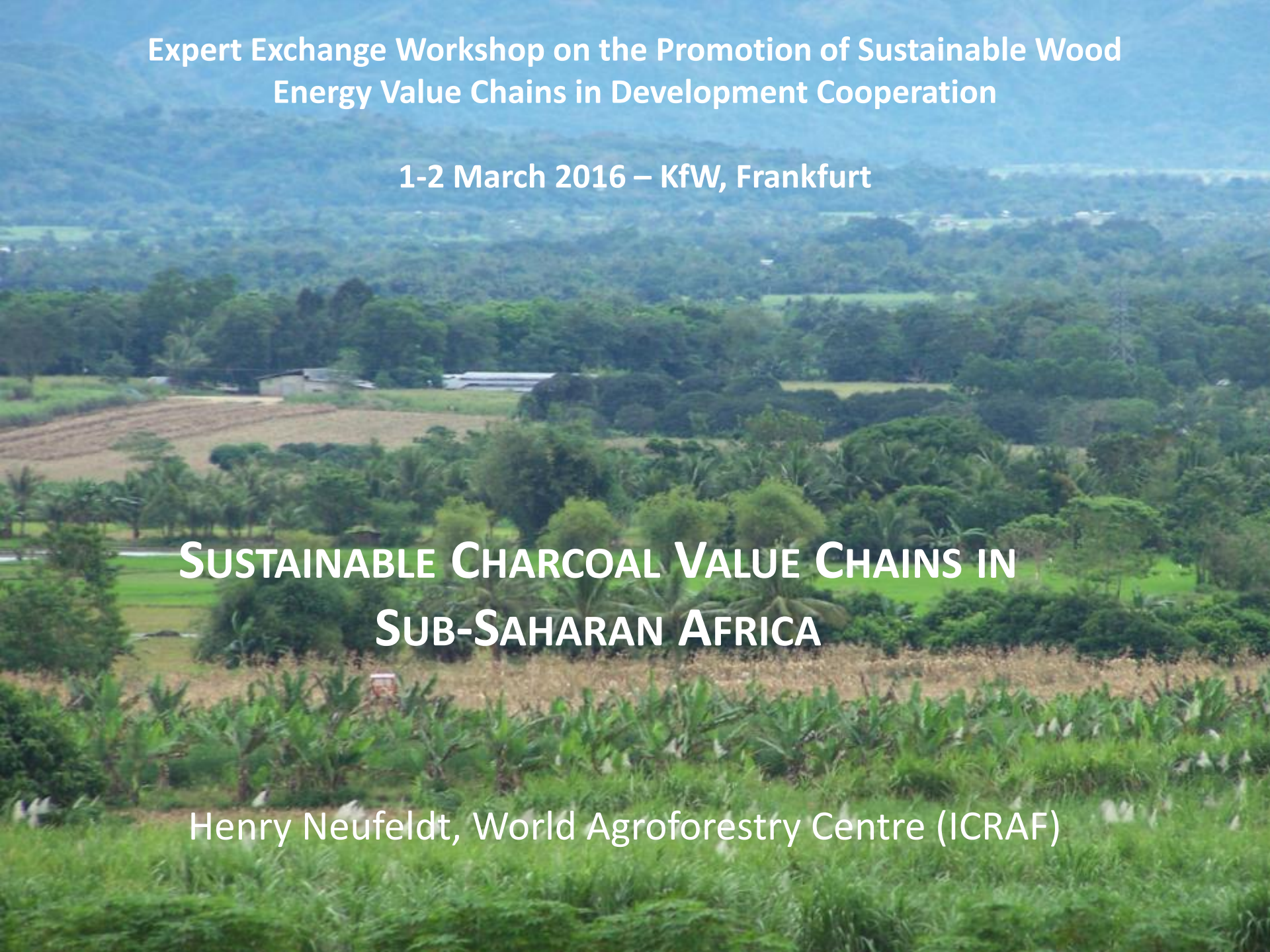
Expert Exchange Workshop on the Promotion of Sustainable Wood Energy Value Chains in Development Cooperation

