
Introduction of improved biomass appliances, observations from the Nhambita project, Mozambique.

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Pro-poor innovation – The case of effective biomass usage in rural households

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Purpose of research

- Pre-feasibility study: introducing ICS to offset carbon emissions in the context of an avoided deforestation and reforestation project
 - Kitchen regime and energy consumption patterns
 - Introduction of ICS: contextual rationale and indicative social response
 - Unveiling social response to carbon projects in the context of REDD
 - Key questions:
 - Can an ICS Carbon offset project 'fit within' a REDD project?
 - Ultimately, what constitutes the most compelling argument for wood stove dissemination in Africa?
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Content

- Research challenges & Methodology
 - Introduction to the project
 - Findings: wood consumption, wood collection patterns and kitchen regimes & fire uses and customs
 - Past and present ICS dissemination paradigms
 - Lessons learnt on the introduction of the Stove Tec and preliminary social response to the stoves
 - Specific conclusions for Nhambita and more general conclusions on ICS dissemination
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Research Challenges

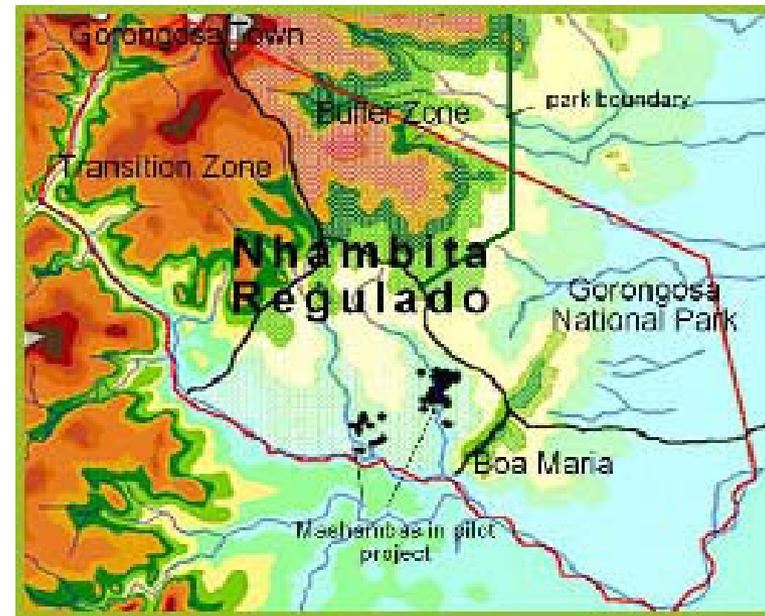
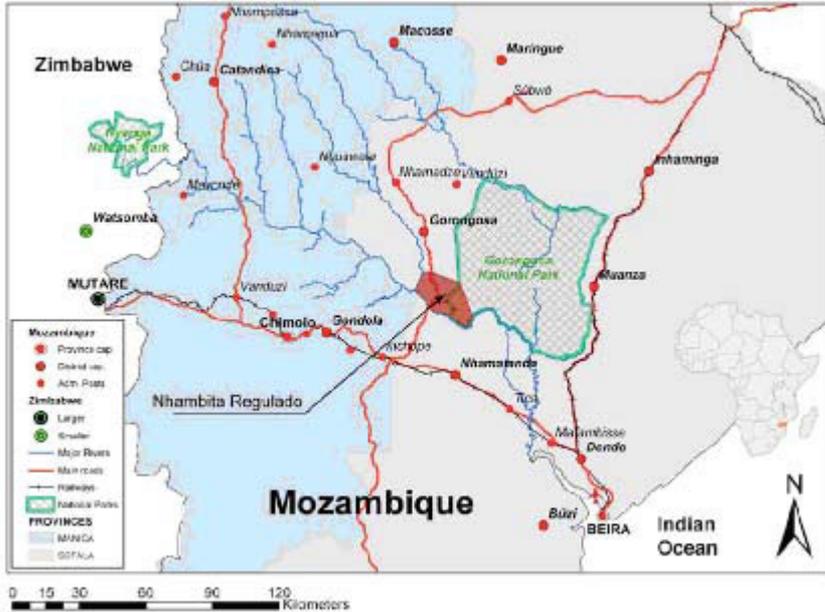
- Multiple audience/partners: SA Sustainability Institute, DIE, ProBec, Envirotrade
 - Logistics (transport, customs duties, funding, etc.)
 - Difficult concepts:
 - household – taken as an “economic unit” (Adegboyega *et al*, 1997)
 - wealth
 - Validity of information?
 - Time constraints
 - Illiteracy, concept of time and quantities problematic
 - Interpretation obscured by language, culture and unspoken codes
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Methodology

