



The Cost-Effectiveness of Combining Reforestation Auctions with Performance Based Payments – A Field Trial in Rural Kenya

Tobias Wünscher

Center for Development Research, University of Bonn

tobias.wuenscher@uni-bonn.de

Mercelyne Khalumba

Kenyan Forestry Service (KFS), Nairobi

khalumbamercelyne@yahoo.com

Karin Holm-Müller

Institute for Food and Resource Economics, University of Bonn

karin.holm-mueller@ilr.uni-bonn.de

Mirjam Büdenbender

Center for Development Research, University of Bonn

Mirjam.Buedenbender@gmx.net



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Contents

Introduction (incl. objectives and hypotheses)

Methodology

Results

Summary & Discussion & Conclusions



Introduction

Procurement auctions

- Major challenge is information asymmetry over cost of service provision
→ May entail high surpluses for service providers
- Procurement auctions for conservation contracts are one viable way to mitigate issue of information rent
- Auctions are being given increased attention, yet gains deviate greatly.
→ Robust assessment difficult
- There is specifically little empirical experience in developing countries
→ (higher risk aversity, less market and more subsistence orientation, lower education levels, weaker institutions, integrated communities)



Introduction

Performance Based Payments

- Most PES schemes pay for implementation of pre-defined land use actions known or believed to contribute to service provision
- This action-based approach gives landholder little incentive to ensure actual service delivery
- Therefore, it has been suggested to make performance based payments, independent of actions
- Advantage: better performance (service delivery)
- Disadvantage: uncertainty over whether chosen actions pay off → risk premiums (inflated by risk averse farmers)
- To reduce level of risk-premiums, base payments have been suggested
- There is little empirical experience with performance based payments, specifically in developing countries.



Introduction

Participatory approach

- Active engagement of stakeholders in planning and decision making process has shown positive effects due to increased:
 - trust
 - ownership
 - improved adaptation to local circumstances

- Disadvantage: Increased transaction costs



Theoretical effects

Auctions

- + ➤ Keeps contracting prices low

Performance based payments

- + ➤ Increases actually delivered 'services'
- ➤ Pushes up prices due to performance uncertainty (risk premium)

Base payments

- + ➤ Relaxes risk averse bidders and reduces risk premium
- ➤ Possibly raising acceptable minimums

Participatory approach

- + ➤ Increases participation, trust, ownership → lower prices, better performance, more equitability

Overall

- + ➤ Better cost-effectiveness?
- ➤ Higher transaction costs

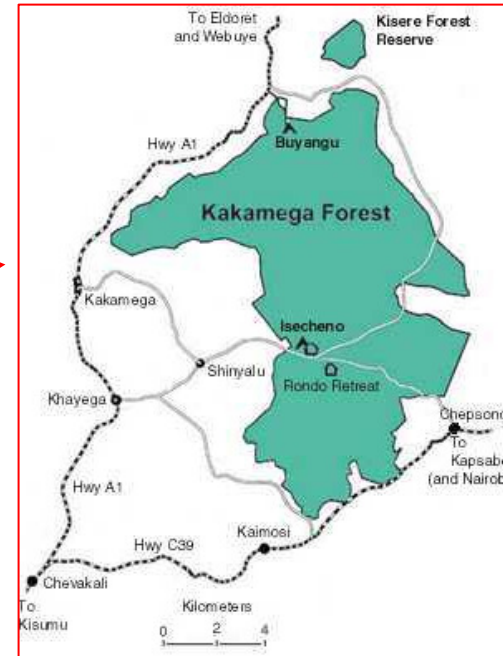


Objective

The objective of this study is to test, in the rural environment of a developing country, the general functioning of a PES approach which may increase a program's cost-effectiveness.



Methodology - Study Area



- ongoing indigenous reforestation by KFS (2134 ha to go) to counteract forest loss
- KFS increasingly dependent on own funding since Forest Act 2005
- reforestation often failed in past (seedlings uprooted by cattle)



Methodology

Field trials

- Location: Three communities in Kakamega, Western Kenya
- Reforestation contracts as proxies for PES contracts
- Duration: 5 months (April to August 2009)
- Auctions to allocate reforestation contracts
- Base payment (60% of bid) plus performance based payment (40%)
- Auctions designed in participatory approach with communities
- Comparison to baseline approach (daily wage)

Shortcomings

- Short period → limited explanatory power for long term behavior
- Small sample → no statistical evidence

