Sustainable Business Models for Tree based Value Chains in Sub-Saharan Africa:

The charcoal value chain:
A threat or opportunity?

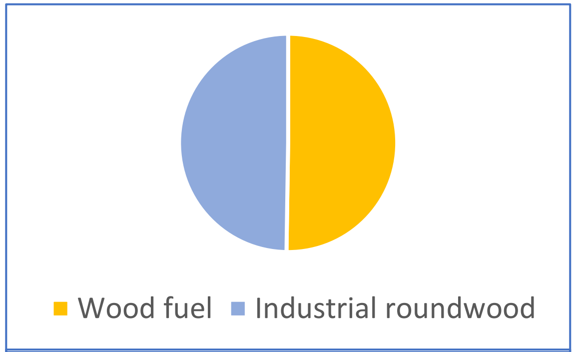
AFF Community of Practice on 30 November 2021

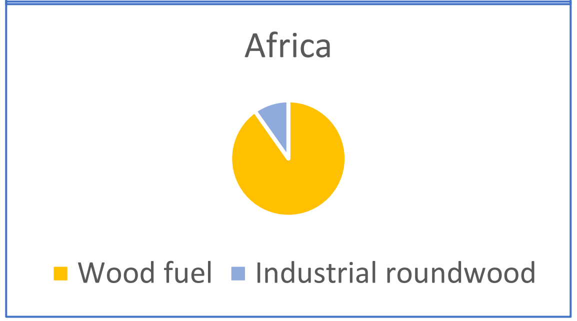
A Roos, L Mahamane, D Mutta, C Wekesa

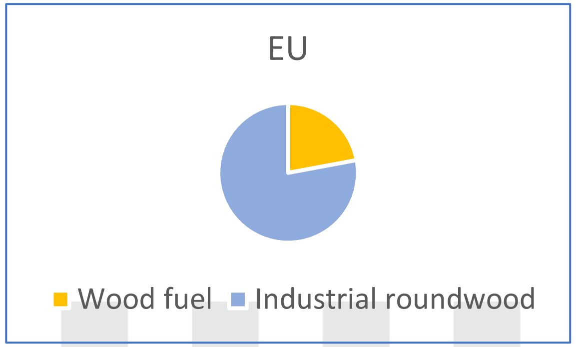
AFRICAN FOREST FORUM (AFF), SWEDISH UNIVERSITY OF AGRICULTURAL SCIENCES (SLU), KENYA FORESTRY RESEARCH INSTITUTE, UNIVERSITY OF NIAMEY

Wood energy

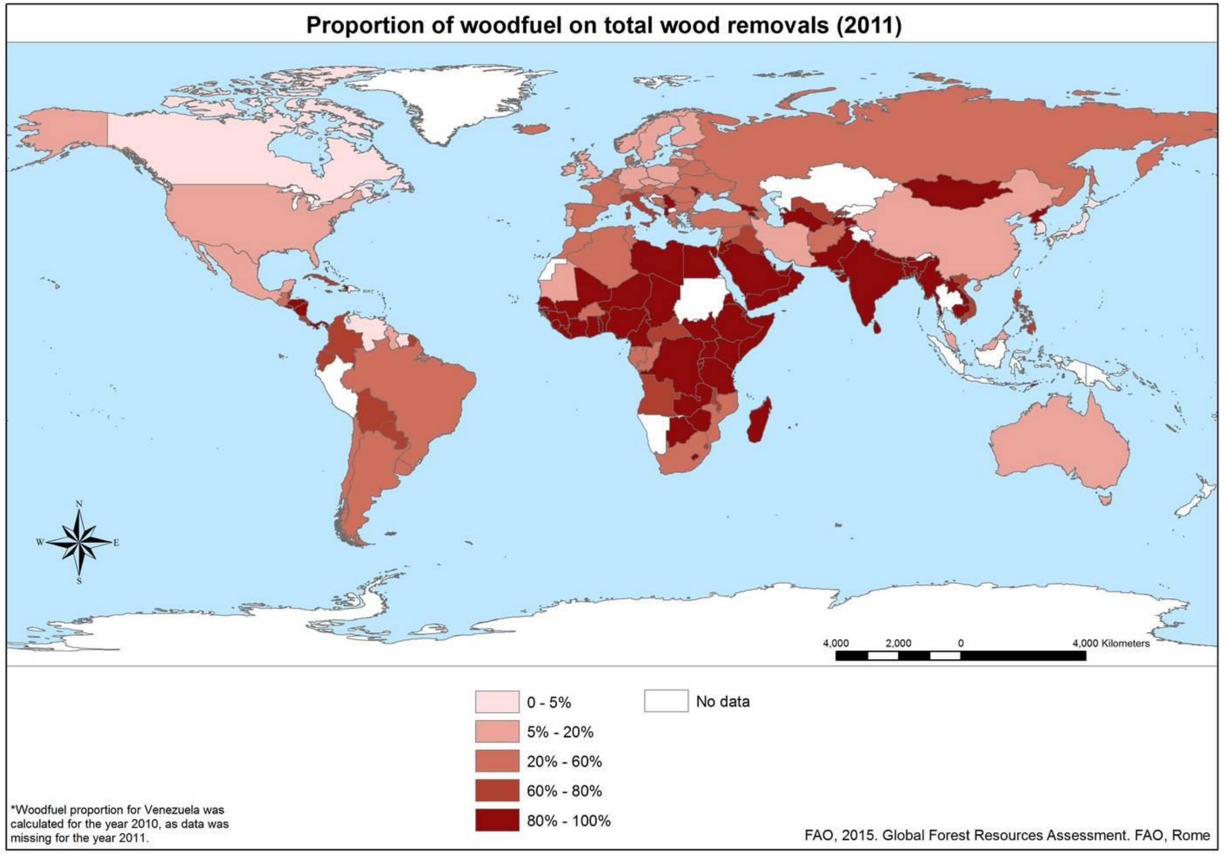
- Production Million m3







- Biomass energy accounts for 14-15% of world's primary energy, and 70-90% primary energy supply in Africa.
- Woodfuel consumption per capita is 0.69m3 /year in Africa. Charcoal accounts for 17% wood energy and increasing



Charcoal is important for everyday life in Africa

- **Charcoal production is the second largest consumer of wood in Eastern Africa:**
  - Tanzania production 49 million m3;
  - Kenya 17.5 million m3;
  - Uganda 11 million m3;

