



# Payments for Environmental Services and Household Behaviour: The case of carbon in Mozambique's Agro-forests

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## Research question

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- Do economic incentives influence household behavior ?

# Methods

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- Household survey/PEN method
- Adapting PEN questionnaire
- Random sample – 330 households
- Resource valuation
  - “Standardization” of local units
  - Reported prices (marketed products)
  - Willingness to pay (non-market products)

# Research

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- Study Area:

- Gorongosa National Park (GNP) buffer zone, Mozambique
- Chicale *Regulado* - area 20 sq. km covering >1,100 households, covering five villages
- PES (Payments for Environmental Services) project under implementation

# Challenges faced in field

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- Lack of knowledge of local language & culture
  - Portuguese and *Sena* – local enumerators
  - Local enumerators was key to building trust
- General low level of education and awareness – intensive training of enumerators & meeting with local leadership and key informants
- Local collaboration is key
- Sustaining motivation – of respondents and enumerators



## Current Analysis

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Concerned with economic shocks and *miombo* woodland resource use

Research question:

- Do *miombo* woodlands serve as safety nets for rural households when faced with economic shocks ?



# Rationale

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- Rural households face numerous shocks – both individual/idiosyncratic (e.g. sickness; loss of livestock) and common (e.g. drought, flood)
- Household responses vary (e.g. increasing labor supply, sale of agricultural products, increased forest use)

Regression (dep. var. – value of environmental resources collected)

Exp. variables	Coefficients	Robust SE	P-value
Land_pc	0.34	0.10	0.00
Wage (ln)	-0.06	0.05	0.26
<b>Woman head</b>	<b>-0.29</b>	<b>0.14</b>	<b>0.04</b>
Head_born	0.17	0.11	0.13
<b>HH_formation</b>	<b>-0.03</b>	<b>0.00</b>	<b>0.00</b>
<b>HH_formation<sup>2</sup></b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
Out-park	0.21	0.14	0.12
PES-participation	-0.57	0.12	0.00
Distance	-0.05	0.04	0.16
<b>Sick</b>	<b>0.42</b>	<b>0.19</b>	<b>0.05</b>
<b>Fire</b>	<b>0.34</b>	<b>0.14</b>	<b>0.00</b>
Constant	14.27	0.72	0.00
R <sup>2</sup>		0.21	
N		303	



## Logit regression (environmental product sold= Y/N)

Exp. variables	Coefficients	Robust SE	P-value
Land_pc	-0.99	0.23	0.97
<b>Wage (ln)</b>	<b>-0.65</b>	<b>0.94</b>	<b>0.00</b>
<b>Woman head</b>	<b>-0.25</b>	<b>0.09</b>	<b>0.00</b>
Head_born	1.37	0.36	0.23
<b>HH_formation</b>	<b>-0.95</b>	<b>0.02</b>	<b>0.03</b>
HH_formation <sup>2</sup>	1.00	0.00	0.14
Out-park	1.02	0.38	0.96
<b>PES-participation</b>	<b>-0.43</b>	<b>0.13</b>	<b>0.00</b>
<b>Distance</b>	<b>-0.70</b>	<b>0.09</b>	<b>0.00</b>
<b>Sick</b>	<b>2.07</b>	<b>0.84</b>	<b>0.07</b>
Fire	1.51	0.63	0.32
Pseudo-R <sup>2</sup>		0.15	
N		303	
Log likelihood		-0.178.0	
LR Chi <sup>2</sup> (11)		61.79	

## Composition of annual cash income (%)

Variable (mean)	Bottom 25%	25-50%	50-75%	Top 25%	<i>Overall</i>
Crops sold	7	7	11	10	9
Livestock sold	12	14	10	5	10
Unfp (sold)	2	1	2	4	2
Pfp (sold)	3	8	6	12	9
Fish (sold)	3	2	11	12	6
Nf (sold)	5	6	7	16	9
Wage	44	40	30	15	32
Business	2	6	8	15	8
Others	23	15	13	11	15
Cash (MTN)	3,406	5,633	8,062	16,190	8,346
US\$	131	217	310	623	321
N	82	82	83	83	330

# Conclusion

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- Miombo woodlands are important to household economy considering their support to livelihoods
- Linkages between income levels and resource use are complex (e.g. richer households derive larger share of environmental income)
- Miombo woodlands are crucial as safety nets
- Significant gender differences exist – has social welfare implications
- PES-like schemes could be potentially important intervention for sustainable resource management