1-2 March 2016 – KfW, Frankfurt



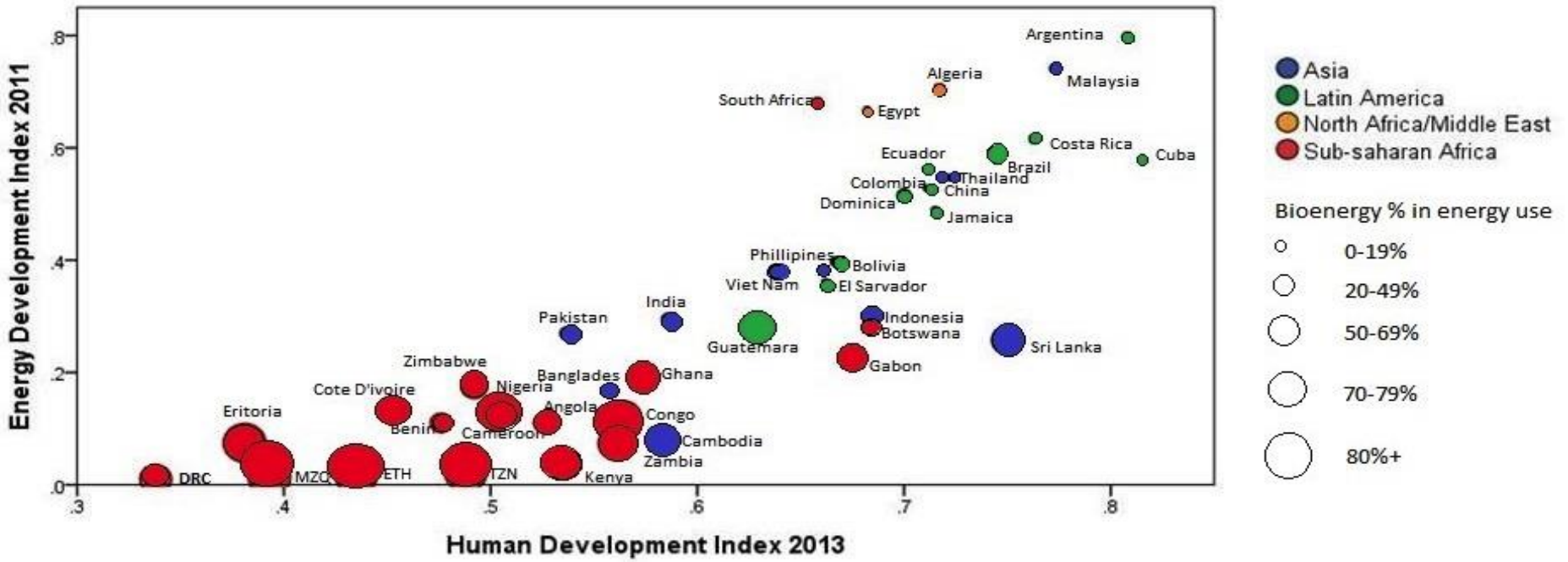
Sustainable Charcoal Value Chains in Sub-Saharan Africa

Henry Neufeldt, World Agroforestry Centre (ICRAF)

SDG7 Ensure access to affordable, reliable, sustainable, and modern energy for all

7.1 by 2030 ensure universal access to affordable, reliable, and modern energy services	50. Share of the population using modern cooking solutions, by urban/rural
	51. Share of the population using reliable electricity, by urban/rural
	7.1. Primary energy by type
7.2 increase substantially the share of renewable energy in the global energy mix by 2030	52. Implicit incentives for low-carbon energy in the electricity sector (measured as US$/MWh or US$ per ton avoided CO_2)
	7.3. Share of energy from renewables
7.3 double the global rate of improvement in energy efficiency by 2030	53. Rate of primary energy intensity improvement
7.a by 2030 enhance international cooperation to facilitate access to clean energy research and technologies, including renewable energy, energy efficiency, and advanced and cleaner fossil fuel technologies, and promote investment in energy infrastructure and clean energy technologies	96. Official development assistance and net private grants as percent of GNI
	95. Domestic revenues allocated to sustainable development as percent of GNI, by sector
	97. Private net flows for sustainable development at market rates as share of high-income country GNI, by sector
	7.2. Fossil fuel subsidies ($ or %GNI)
7.b by 2030 expand infrastructure and upgrade technology for supplying modern and sustainable	51. Share of the population using reliable electricity, by urban/rural
energy services for all in developing countries, particularly LDCs and SIDS	52. Implicit incentives for low-carbon energy in the electricity sector (measured as US$/MWh or US$ per ton avoided CO_2)

The relation between HDI, EDI and bioenergy dependence for the selected developing countries (data: UNDP-HDI, IEA-EDI, WDI – combustible renewables as % in total energy use)



Relative risks for health outcomes from exposure to solid fuel smoke

Strength of evidence	Health outcome	Sex and age group	Relative risk
Strong evidence			
	Acute lower respiratory infection	Children < 5	2.3
	Chronic obstructive pulmonary disease	Women ≥ 30	3.2
	Lung cancer (from exposure to coal smoke)	Women ≥ 30	1.9
Strong evidence for specific groups only			
	Chronic obstructive pulmonary disease	Men ≥ 30	1.8
	Lung cancer (from exposure to coal smoke)	Men ≥ 30	1.5
Limited evidence			
	Lung cancer (from exposure to biomass smoke)	Women ≥ 30	1.5
	Asthma	Children 5–14	1.6
	Asthma	All ≥ 15	1.2
	Cataracts	All ≥ 15	1.3
	Tuberculosis	All ≥ 15	1.5

Source: Desai and others, Indoor smoke from solid fuels: assessing the environmental burden of disease at national and local levels (2004).

Note: Relative risk is defined as the probability of the health outcome in the population exposed to smoke from solid fuels relative to the probability of the health outcome in the population not exposed to smoke from solid fuels. For confidence interval values of the relative risk of health outcomes shown, see Desai and others (2004).

Reduction in acute respiratory infections and acute lower respiratory infections for women and men aged 15–49 by switching the cooking from indoor open fires to different indoor and outdoor stoves, Central Kenya, Laikipia District, Mpala Ranch, 1999

	Disease rate (%)	Disease reduction (%) by switching to…			
	Open fire inside	Ceramic woodstove inside	Charcoal stove inside	Open fire outside	Ceramic woodstove outside
Acute respiratory infection					
Female	7	14	68	15	37
Male	4	2	62	50	58
Acute lower respiratory infection					
Female	2	15	65	17	43
Male	1	10	45	38	42

Source: Ezzati and Kammen, Evaluating the health benefits of transitions in household energy technologies in Kenya (2002).

Note: Disease rate was calculated as the percentage of weekly examinations (in a two-year period) during which a person was diagnosed with acute respiratory infection or acute lower respiratory infection.