  (Côte d'Ivoire reported production 31,000 tons in 2014)
- **Income source for producers, transporters, vendors etc**.
  - Kenya earns US$530 million/year, 2 million dependants;
  - Tanzania charcoal demand is at US$500 million;
  - Southern Africa engages 602 966 charcoal producers
- **Raw materials sourced from natural forests and woodlands**.
  - Sustainable? Associated w/forest degradation; global warming, indoor pollution
- **Alternative energy sources are not accessible; gas, kerosene, electricity**
  - **Implication: We need to combine production of charcoal that improves livelihoods**

and is sustainable! –*through SFM*

Underlying trends (”megatrends”)

- Informal economy
- Infrastructure
- Communication, ICT
- Economic growth and persistent poverty
- Education
- Urbanization (1% rise – 14% consumption rise)
- Demographic trends
- Climate change

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Objectives

In-depth analyses (Kenya, Niger)

Inform scientific evidence-based development of sustainable supply chains

1. Map value chain structures, members, and processes
2. Identify value chain members' *resources*, *competencies, and business strategies,* and the *institutional conditions* for sustainable value chains
3. Identify improvement opportunities

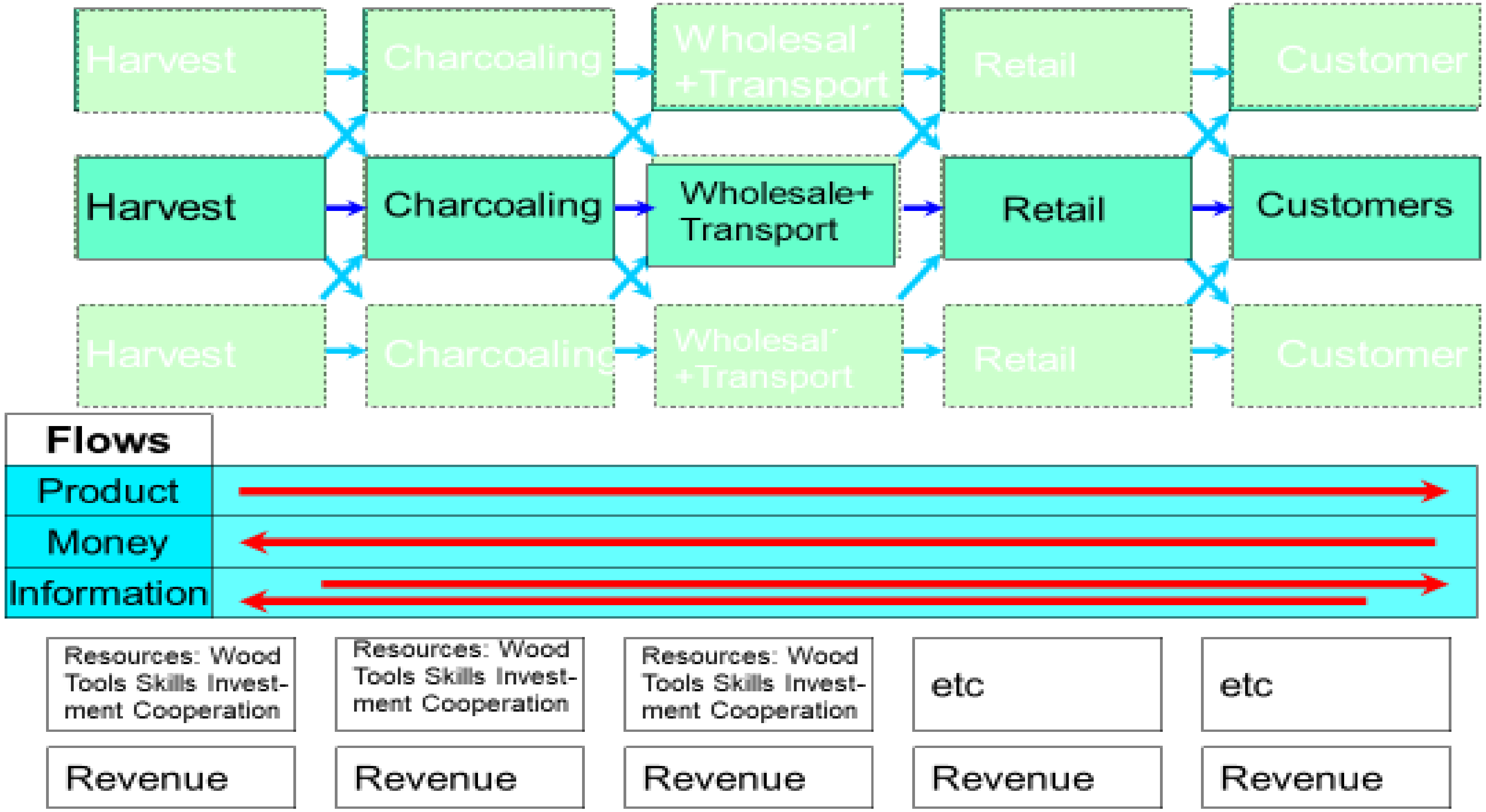
FOCUS

1. ***Actors along charcoal value chains in Sub-Saharan Africa***
2. ***Resource-poor, women, and young adults***
3. ***Tree-based products: wood energy - from forests, agroforestry systems, "trees outside forests" etc.***
4. ***Sustainability and livelihoods outcomes***

The charcoal value chain

Analyses

- Value chain structure, processes, participants
- Resources, capabilities, business environment
- Policy imperatives



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Actors

Age range	Household size					Total
	0-3 children	4-6 children	7-9 children	10-15 children	16-20 children	
15-25 years	10,8%	0%	0%	0%	0%	10,8%
26-35 years	17%	8%	4%	0,9%	1,7%	31,5%
36-45 years	1,1%	11,6	6,3%	5,1%	2,6%	26,7%
46-55 years	0,3%	4,8%	7,1%	4,3%	1,1%	17,6%
56-65 years	0%	2,3%	3,4%	4%	1,1%	10,8%
66-75 years	0%	1,1%	1%	0,3%	0,3%	2,3%
76 years to more	0%	0,3%	0%	0%	0%	0,3%
Total	29%	28,4%	21,3%	14,5%	6,8%	100%

Women are more in the marketing-vending
Women are a minority in production and transporting