Analysis

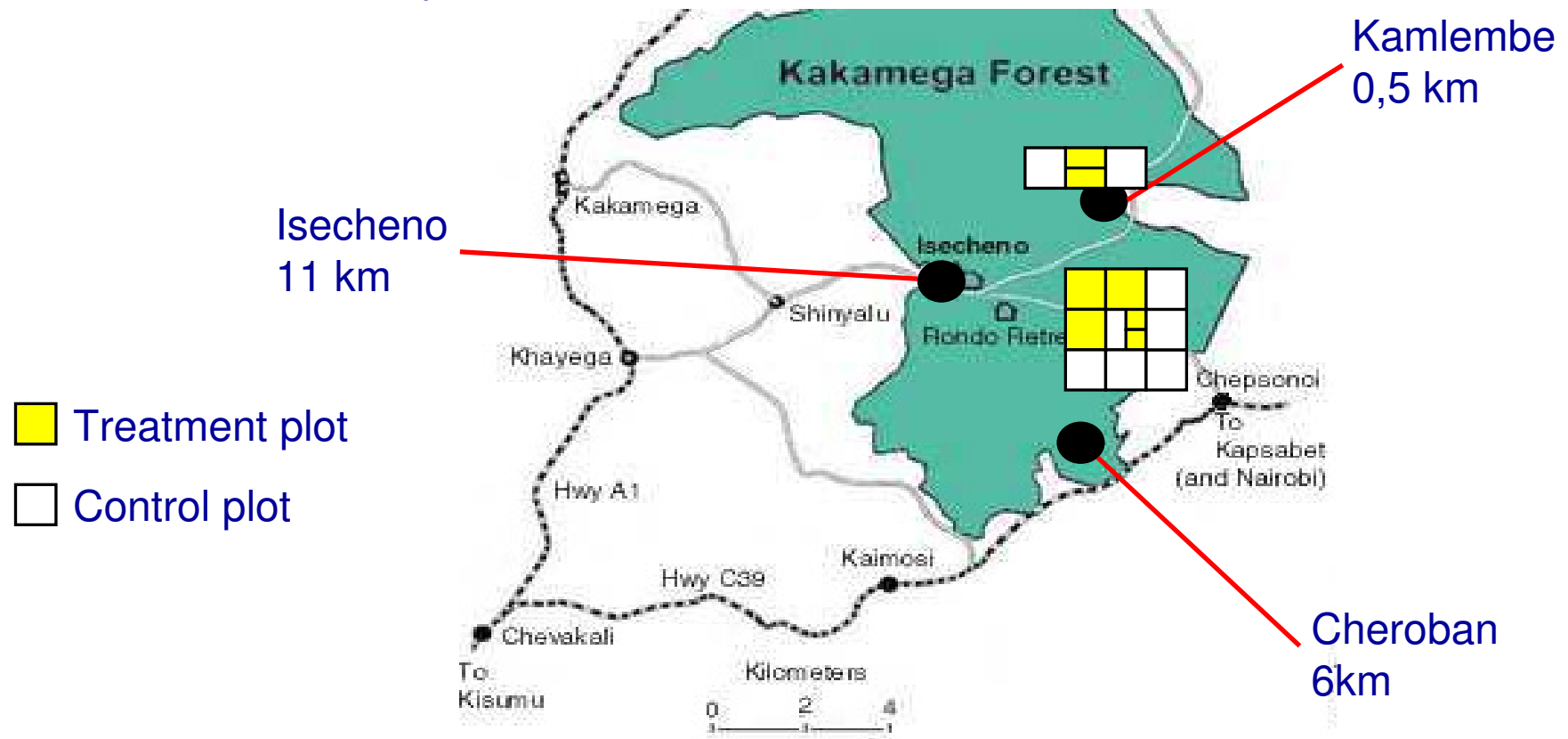
- Quantitative indicators
- Qualitative interpretation



Methodology - Study Area



- Community selection in cooperation with KFS
- Site selection in cooperation with KFS and communities





Methodology

- Oct 2008: Consultations with KFS and community elders
- Dec 2008: Announcement of auctions
- Feb 2009: Participatory planning workshop
 - Auction design
 - Site selection
 - Evaluation criteria
 - Planting requirements (e.g. spacing)
- Mar 2009: Questionnaire with 286 randomly selected households
- Apr 2009: Auctions and planting (seedlings free of charge)
- Aug 2009: Questionnaire with 114 auction participants
- Aug 2009: Evaluation of plots
 - Seedling survival, damage, site preparation, planting quality
 - Maximum score (S_{\max}) 15; performance payment $P = S_i/S_{\max} (0.4b_i)$