- Random sampling: 40 semi-structured interviews (control group)
 - socio-economic baseline of households (HH),
 - kitchen regimes (source: Golden Std, Restio Energy group, ProBec)
 - wood collection regimes
 - interaction with natural resources
 - A glimpse into local cultural codes
- Selection of 20 HH for the pilot research on ICTs (target group)
- 2 participatory rural appraisal sessions
- 6 focus group discussions with the women of the 20 selected HH
- Literature review



Project overview



Research focus on 3 settlements:
Nhambita, Boa Maria and
Munhanganha

>1000 inhabitants

5.3 people per HH

Project overview cont.

- Set up 2003 - University of Edinburgh and Edinburgh Centre for Carbon Management (ECCM), managed by Envirotrade, original contribution by ICRAF
 - Funding: European Commission, DFID, Envirotrade
 - Concept: pilot 35,000 hectare area in the buffer zone around the Park ("human fence")
 - "a new way of doing business" = BOP?
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Determining fuel wood consumption levels

- Daily amounts of wood measured (Hiemstra-van der Horst and Hovorka (2008)) with a spring balance & cross checked
- seasonal variations could not be established (Shackleton 2008; Brouwer & Fãlçao 2004)



Wood consumption patterns cont.

- average annual consumption of fire wood per capita is 1.62m^3 (= 4.6 kg p.c per day with SD of 7.77).
- O'Keefe (1984) estimated fuel wood consumption in African savannahs from 1.1 to 1.7 m^3 per year p.c
- Relative high consumption (in Mozambican cities it is estimated between 0.8 to 1 m^3)
- (perceived) abundance of resource, which is visible through cultural uses and customs:
 - 58% of HH indicated leaving their fire burning throughout the day
 - 20% of HH had two fires burning at the same time at a given time of the day.



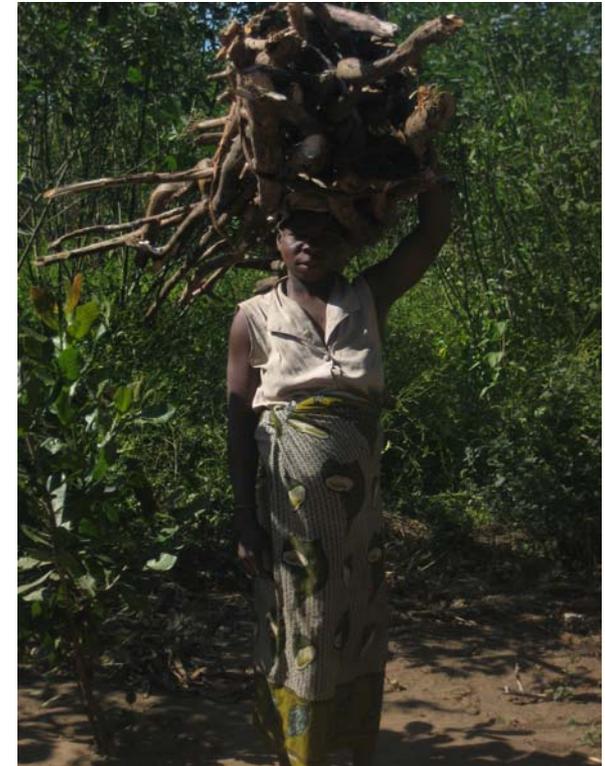
Kitchen regimes

- 7 HH use fire wood commercially
- HH on average cooked 2.6 meals per day
- 98% cooked exclusively on a 3 stone fires
- 4 HH had a charcoal stove
- 50% had a fire place inside their main house or kitchen
- HH indicated in 95 % of cases that they cooked mostly outside – only 2 HH indicated that they cooked all meals inside in all seasons