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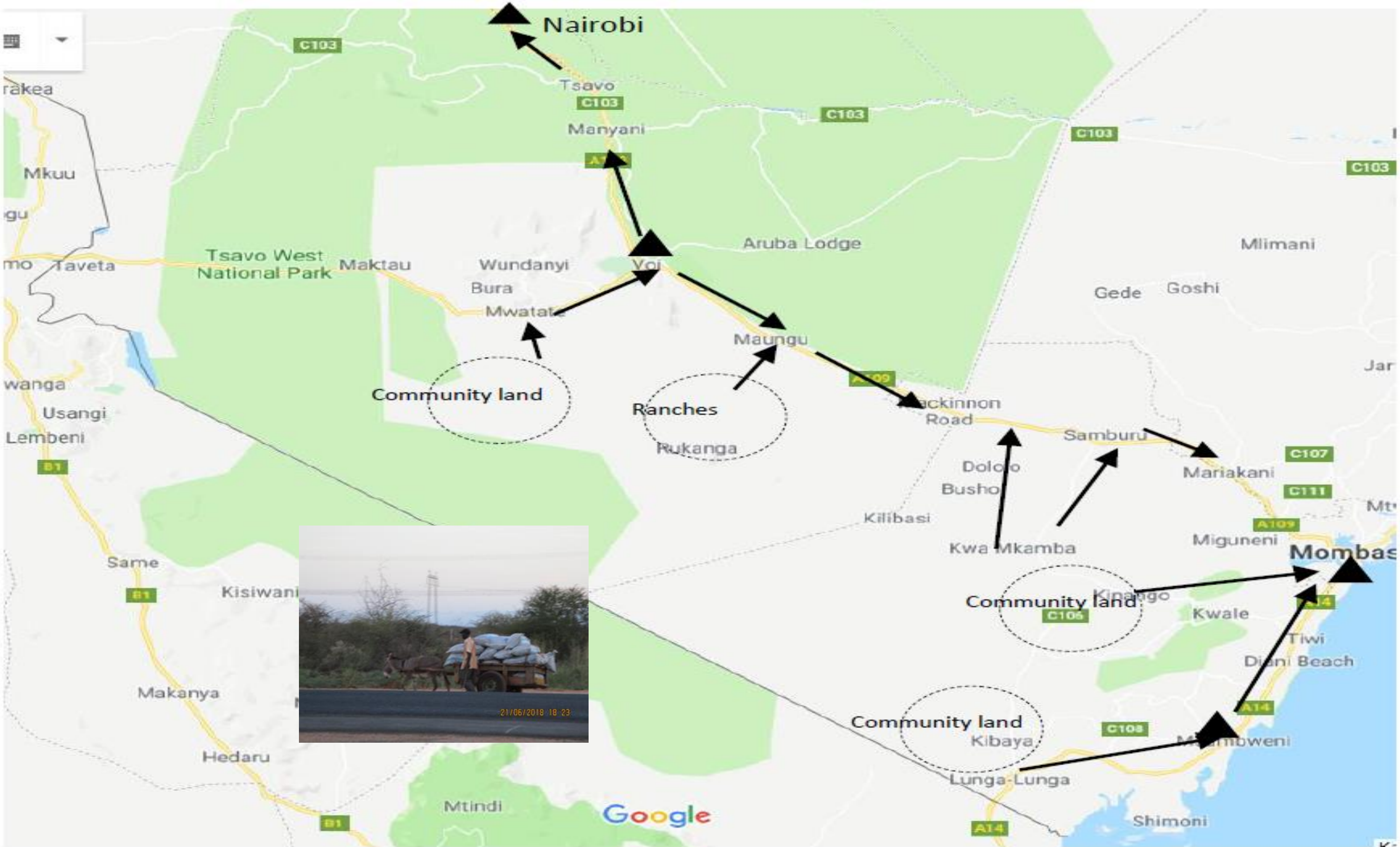
Production areas and supply chains (Kenya)



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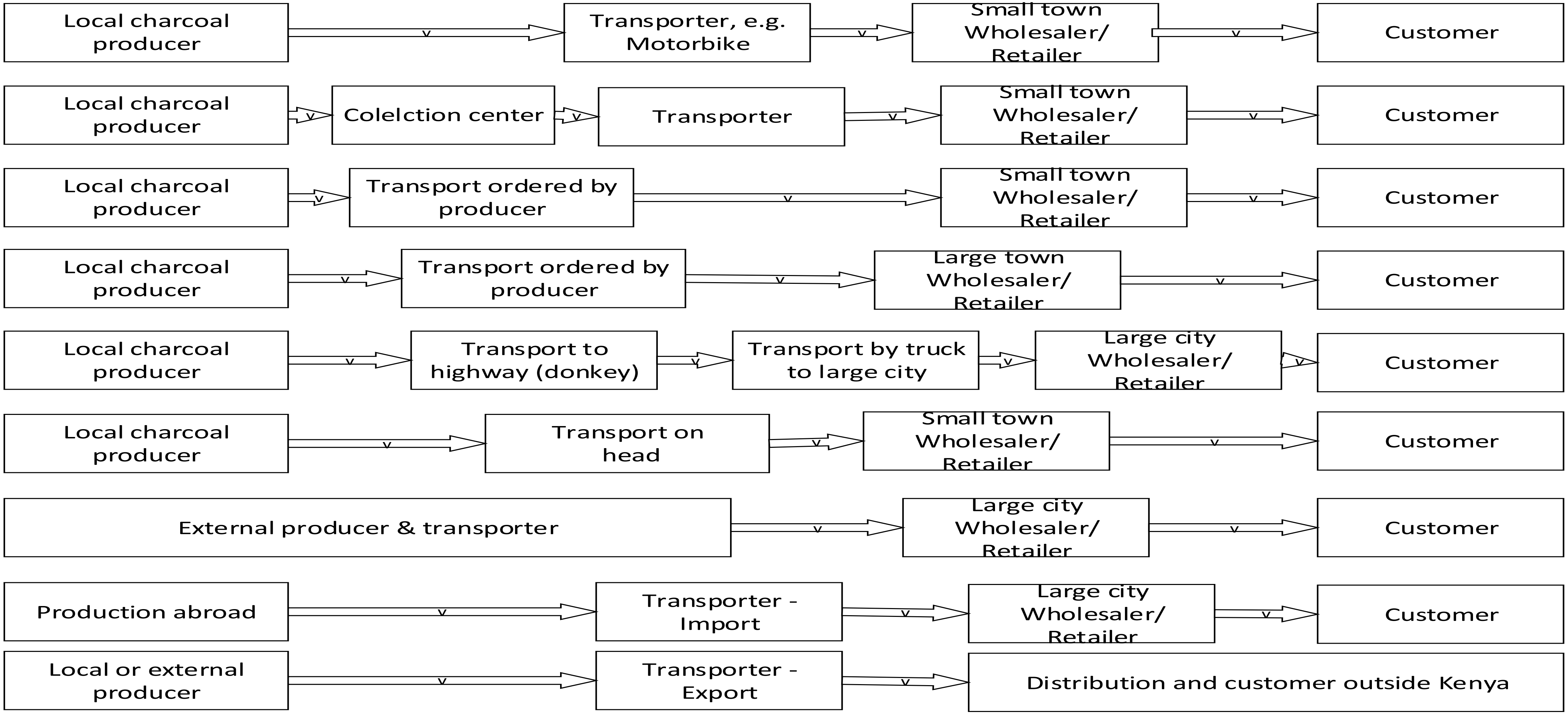
Marketing channels