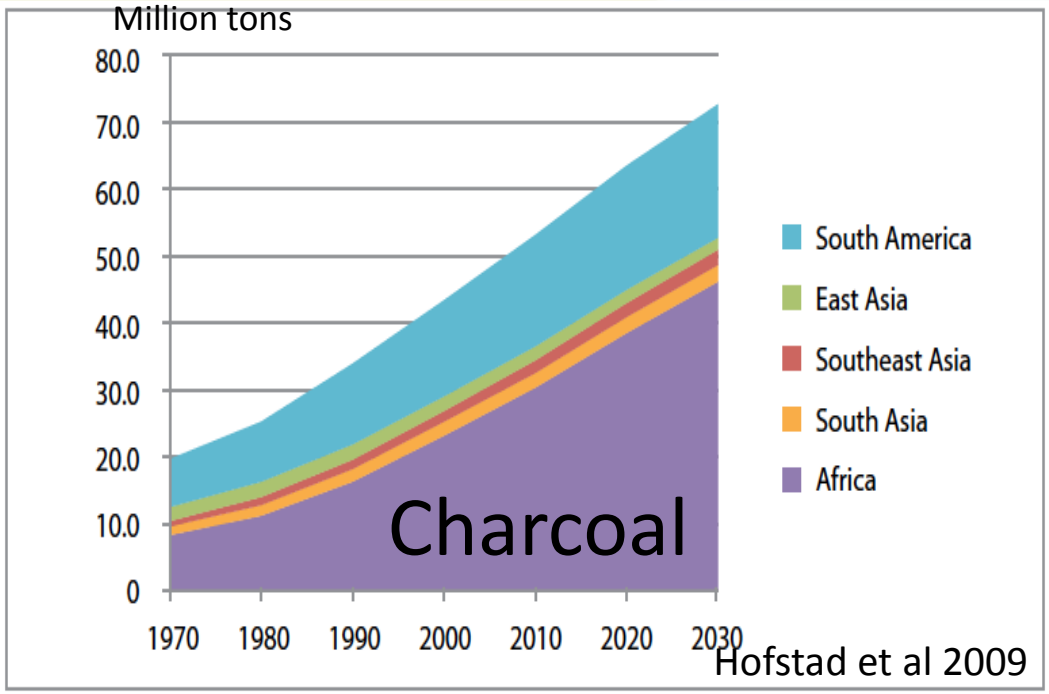
Women and men engaged in firewood collection and average time burden

	Year	Percentage collecting firewood		Average time burden in population (*minutes per day*)	
		Women	Men	Women	Men
Africa					
Benin	1998	22	5	16	4
Ghana	1998/99	35	16	37	30
Madagascar	2001	10	15	7	13
Malawi	2004/05	..	..	19	3
Morocco	1997/98	3	..	3	..
South Africa	2000	5	2	5	3
Asia					
Lao People's Dem. Rep.	2002/03	..	..	18	6
Pakistan	2007	4	2	3	2
Central America					
Nicaragua	1998	9	34	8	39

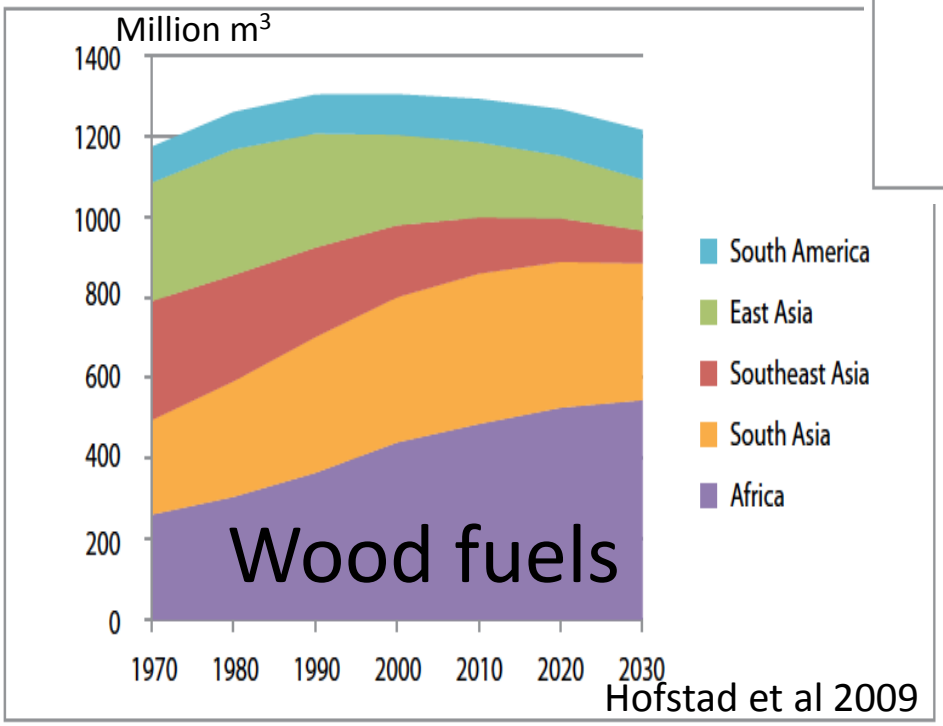
Sources: Compiled by the United Nations Statistics Division from World Bank, *Gender, Time Use, and Poverty in Sub-Saharan Africa* (2006) and time use survey reports from national statistical offices of Lao People's Democratic Republic, Nicaragua, Pakistan and South Africa.

Note: Average time burden in population is calculated taking into account those involved in firewood collection as well as those not involved. Data may not be strictly comparable across countries as the methods involved for data collection may differ.