Wood collection

- Wood collectors: 2.2 people per HH
- Almost exclusively women and children but 37.5% of households reported that men played a part in it.
- 2.3 trips per week
- 6 bundles of wood per week per HH on average, with bundles from 6 to 28 kg
- 50% of HH used a tool (knife or/and machete)
- On average 1 hour per trip – 2.5 km
- 46 % of people indicated that they collect wood from the machamba



Uses and customs around fire: implications on the use of ICS

- Smoke used as an insect repellent
- Different fires for different economic units
- “Dual fire” // Gender division
- 20 % of observed HH had two fires burning at the same time at any given time of the day.



Background on ICS dissemination past/prevaling paradigms

Time period	Argument used for ICS dissemination	Rational/market ing argument	Actors	Outcome	Comments
1960's	Livelihoods' improvement	Alleviate the Poor's energy related burdens	Various donors	Limited impact	Untargeted donor driven approach The promotion of the approach was not complemented by products suitable to local needs
1970's	Wood fuel crisis	Depletion of forests in developing countries	National governments, NGOs	Failure	In that time period the stoves were designed in laboratories Lack of field testing leading to inadequate stoves
1970's to date	Health	Livelihood benefits through the reduction of PIC, the main cause of Indoor Air Pollution (IAP) a large cause of mortality	WHO NGOs	Mitigated impact	The approach is donor driven and the health argument is not a "push" factor for the end user. Health considerations made the case for stove design, since some stoves appeared to increase the emission of health damaging particulates, such as the " <i>rice-fuelled improved mud stove which has sixteen times the TSP emissions of a traditional stove burning the same fuel.</i> " (Avis, 2004:39)
1997 with the advent of the CDM	Carbon trading	Sustainable development and climate change mitigation (Rosales and Pronove, 2002).	Private companies in partnership with host countries and NGOs	Too early to assess	Rarely considered in stove dissemination programmes (Ballard-Tremeez, 2004, as cited in Avis 2004). Methodologies are complex and contradictory. More gases should be included under the Kyoto Protocol and the definition of non renewable biomass should be revised to reflect the reality on the ground.

'Feasibility' of ICS carbon offset projects

- Perceived shortcomings of ICS from carbon trading perspective:
 - Kyoto Protocol excludes 'black carbon' from the noxious gases which could be avoided from the use of ICS
 - 3 assumptions to make ICS effective Co2 mitigation tools (additionality):
 - i) that the ICS used reduces GHG emissions;
 - ii) that the biomass 'saved' through the use of these stoves would have otherwise disappeared and further endangered a local ecosystem
 - iii) that the stoves will be effectively used by the intended beneficiaries.
 - Questionable definition of non renewable status of biomass (UNFCCC and GS methodologies)

Introduction of stoves

- Introduction of green fire one door wood cook stoves
- 2 hour training (Stovetec training manual)
- 5 days trial run to decide of StoveTec purchase
- 200 Meticaes (4 US\$) over 2 installments
- 19/20 stoves purchased
- Call for caution
 - more education was required
 - the response to the stoves is conditioned by the way and the environment in which stoves are introduced
- Women were at first shy to use stoves
- After care required in response to a perceived discriminatory process



Issue of pricing

- Importance of a realistic market value
 - Difficulty to “pitch” the price out of broader distributional intent
- Hypothesis on WTP (Willingness to Pay)
 - 200Mts too little
 - All respondents would have bought stoves for 300 Mts;
 - A few would have bought it for 500 Mts

Cost Item ⁵	Assumed amounts (American Dollars - US\$)	Assumed amount (Mozambican Meticaes -Mts)	Assumed amounts (South African Rand - ZAR)
Stove out of factory	9.4	272	68
Import duty: 65% of original value of each unit	6.11	177	44.3
Transportation: 40% of original value of each unit	3.76	109	27.3
Total	19.3	559	140

Source: Author, based on Pers Com with van Zyl (2009) and Aitken (2009).