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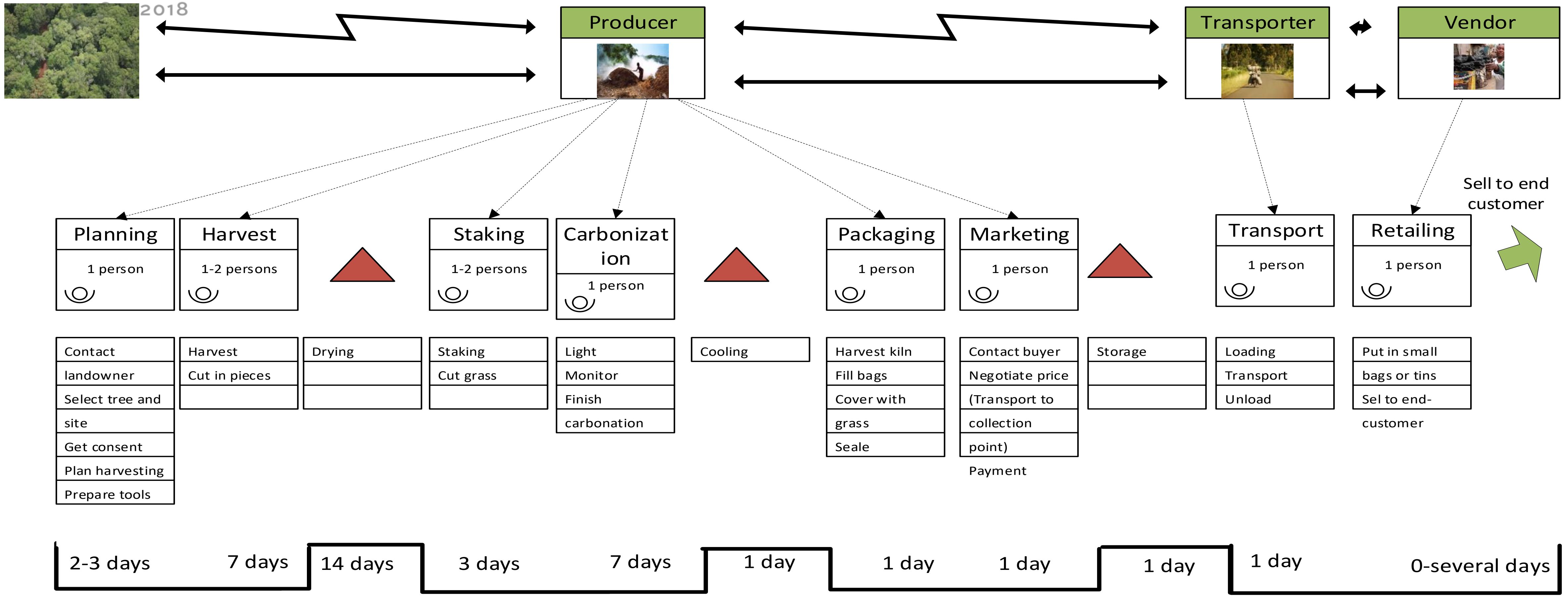
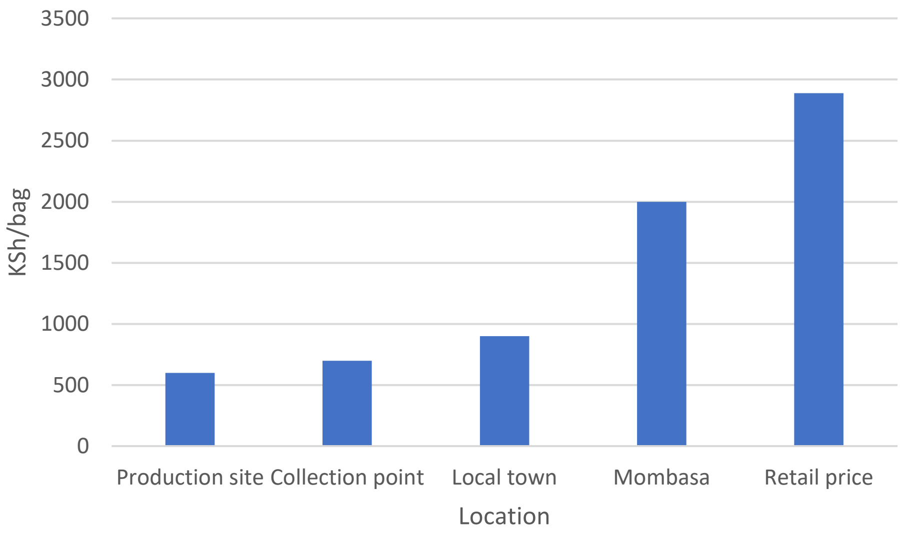
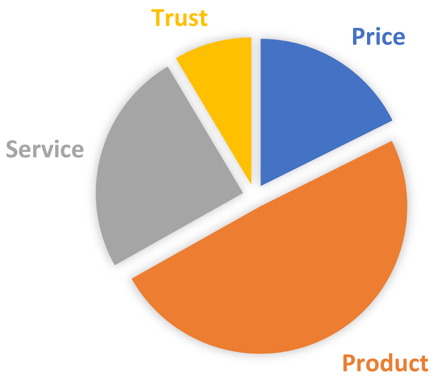
Value stream map