Methodology

Auction design

- 7 rounds
- Anonymous bids (sealed envelope), openly published
- Descending
- Discriminative
- Chosen by 85%

Other options were presented such as

- One shot (single bid)
- Closed



Results

- **Acceptance level was high**
- **The approach was generally well understood**

Income categories of participants (percentages in brackets)

Income category	Cheroban	Isecheno	Kamlembe	TOTAL
Low (population)	(62)	(70)	(18)	(49)
Low	26 (79)	35 (80)	27 (74)	88 (77)
Middle	7 (21)	9 (20)	5 (13)	21 (18)
High	0 (0)	0 (0)	5 (13)	5 (4)
TOTAL	33 (100)	44 (100)	37 (100)	114 (100)



Final bids and costs compared to baseline

ID	Site	Plot (ha)	No of seedlings	Planting date	Tree species	Baseline	Cost
1	Isecheno	1	400	April 16, 2009	Assorted indigenous	5520	4500
2	Isecheno	1	400	16 th April 2009	Assorted indigenous	5520	3650
3	Isecheno	1	400	16 th April 2009	Assorted indigenous	5520	3900
4	Kamlembe	0.5	200	8 th April 2009	<i>Croton megalocarpus</i>	2760	1320
5	Kamlembe	0.5	200	8 th April 2009	<i>Croton megalocarpus</i>	2760	1450
6	Cheroban	0.25	100	16 th April 2009	Assorted indigenous	1380	794
7	Cheroban	0.25	100	16 th April 2009	Assorted indigenous	1380	690
8	Baseline 1	1	400		Assorted indigenous	n.a.	5520
9	Baseline 2	1	400		Assorted indigenous	n.a.	5520



Survived Seedlings after 5 months and Cost-Effectiveness

	Isecheno	Kamlembe	Cheroban	Baseline 1	Baseline 2	Total
n (no of control units)	60	31	30	90	31	242
Survived seedlings %	75 (15)	87 (4.5)	52 (14)	58 (20)	48 (14)	64 (20)
Mode of destruction (%)						
Drying up	46	59	54	13.5		
Cattle Chew	33	0	16	72		
Pests		----- 31 -----		14,5		
Cost-effectiveness (cost per survived seedling)						
Kenyan Shilling	8	5	14	26		
US\$	0.11	0.07	0.19	0.36		



Summary

1. The approach was well accepted, understood and implemented
2. The approach returned a considerably higher cost-effectiveness than the baseline approach (daily wages)
3. Increase in cost-effectiveness is partly due to lower contracting costs (competitive bidding effect), all cases
4. And partly due to better care-taking and higher survival rate (performance based payment effect), in two out of three cases
5. Where care-taking is costly (relative and absolute) we observed:
 - i. Less caretaking and lower survival rates
 - ii. As opposed to higher bids
6. Poor community members represented disproportionately high in auctions (participatory effect)



Discussion

Social desirability: Why bargain down low incomes to lower incomes?

- Under budget constraint there is trade-off between number of people who can be paid and amount that can be paid (many little vs. few much): from a distributional point of view not clear what is better.
- From conservation perspective smaller payments clearly more desirable
- Choice of instrument (e.g. auction vs. no auction) depends on primary goals
- In general participation is voluntary. Assuming that bidder can estimate costs (see winner's curse), people should always take home gains
- Theoretically derived daily bids (146 KSH), based on 23 working days, above legal minimum daily wage (127 KSH) – except in one case.
- Possible explanations are:
 - actual working days fewer than 23
 - no alternative income opportunities → Beware



Conclusion

Taken together, the findings represent rather good news for innovative approaches of ecosystem restoration in developing countries.

But statistical evidence needs to be provided in further studies.