Responses to stoves? (Limited findings to date)

- Enthusiastic response
 - the packaging was one of its most impressive attributes (conventional marketing approach)
 - Versatility of stoves for different stove
 - Deemed the greatest asset of the HH, cooking 'staged' for neighbors
 - Embracing epitomized by local renaming of the pot parts



But....

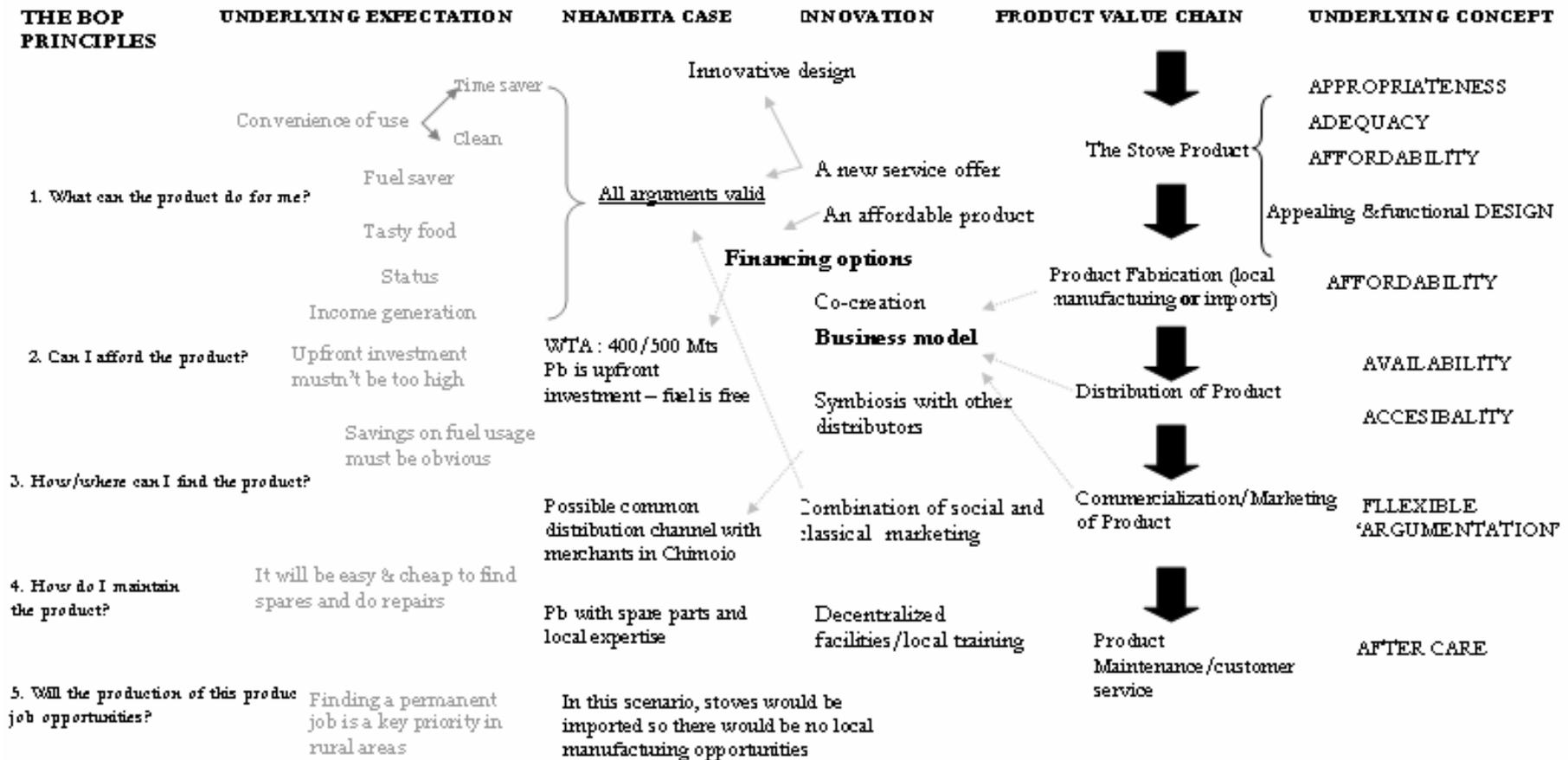
- Women still found to light 2 fires
- now it might be easier to have 2 stoves on the fire at the same time, which encourages dual (if not triple) fire scenarios
- Hypothesis: the wood freed up will be combusted anyhow because of the perceived abundance
- Potential 'rebound' effect of technological advancement
- Are the stoves still in use?