In Africa 80% of energy is derived from firewood and charcoal

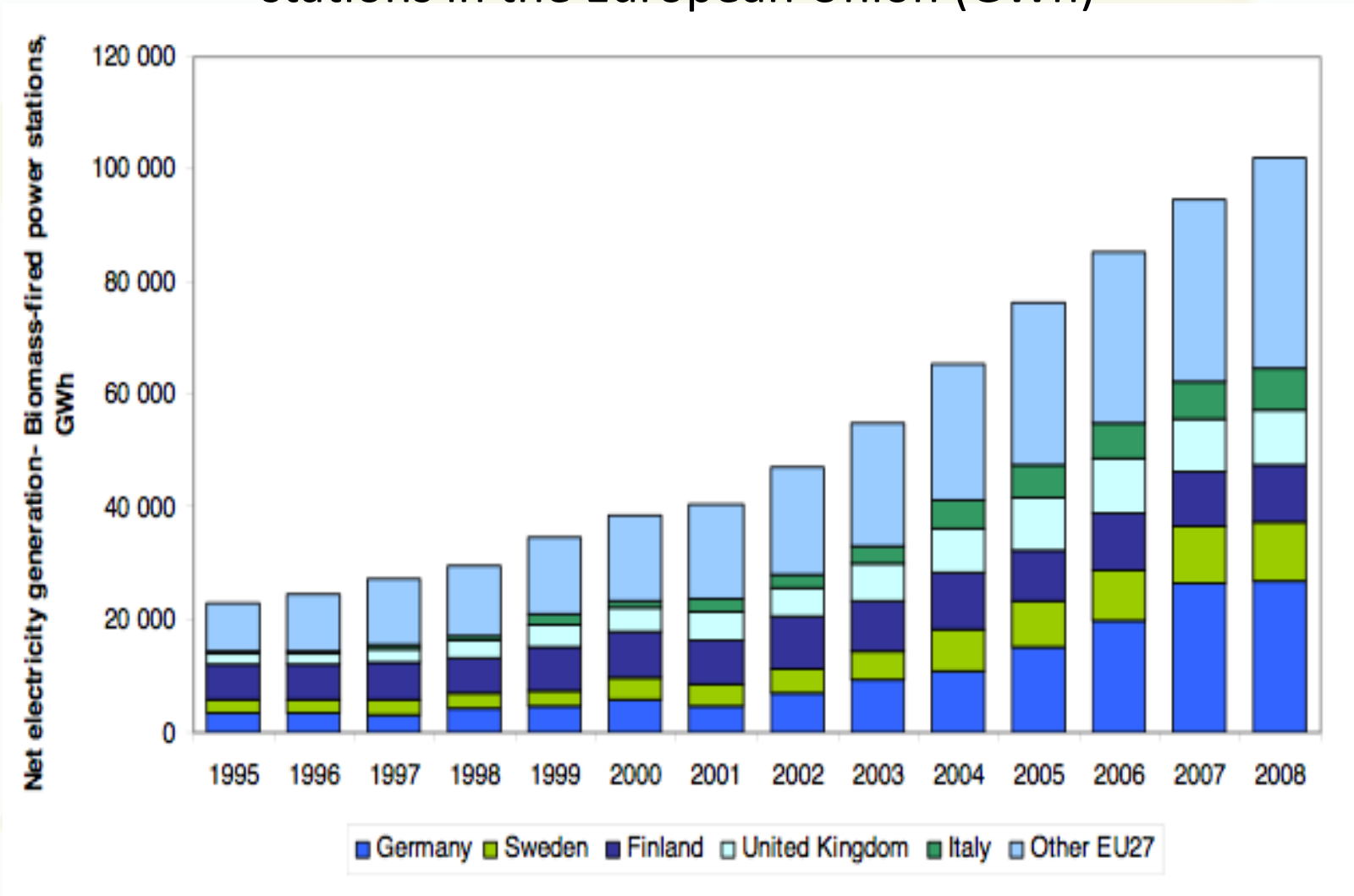


Hofstad et al 2009



Hofstad et al 2009

Current electricity generation from biomass-fired power stations in the European Union (GWh)



Charcoal is among the most commercialized resources in SSA; many stakeholders are competing for profit margins at different stages of the value chain from rural supply centres to urban demand centres

- US$8b revenue +7m employment in 2007; estimated US$12b+12m by 2030
- complex and multi-layered “command and control”-type regulatory contexts, which result in an unclear framework for stakeholders operating in the sector