Revenues



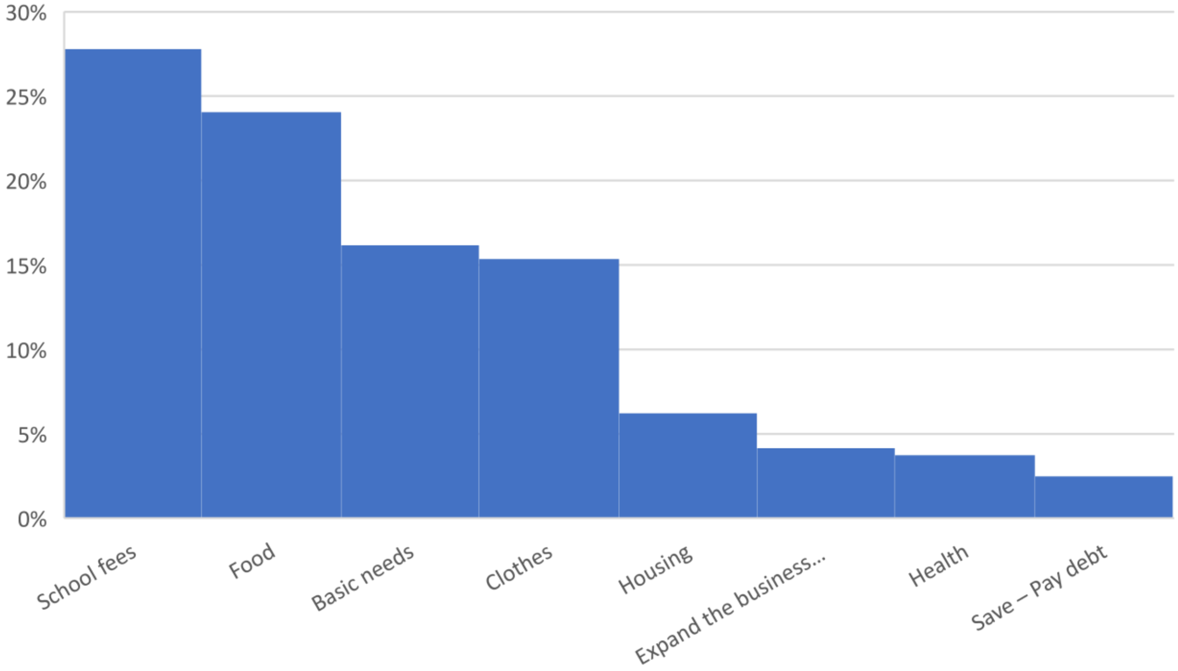
Customer satisfaction-pull
Product: Shiny, black, heavy, right tree species
Service: Location, communication
Trust: Trustworthy in order delivery
Price: Steady price, room for bargaining.



Employment for rural poor local communities

Income statement (Simplified)			
	Cost per bag Kes	Cost per year	
Net operating revenues	670	136010	
Cost of goods sold	100	20300	
Gross profit		115710	
Expense (tools, empty bags, accidents)*		6160	
Fees	10	4060	
Operating income	KSh	105490	
	USD	1049	
Income per work hour**	USD/h		0.50
Daily income per family member***	USD/(day,person)		0.96
*) Annualized costs; **) 2108 h/year; ***) Operator+3 children			

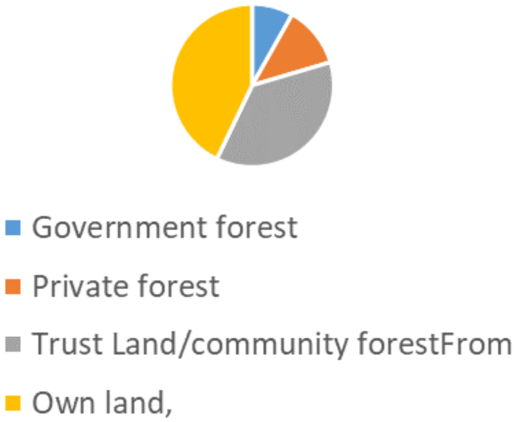
Livelihoods



Charcoal income meeting the livelihood needs of rural poor

Alternative income source	Producers (%)	Transporters (%)	Vendors (%)
Shop	30	25	63
Farm	40	28	5
Food relief	4	0	0
Labourer (e.g. construction)	15	19	21
Hotel	4	0	5
Transport	4	28	3
Various	4	0	3

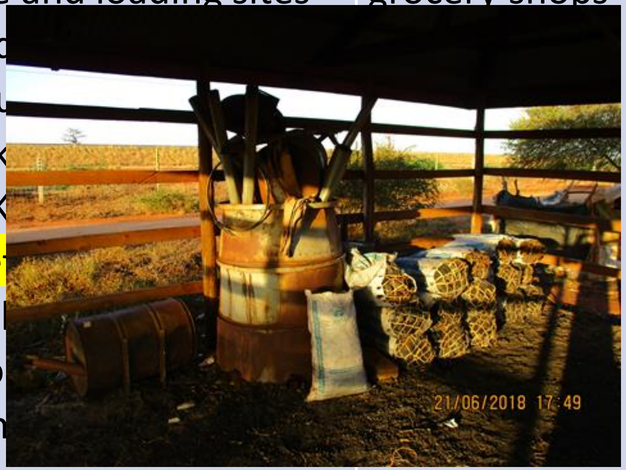
Resources, capabilities, competencies



- 49% producers source woody material from own farmland
- 42% producers source woody material from community forests and trust lands
- 14% producers source woody material from private land
- 9% producers sources woody material from government land

The supply of raw materials is declining

	Production	Transportation	Marketing
Physical resources	• Woody material from forests and trees • Carbonisation site-physically close to source of raw materials • Carbonisation ingredients: sand, stones, grass, animal dung, • Carbonisation tools-axe 24%, jembe 19%, panga 24%, shovel 1%, spade 11% sacks 20%, rake 1%, wheelbarrow 3% • Equipment-earth kiln	• Motorised and non-motorised vehicle • 6-8 wheeled trucks namely lorry and canter, 4-wheeled cars-Probox and van: transport between trading centres and towns. Rented at a fee Kes13,000 per trip • 2- wheeled motorcycle: between production site to roadside and loading sites accessed by produ • Ox/donk bicycle K • Road ne 1,832.2 and into 2,028 kn	Premise, charcoal holding area Premise is physically close to customers in residential areas; semi-permanent structures or grocery shops