Thank you for your interest

Tobias Wünscher

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tobias.wuenscher@uni-bonn.de

Mercelyne Khalumba

Kenyan Forestry Service (KFS), Nairobi

khalumbamercelyne@yahoo.com

Karin Holm-Müller

Institute for Food and Resource Economics, University of Bonn

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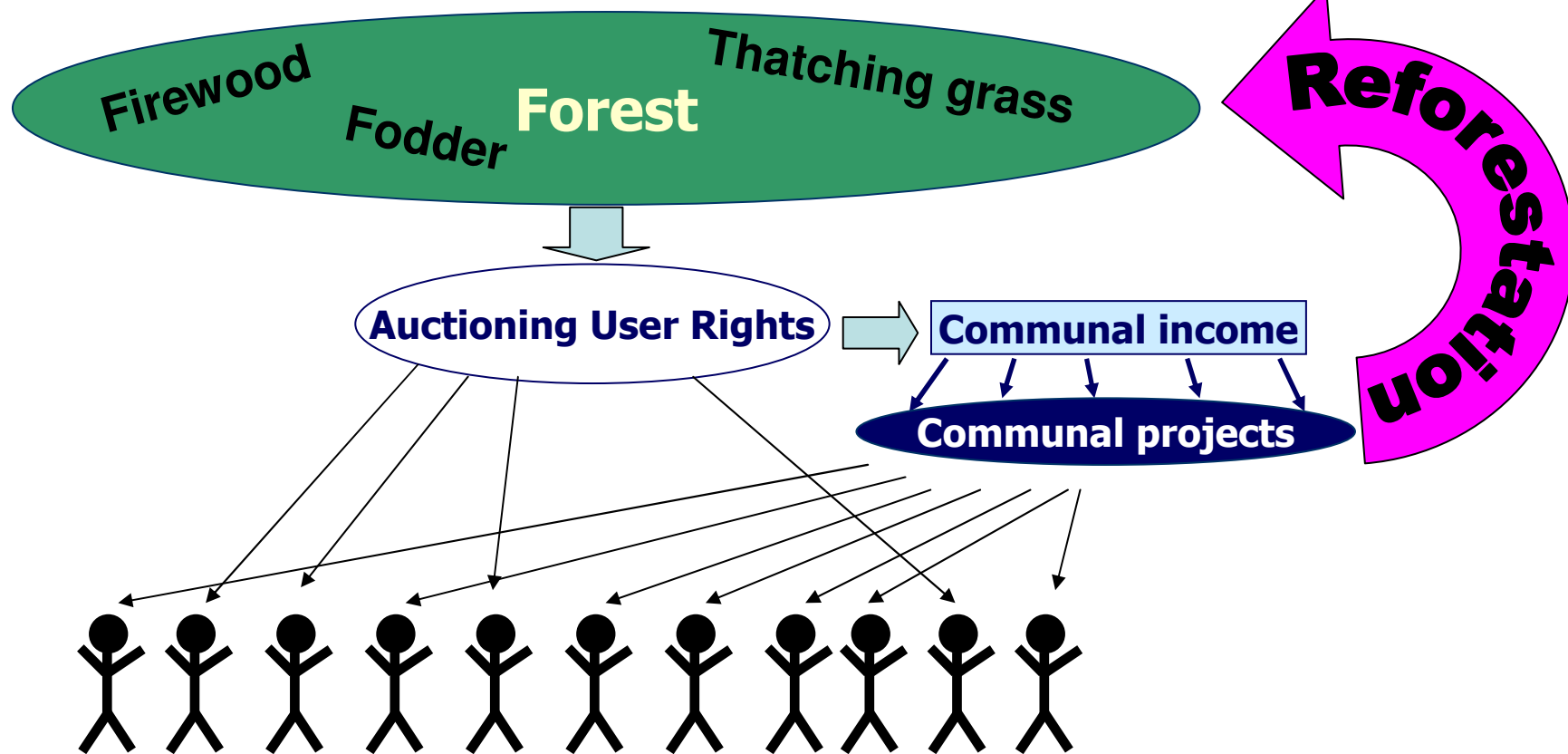
Household Characteristics

Variable	Isecheno	Kamlembe	Cheroban	Overall
Household head is male (%)	90	75	79	82
Farming is main occupation of household head (%)	52	81	37	58
Farmer grows crops mainly for subsistence (%)	79	73	88	80
Household's house made of mud (%)	86	91	87	88
Household's roof made of grass (%)	70	18	62	49
Household grazes cattle in the forest (%)	82	68	85	78
No of cattle owned by HH	2.3	1.5	2.5	2.1
Age of household head in years	42.4	46.9	39.2	43.0
Years of formal education	6.9	6.0	5.3	6.1
Total land area in hectare	0.89	0.52	0.20	0.64
Average family size	5.7	5.9	5.6	5.7



Methodology Background

Reforestation auctions offshoot of another field trial in which forest user rights were auctioned to community members



$$\text{Benefit (Forest}_{\text{selected}} + \text{Communal projects)} > \text{Benefit (Forest}_{\text{all}})$$