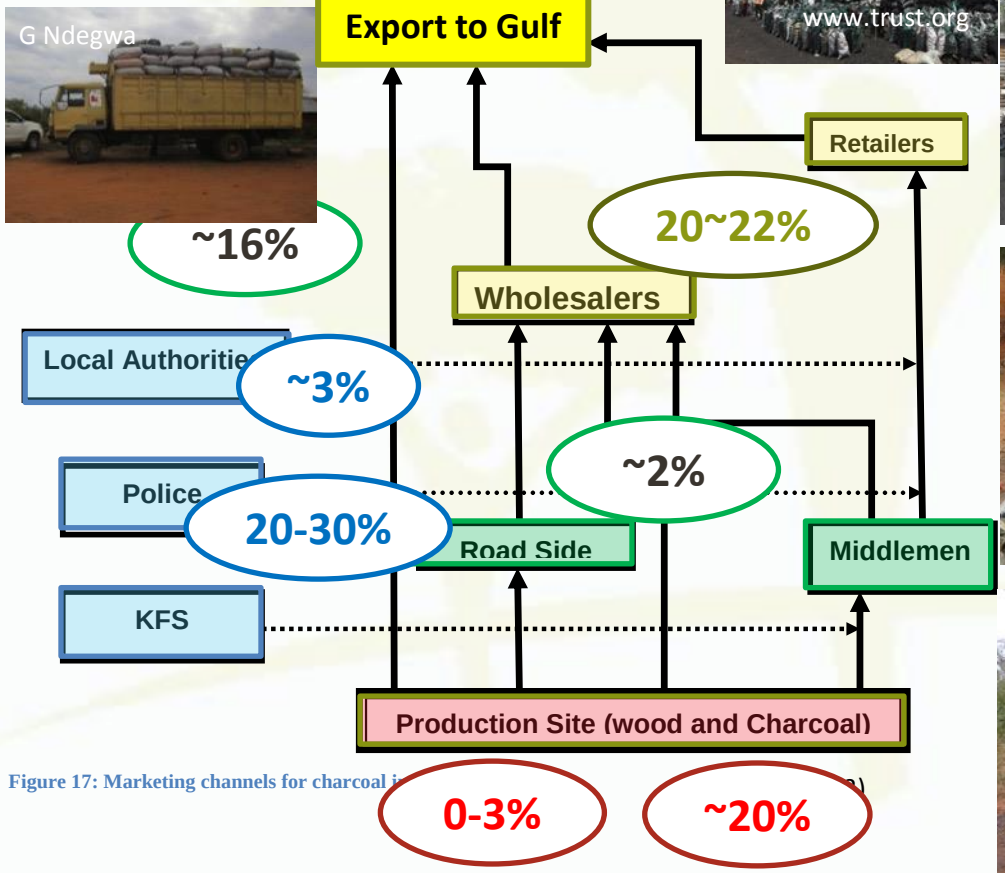


Figure 17: Marketing channels for charcoal i

Rural-urban linkages

Rural landscapes are sources of charcoal for urban centres

Over 80% of urban households in Eastern and most of Southern Africa region use charcoal

9 out of 10 households use firewood in rural areas

Efficienct cooking systems

Factors: Wood, cook stoves, ventilation, user behaviour

- Saves 40% fuel Vs traditioanal 3 stone stove
- Yield 20% charcoal

- Reduce CO, $PM_{2.5}$ by 45% and 90% Vs 3 stone stove

Sustainable wood energy production

In SSA, 90% of the population rely on woodfuel (firewood and charcoal) (IEA, 2006).

Kenya 2.5m t/year or 6850 t/day 87% of it is from private and communal farms in drylands

biomass = 40 t/ha

biomass = 70 t/ha

biomass = 260 t/ha

10% kiln need 68500t & 1720ha

30% kiln need 22605t & 565ha

Landscape restoration

- Coppice management of native species. *Acacia* drepanolobium 18t/ha of wood for charcoal 12-14yrs rotation (1.8-5.95t/ha charcoal)
- FMNR in Senegal adopted in over 50,000 hectares of farmland within a 4 year period http://fmnrhub.com.au/,
- Domestication of preferred woodfuel species -*yield more than native stands 6 year rotation+honey, pasture*

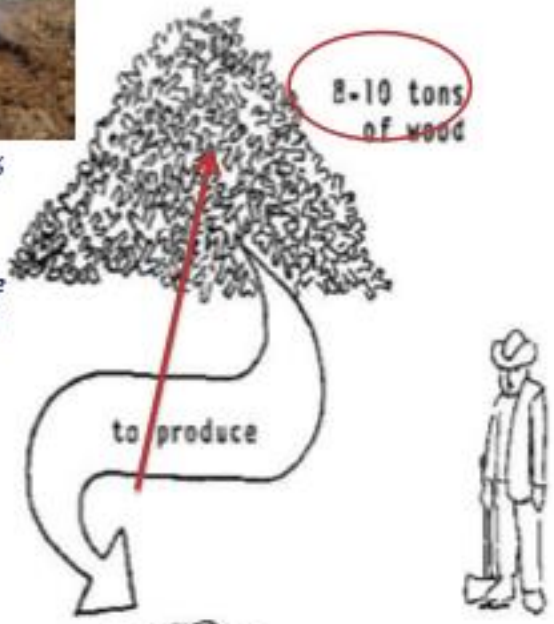
- In Embu Kenya 40% of households exclusively source firewood from trees on farm

Business-as-usual

Selective one-off cutting of live hard wood species, leading to degradation & biodiversity loss

Earth Kiln – 10%

- *Extremely inefficient*
- *Done on site where trees are cut*



Earth Kiln – efficiency ±10% low capital, skills required, done on site

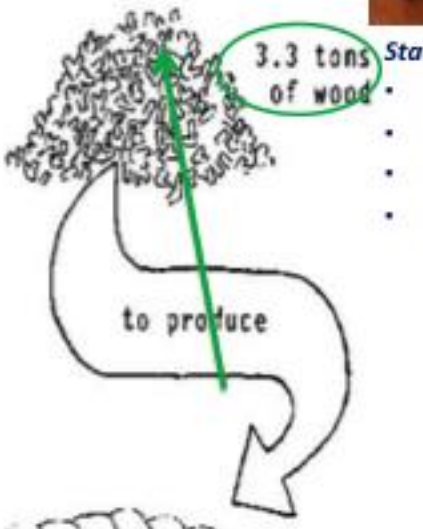
Open fire or inefficient stoves, causing indoor air pollutions

Sustainable charcoal

Sustainable harvest of wood on farm ex. agroforestry, reducing pressures on forests

Stationary Kiln -30%+?