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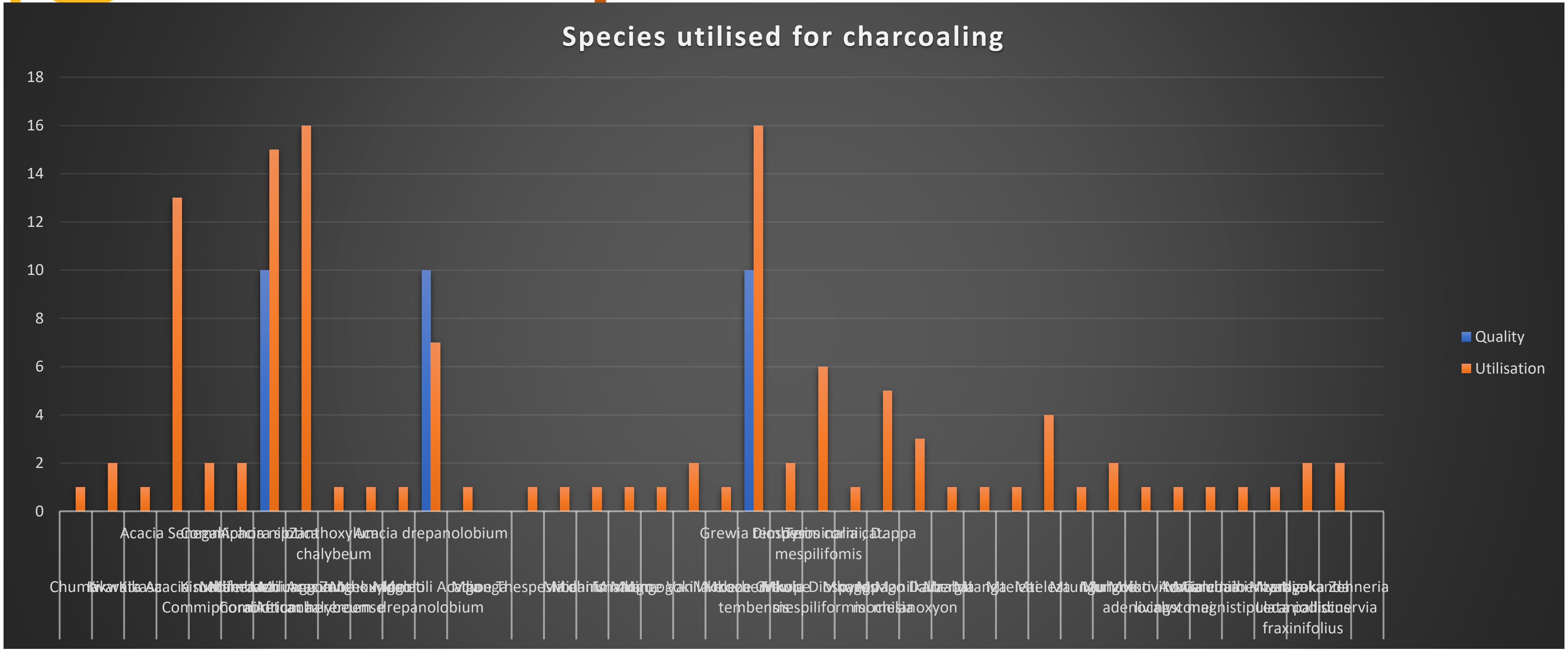
Species utilised



- 19 indigenous and exotic species in ten families used for charcoal production -Taita Taveta, Kwale forests and farm lands, Leguminosae with five species (31%) highest number of species
- Most utilised (>15) mentions: Mchemeri *A. nilotica*, Mchirangombe *C. hereroense*, Mkone *Grewia tembensis*
- Quality species (10 mentions): Mchemeri, Mgololi *A. drepanolobium*, Mkone (10 mentions)

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Technologies

	Production	Transportation	Marketing
Technologies	• Traditional earth mound kiln • Communication technologies- 75-80% mobile telephony coverage: towns, along highways; hinterland are uncovered or limited coverage, • Phone (communication&calculation	• Communication technologies- 75-80% mobile telephony coverage: towns, along highways; hinterland are uncovered or limited coverage, • Phone calculator mobile phone, calculator	• Communication technologies: 75-80% mobile telephony coverage: towns. • Phone calculator

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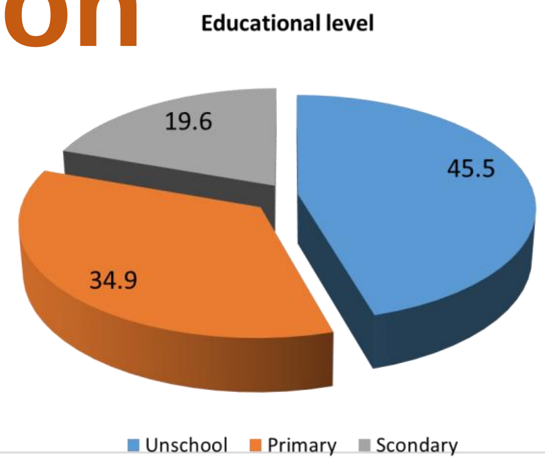
Formal education



	Producers, transporters, Vendors
Apprenticeship -parents	25.8%
Apprenticeship neighbours	25.8%
Brother/sister	8.06%
Friends	12.9%
Association	4.8%
On the job/observing older generations	22.6%

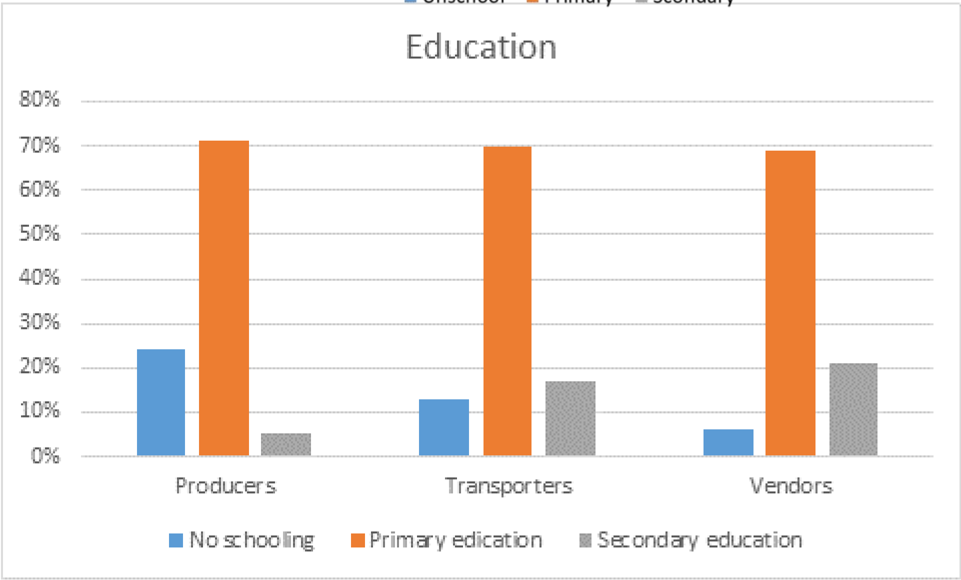


Table. Education level Personal interviews

	No schooling	Primary education	Secondary education
Producers	24%	71%	5%
Transporters	13%	70%	17%
Vendors	6%	69%	21%

