b>M</b>	<b>P</b>
Precipitation – High amounts				x	x	X	X X	X	X	x			
Precipitation – Low amounts	X X	X X	x								x	X X	
Temperature - High				x	X X	X X	x	x					
Temperature - Low	X X											X X	XX
Wind - earlier				x	x	x							
Wind - now				x	x	x	x	x	x	x			
<b>Charcoal production seasonal calendar</b>	<b>J</b>	<b>F</b>	<b>M</b>	<b>A</b>	<b>M</b>	<b>J</b>	<b>J</b>	<b>A</b>	<b>S</b>	<b>O</b>	<b>N</b>	<b>D</b>	
<i>Local calendar</i>	<b>P</b>	<b>M</b>	<b>F</b>	<b>C</b>	<b>B</b>	<b>J</b>	<b>A</b>	<b>S</b>	<b>B</b>	<b>A</b>	<b>K</b>	<b>M</b>	<b>P</b>
Char coal production (EARLIER)	x	x	x	x	x	x	x					x	x
Char coal production (NOW)	X	X	X	X	X	X					X	X	X
Char coal use	X	X	X	X	X	X	X	X	X	X	X	X	X
Best quality charcoal		x	x	x	X	X							
Low quality charcoal	X										X	x	X

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

**Table 5: Determinate climate risk relevant functions**

Climate risk relevant market functions (see Step 1)		Relevant climate risk (hazard) (see Step 2)	Remarks on impacts
<b>Core</b>	Biomass collection	Changing temperature, increase and seasonal variation;  Changing precipitation, decrease/ Drought;  Forest fires	<ul style="list-style-type: none"> <li>Increased biomass growth</li> <li>Faster drying of standing and cut biomass</li> <li>Biomass dies faster and drops the leaves (less ash content in the char coal) ; more difficult to cut dry biomass than fresh/green biomass.</li> <li>Higher chances of forest fires</li> </ul>
	Charcoal production	Wind;  Forest fires,  Changing precipitation, seasonal variation	<ul style="list-style-type: none"> <li>Reduced biomass availability</li> <li>Wind and changing seasonality of precipitation reduces the production season</li> <li>The firing process needs to be carefully managed and supervised to reduce the change of forest fires.</li> <li>Biomass dies faster and drops the leaves; Less leafy material improves the quality of the char coal as less ash content in the char coal means higher density and therefore longer burning</li> </ul>
	Charcoal processing	Fog Precipitation Temperature	<ul style="list-style-type: none"> <li>Increased humidity causes pillows, briquettes and pellets to dry slower</li> <li>High temperature helps to dry fast of charcoal products</li> </ul>
	Charcoal sales	Changing temperature, increase and seasonal variation	<ul style="list-style-type: none"> <li>On the market side, increased temperatures reduce the market for heating material.</li> <li>However, no effect observed in incense industries and small SMEs like iron smith, gold smith etc.</li> </ul>
<b>Support</b>	-	-	-
<b>Rules/Regulations</b>	-	-	-

Source: modified by HELVETAS Swiss Intercooperation from the operational guide for the making markets work for the poor approach, 2014



**Step 4: Identify most resilient sub-sector based on a scoring matrix**

**Table 6: Scoring matrix**

Category	Criteria	(Weighting)	Sub-sector		Remarks
			Sub-sector A	Sub-sector B	
<b>Poverty Reduction Potential</b>	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				
<b>Economic Growth Potential</b>	Previous growth trajectory (last 5 years)				
	Forecast for growth in the next 5-10 years				
	Import substitution potential				
	Export potential				
	Level of competitiveness				
<b>Potential to facilitate systemic change</b>	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				
<b>Climate change</b>	Negative impacts of future climate trends				
	Positive impacts by future climate trends				
	Likely investment costs in risk reduction relative to actors' annual income and capital stock				
	Investment horizon: 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)				
<b>Further considerations</b>					
<b>TOTAL</b>					

Source: modified by HELVETAS Swiss Intercooperation from the operational guide for the making markets work for the poor approach, 2014

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

**Table 7: Identify adaptation to climate change and disaster risk management options**

Climate risk relevant market functions (see Step 1)		Relevant climate risk (hazard) (see Step 2)	Remarks on impacts	Adaptation to climate change and disaster risk management measures
<b>Core</b>	Biomass collection	Changing temperature, increase and seasonal variation;  Changing precipitation, decrease/ Drought;  Forest fires	<ul style="list-style-type: none"> <li>Increased biomass growth</li> <li>Faster drying of standing and cut biomass</li> <li>Banmara dies faster and drops the leaves (less ash content in the char coal) ; more difficult to cut dry biomass than fresh/green biomass.</li> <li>Higher chances of forest fires</li> <li>Reduced biomass availability</li> </ul>	<ul style="list-style-type: none"> <li>Adjustment of cutting depending on dryness of the biomass</li> <li>Frequent collection of biomass</li> </ul>
	Charcoal production	Wind;  Forest fires,  Changing precipitation, seasonal variation	<ul style="list-style-type: none"> <li>Wind and changing seasonality of precipitation reduces the production season</li> <li>The firing process needs to be carefully managed and supervised to reduce the change of forest fires.</li> <li>Banmara dies faster and drops the leaves; Less leafy material improves the quality of the char coal as less ash content in the char coal means higher density and therefore longer burning</li> </ul>	<ul style="list-style-type: none"> <li>Adjustment of char coal production depending on dryness of the biomass</li> <li>Proper management and supervision of firing process</li> </ul>
	Charcoal processing	Fog	<ul style="list-style-type: none"> <li>Increased humidity causes pillows, briquettes and pellets to dry slower</li> </ul>	<ul style="list-style-type: none"> <li>Construction of shed</li> <li>Use of drier</li> </ul>
	Charcoal sales	Changing temperature, increase and seasonal variation	<ul style="list-style-type: none"> <li>On the market side, increased temperatures reduce the market for heating material.</li> </ul>	<ul style="list-style-type: none"> <li>Diversification strategy for charcoal products and relevant mar</li> </ul>
	<b>Support</b>	-	-	-
<b>Rules/Regulations</b>	-	-	-	

Source: modified by HELVETAS Swiss Intercooperation from the operational guide for the making markets work for the poor approach, 2014

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

**Table 8:** Prioritization of best/most appropriate adaptation to climate change and disaster risk management measures

	Effectiveness in enhancing resilience	Cost	Feasibility	Sustainability	Further criterion?	Overall evaluation (total)
<i>Transferred from Step 5, Table 7 → Possible adaptation and risk management options</i>	<i>Explain how effective the option is enhancing resilience and score with (0) not effective, (1) effective, (2) very effective</i>	<i>Explain how costly the option is and score with high costs (0), medium costs (1), low costs (2)</i>	<i>Explain how feasible the option is to implement and score with not feasible (0), feasible (1), very feasible (2)</i>	<i>Explain how sustainable the option is and score with e.g. low (0), medium (1), high (2)</i>	<i>Explain and score the options to the criterion of your choice accordingly</i>	<i>Make an overall assessment of the option with regard to the outcome of the criteria scoring Cost/benefit considerations shall be taken into account</i>

Source: modified CEDRIG, SDC

**Step 7: Plan and implement selected measures**

**Table 9:** Sustainability matrix (Action plan)

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						
Packaging/storage						
Marketing						
Sapling roduction						
Extension						

Source: modified by HELVETAS Swiss Intercooperation from the operational guide for the making markets work for the poor approach, 2014

**Step 8: Monitor and measure results**