- *Efficient*
- *Capital intensive*
- *Need skills*
- *Inmobile*



Efficient kilns– efficiency ±30% but capital intensive, need skills, immobile

Improved stoves, save up to 10-60% biomass, cleaner combustion

Available online at www.sciencedirect.com

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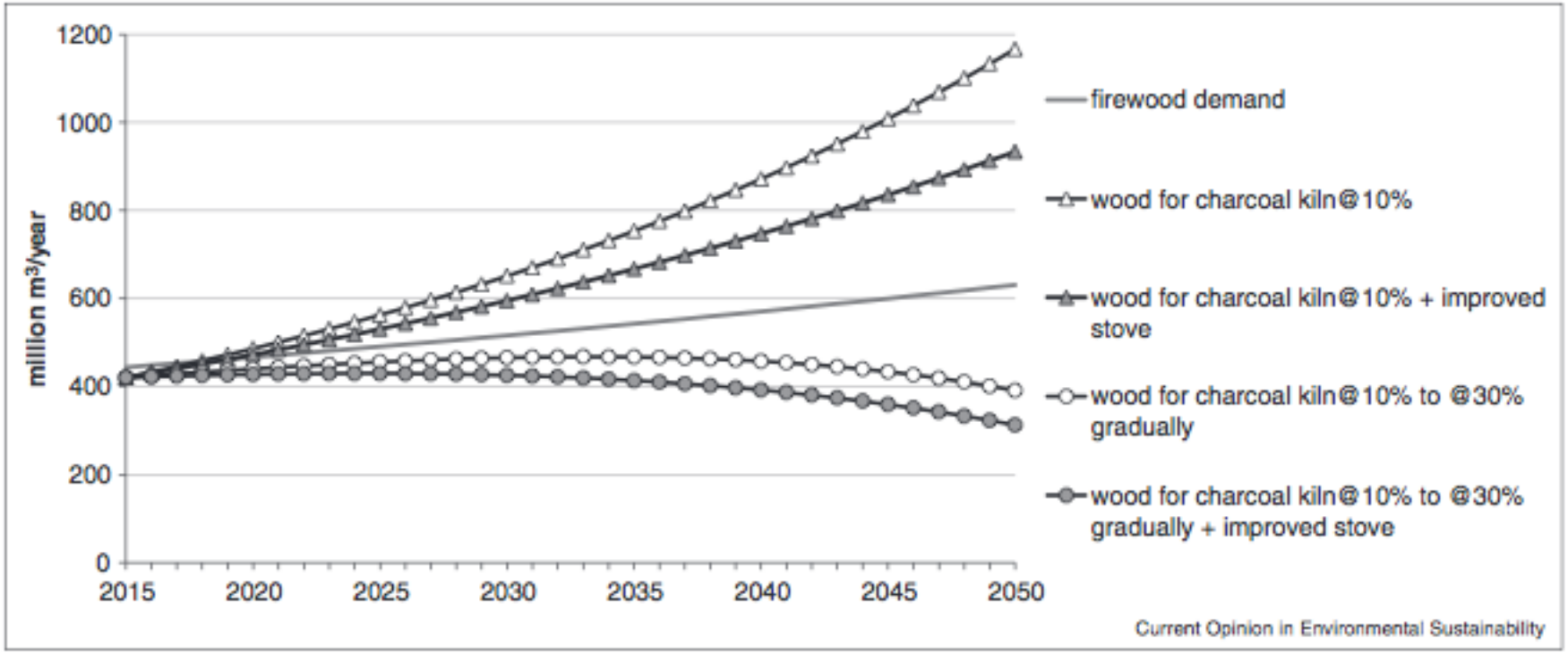
Current Opinion in Environmental Sustainability

The potential of agroforestry in the provision of sustainable woodfuel in sub-Saharan Africa☆

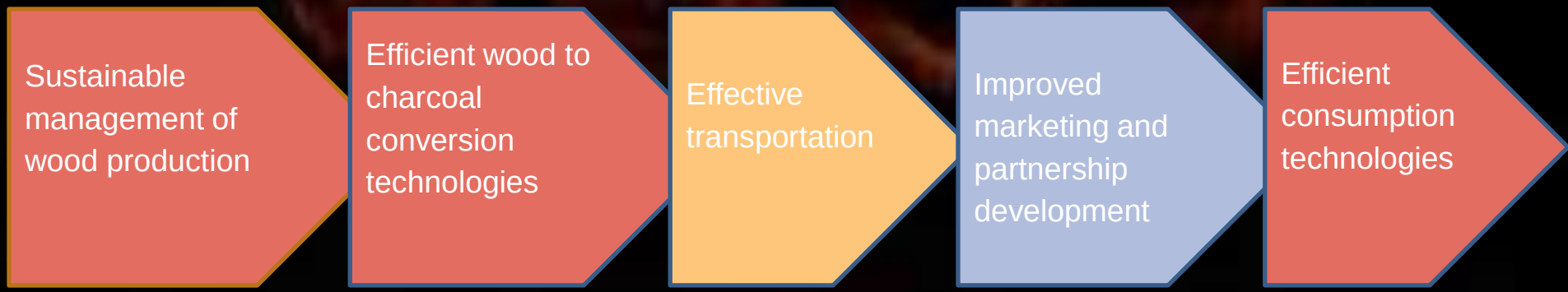
Miyuki Iiyama[1], Henry Neufeldt[1], Philip Dobie[1], Mary Njenga[1,2], Geoffrey Ndegwa[1,3] and Ramni Jamnadass[1]



Projected woodfuel demand under different kiln and stove efficiency scenarios in sub-Saharan Africa. Notes: Where there were obvious reporting errors on charcoal demand in FAOSTAT for individual countries, figures were adjusted when other national data on consumption were available.