Trade is accessible to population segment with little formal education
Most important skills used-numeracy 97-83%, reading skills 72-67%

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Impact of legal control of charcoal production on forests and livelihoods

Charcoal Regulations 2009, Forest Act to reduce deforestation and forest degradation. Charcoal ban in force in Kenya, Niger

Production: Decreased production, **increased illegal production**, **increase in price** of charcoal (Kes 600 to 1000)

Transportation: Volumes declined by 30-35% of recognised CPAs. Transportation– at night using on motorbikes. **External large scale entrepreneurs** have increased. **Imported quantities –** hard to quantify, but permits from Uganda being used to distribute charcoal in Mombasa

Marketing: Irregular supply, declining charcoal quality over burnt charcoal and powder or contaminations/adulteration. vendors sell less due to increased prices, from 20 to 3 bags/day; affecting the overall net income.

Consumer: **Decreased consumption** –At consumption level, **prices have increased** by 100% inconvenient for low income customers who buy in small quantities several times a week.**Imported quantities –** sometimes permits from Uganda being used to distribute charcoal in Mombasa. Ban has **strained household budgets** for both value chain actors and end users/customers.

Impact on vendors

Unable to pay school fees

Breaking of marriages

Inability to meet basic needs – food, housing and clothes

Inability to pay medical bills

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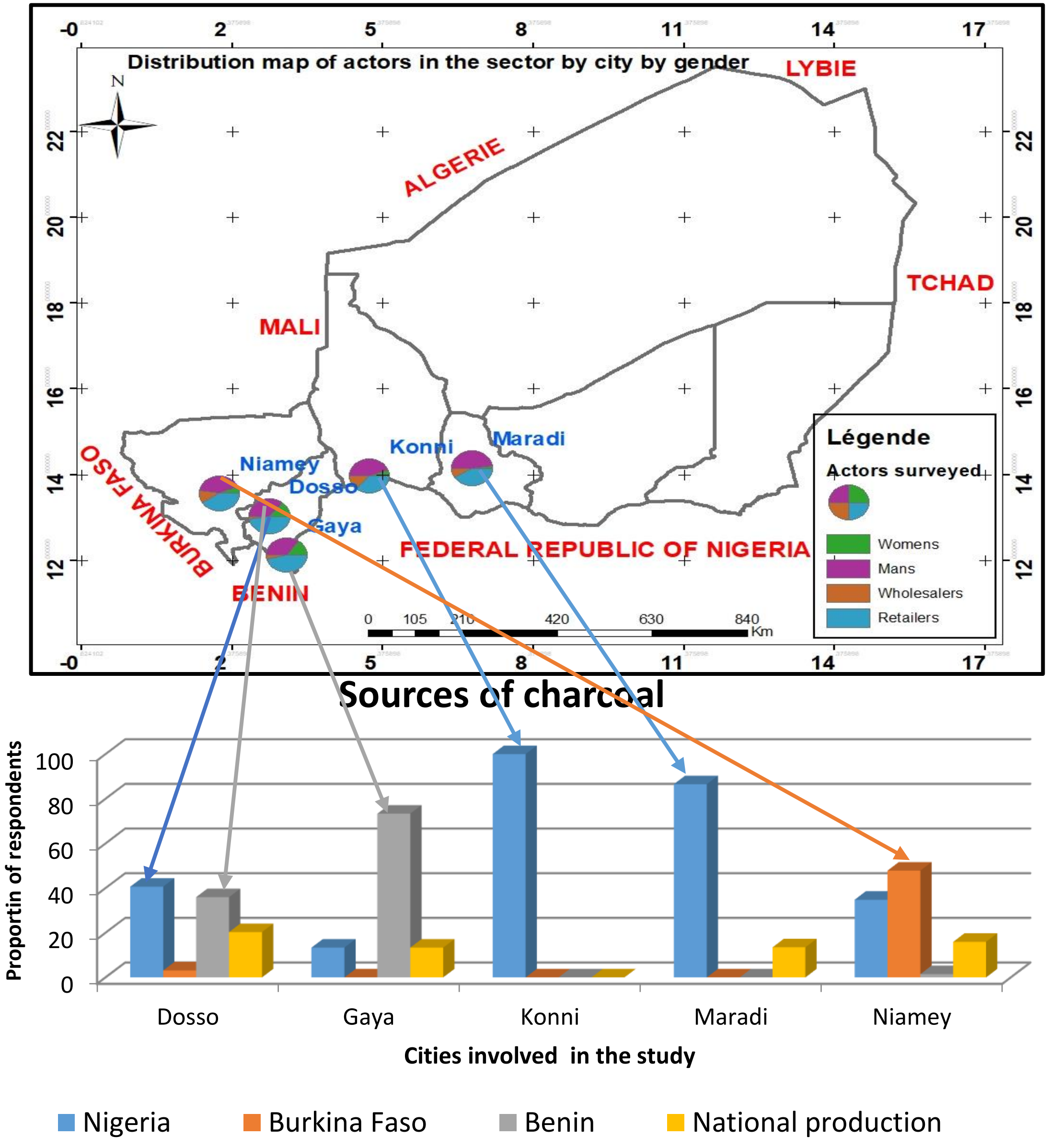
Niger imports