Conclusions. Relevance of ICS arguments in the case of Nhambita

Environmental benefits		
Reduced deforestation and forest degradation	Most respondents indicated that wood supply was not an issue	Medium relevance <i>The argument is valid but context of Nhambita as project</i>
Reduced indoors air pollution (IAP)	Most respondents did not perceive IAP as an issue.	Irrelevant
Reduction in use of dung and crop residues means more fertiliser available for soil	Only crop residues are used Very few households use fertilizers and no manure is applied to the soils.	Irrelevant
Reduced GHGs emissions.	People are not aware of GHGs issues and do not feel concerned. To them they are planting trees because they are getting paid and they address the needs of "people in Europe who are running out of oxygen"	Irrelevant <i>It is assumed that the divi</i>
Economic benefits		
Reduced fuel cost	People do not pay for fuel – all biomass resources are free.	Irrelevant
Income generation for stove producers	Not applicable	Irrelevant
Increased time for income generating activities for stove users	Wood collection is the less time consuming of all house chores.	Irrelevant <i>Should a StoveTec proje community, they would be activities would be generate</i>
Social benefits		
Improved respiratory and general health	Out of 40 households, only 1 indicated that smoke constituted a health concern. Fire is not seen as a danger to children either.	Irrelevant
Reduced eye irritation	Not applicable	Irrelevant
Reduced cooking times	This is highly applicable since women indicated that they spent a lot of time cooking	Highly relevant
Less time spent gathering fuel, more time for women and children to pursue other activities; educational benefits for children	Women appreciated the convenience of a stove that did not require so much supervision of the pots whilst cooking. Many women indicated that they often carried other tasks whilst the food was cooking (taking care of children, tending to nearby fields, etc.).	Highly relevant
More attractive and desirable stoves	Women felt a lot of pride in owning a stove, which many visitors came to look at whilst they were cooking.	Highly relevant
Ease of use	Women appreciated the convenience if use	Highly relevant
Cleaner homes	Women often mentioned how they themselves got dirty whilst cooking.	Highly relevant
Protection for community forests	Forest degradation was perceived as a problem but people did not correlate it with possible shortage of supply in the future.	Medium relevance

conclusions – scope for innovations re ICS dissemination



conclusions

- Push factors from the end users' perspective? Health and environmental (carbon) arguments secondary; economic and social considerations prevail – ICS dissemination is about market penetration
 - Product is to be affordable, available, appropriate, adequate... emergence of a new paradigm, merger between Bottom of the Pyramid (Prahalad 2005) & Bottom of the Ladder (Floey, 2005) 'BOPBOL'
 - ICS carbon offset project viable only if non renewability status of biomass can be proven
 - In Nhambita, only dead wood harvested; resource not scarce; manual wood collection not a cause of deforestation BUT the wood frontier is mobile and it doesn't mean the resource will not be threatened in the future
 - ICS project currently not viable at this stage in Nhambita
 - issue of overlap between emission baselines – that of the REDD/Plan Vivo on the one hand, and the stove project on the other hand
 - conundrum: an ICS project would constitute a valuable reinforcement of the REDD project but lack of additionality at this stage
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For more information

- <http://www.envirotrade.co.uk/html/resources.php>BBC
 - Video: <http://www.rockhopper.tv/programmes/287>
 - Research papers available from : Sasha.lagrange@gmail.com
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