Challenges facing development of sustinable woodfuel

- Negative perception: more negative than nurturing
- Inadequate funding and investment in wood energy
- Policy: more controlling than enabling and regulating
- Localizing improved cooking systems



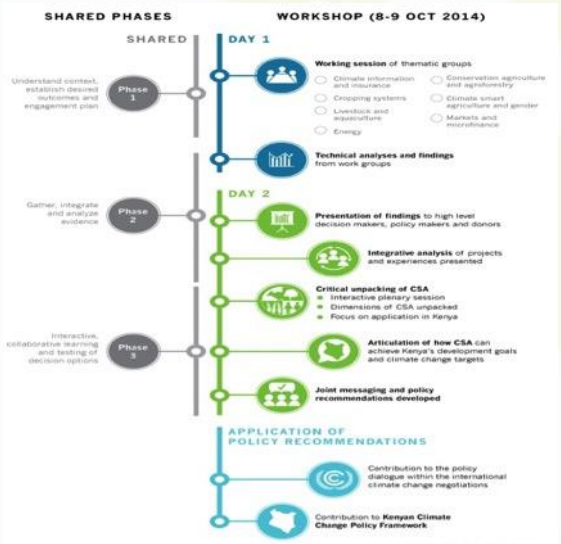
Barriers to adoption of agroforestry in smallholder agriculture

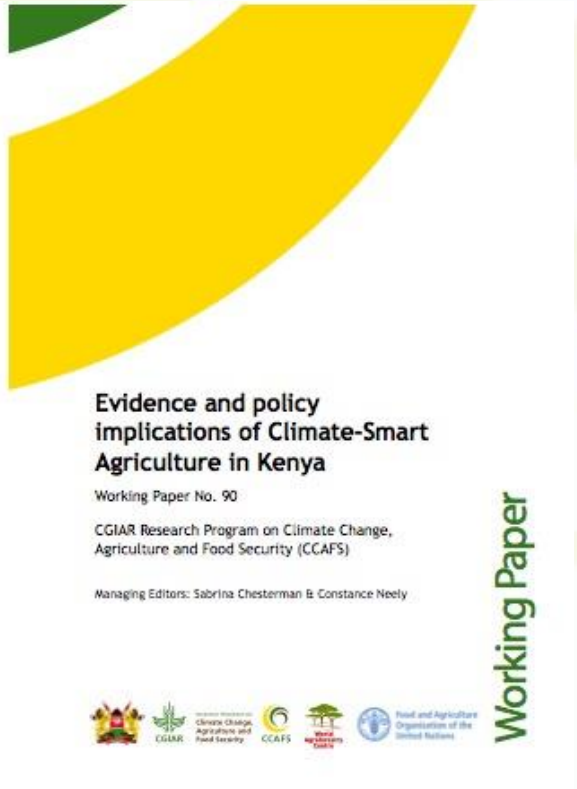
- Provide an enabling legal and political environment
- Improve market accessibility
- Involve farmers in the project-planning process
- Improve access to knowledge and training
- Introduce more secure tenure
- Overcome the barriers of high opportunity costs to land
- Improve access to farm implements and capital