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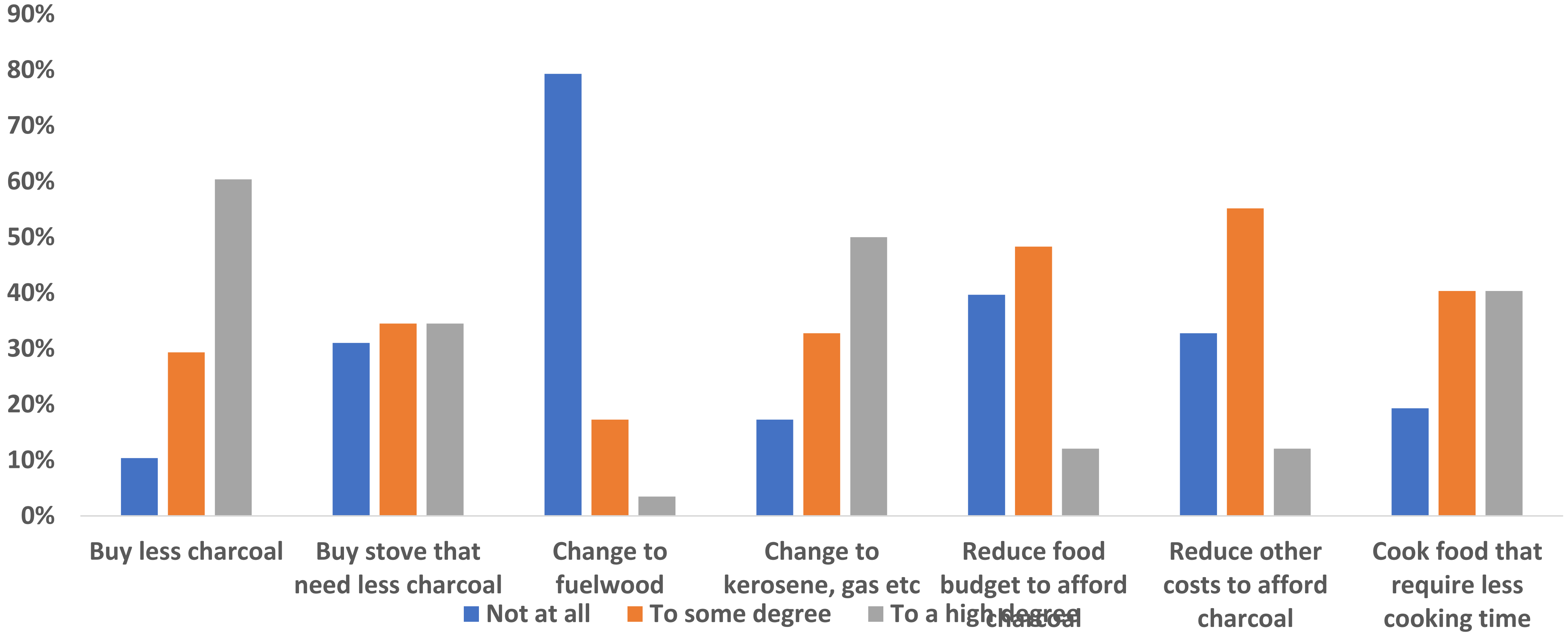
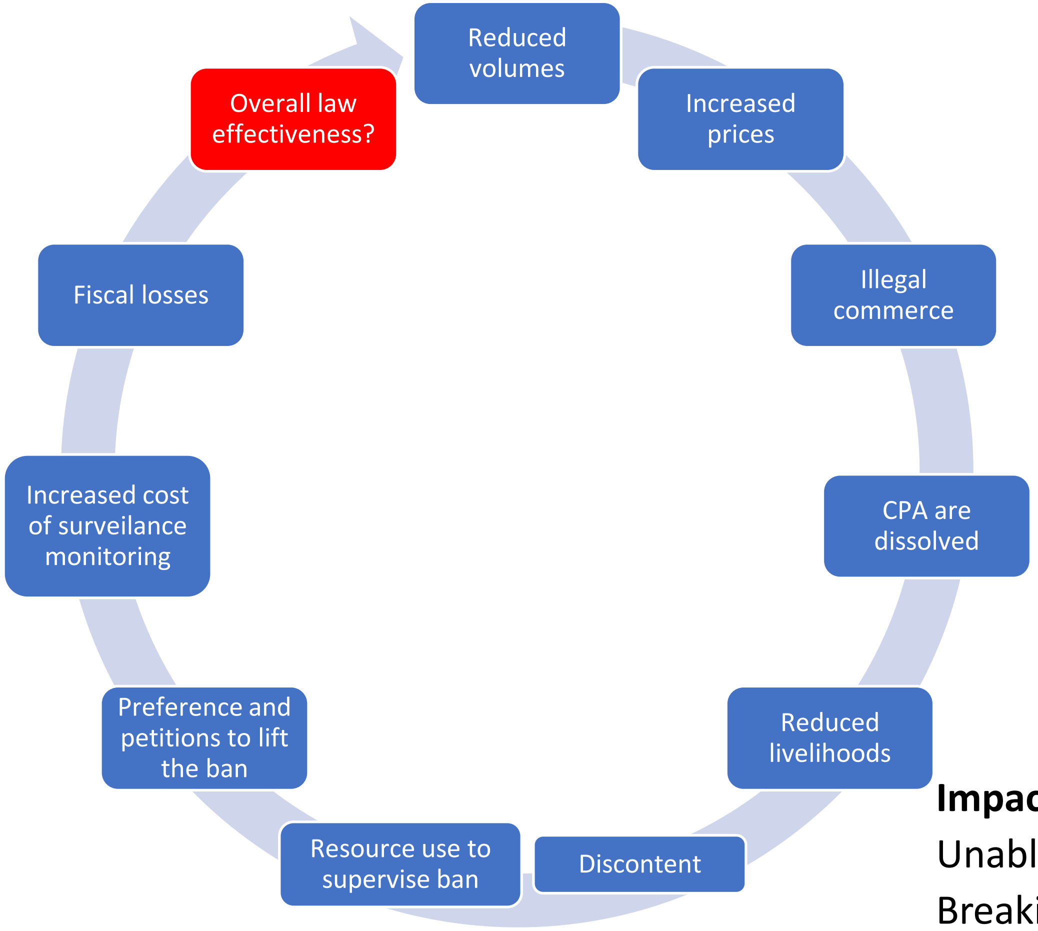
Consumers' coping strategies at households level



Feedback loop



Long term impact on forests cover and sustainability?

How can a positive feedback loop be designed?

Impact on vendors

Unable to pay school fees

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Inability to pay medical bills

Which way

Inclusive socio-economic development

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Focus on SDGs

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https://sustainabledevelopment.un.org/sdgs