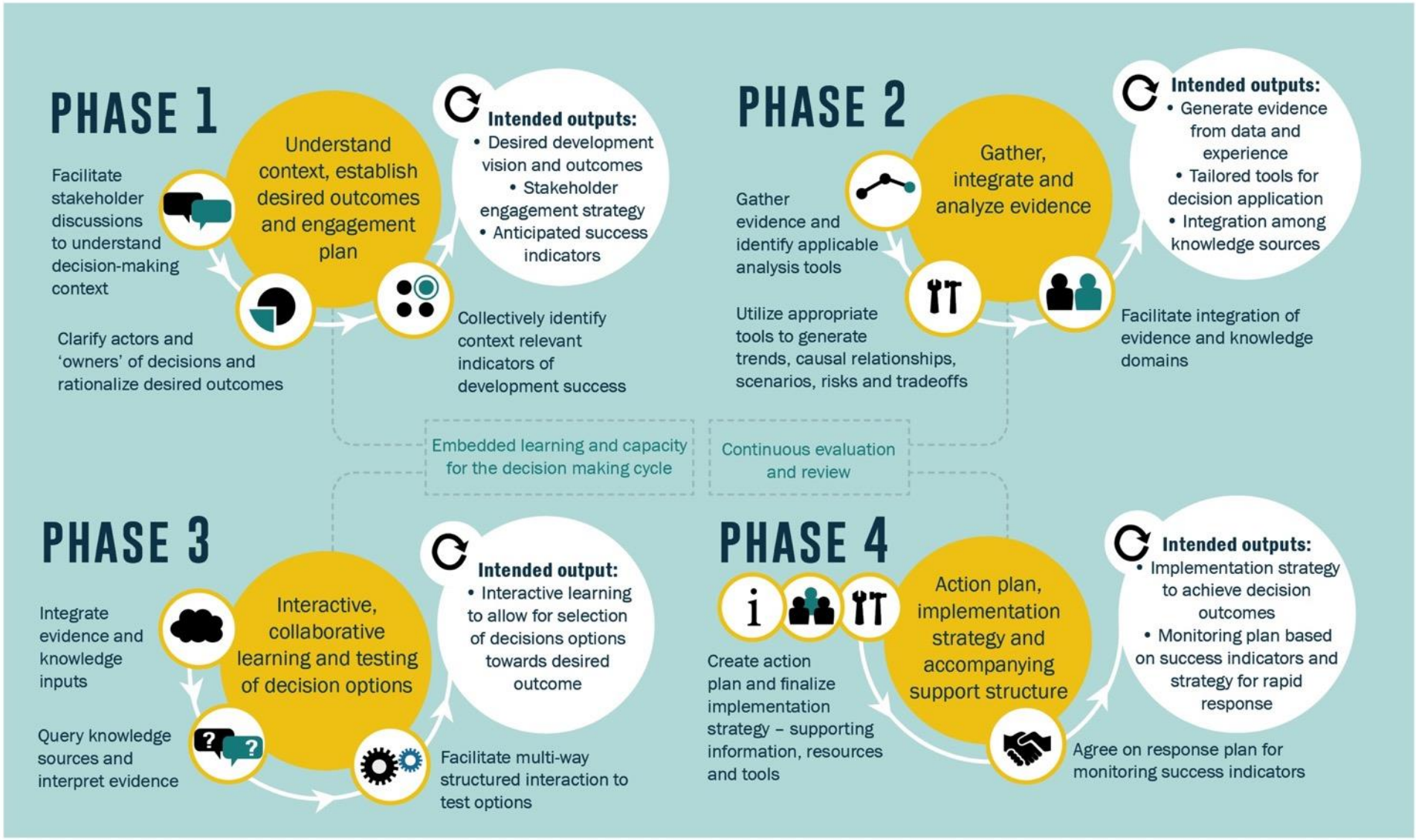
Thorlakson and Neufeldt, 2012

Integrating knowledge systems to advance climate-smart agriculture (CSA) in Kenya

Using the principles and structure of the SHARED framework, researchers, development actors, farmer leaders and decision makers convened at the Kenya National Climate Change Agriculture Workshop to share scientific and experiential evidence to enhance collective knowledge and decision making around CSA in integrated farming systems. Synthesized information was critically examined, resulting in a technical document on the State of CSA in Kenya as well as policy recommendations to the National CC Policy Framework and the UNFCCC.



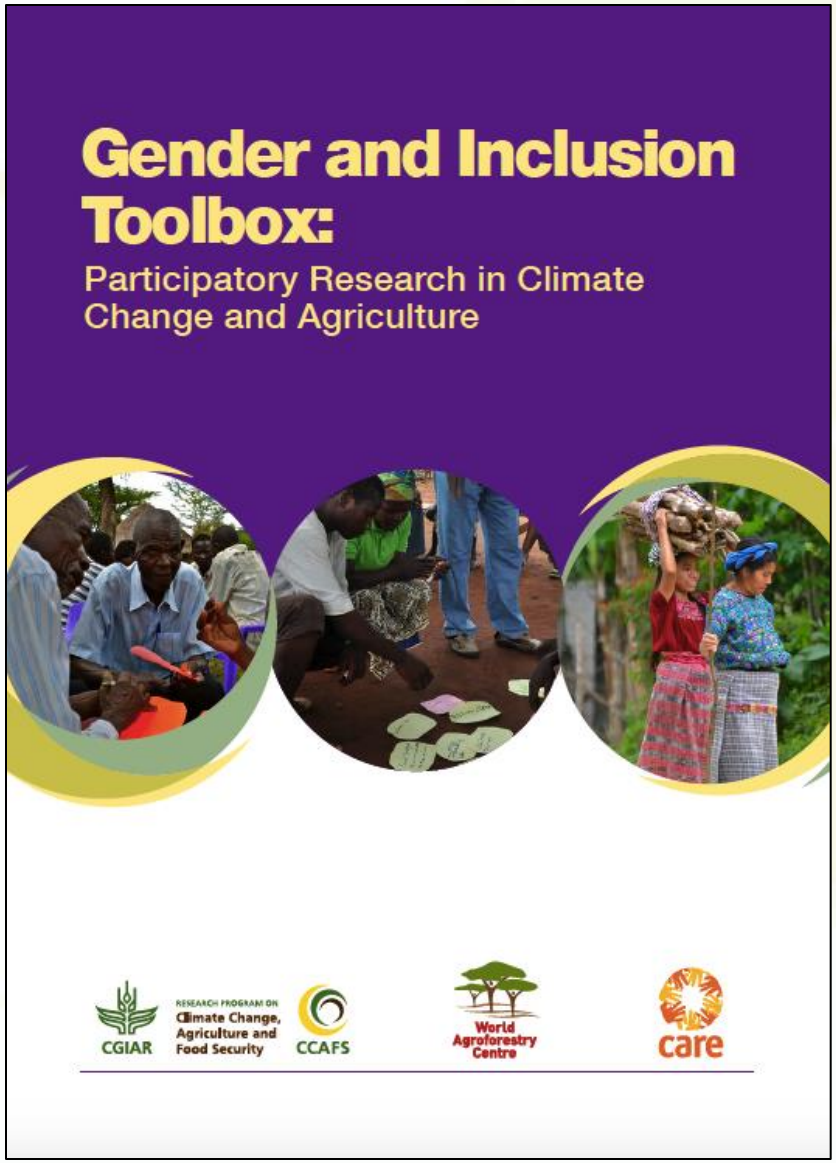




SHARED
the decision-making hub

World Agroforestry Centre

CSA AT ICRAF



- Gender and inclusion for resilience*
  - Moving from sex disaggregated diagnostic research towards informing, catalyzing and targeting adaptation and mitigation solutions to women
  - Finding: Gender norms must be addressed to achieve the SDGs and CGIAR IDO

Thanks for a future