Local communities' preferences and willingness to contribute communal labor towards rehabilitating small-scale mined (ASM) community lands: A choice experiment approach

AUTHORS

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1. INTRODUCTION

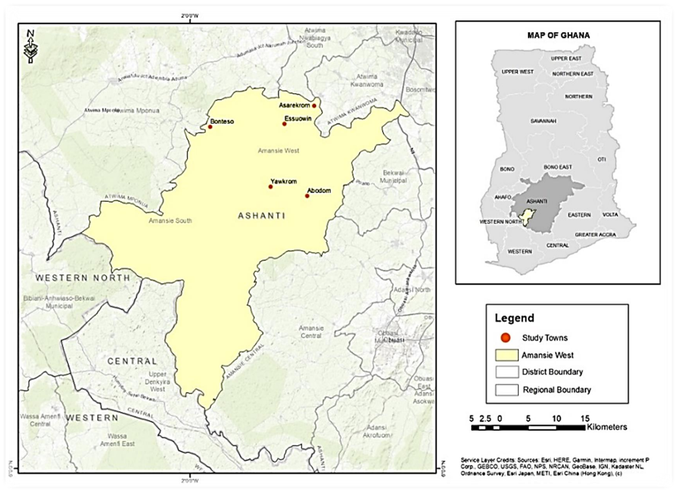
- In communities in mineral-rich developing countries, illegal ASM operations have led to a growing number of degraded, mercury-contaminated and abandoned mined local lands.
- State governments often lack the resources to implement rehabilitation effectively.
- Engaging rural communities in land rehabilitation projects can enhance environmental sustainability and community well-being
- **STUDY OBJECTIVE: To understand local preferences for land rehabilitation attributes, which could inform their willingness to contribute to community land rehabilitation initiatives**

ASM land degradation, mercury-contamination and restoration using community-based land rehabilitation approach in pictures

2. METHODOLOGY

i. Research study case and area

- Tropenbos Ghana's pilot approach of rehabilitating and reforesting degraded, heavy metal contaminated and abandoned mined lands with the participation of local communities in the Amansie West district
- 5 project-beneficiary-communities within this district were selected



ii. Sampling and data collection

- Focus group discussions with 45 participants (32 Males, 13 Females)
- Discrete choice experiment with 320 participants in the 5 communities

iii. Experimental design

- The Discrete Choice Experiment (DCE) was based on respondents' selection of desired degraded land restoration options: profiling systematic variations in selected rehabilitation input and outcome attributes or no change in current conditions:

$$Prob(WTP = Yes, No \mid Z^{restoration}, Z^{statusquo}, w) = Prob(U^{restoration} > U^{statusquo})$$

where $Z^{restoration}$ = set of restoration attributes, $Z^{statusquo}$ = current land condition, and w = respondents' characteristics

- These selected rehabilitation attributes included physical land reconstruction, phytoremediation, revegetation, implementation period and labor commitments

iv. Analysis

- The DCE data was analyzed following the random utility model (MXL) using STATA
- MXL model estimated the utility (coefficients) a decision maker obtains from choosing a land rehabilitation option from a set of alternative rehabilitation options presented
- Respondents' willingness to contribute voluntary labor (WTP), which are observable, was calculated using the estimated latent coefficients

3. RESULTS

- Strong preference for physical land reconstruction, despite its higher cost compared to other attributes
- Phytoremediating 50% of reclaimed land → limited awareness of health implications of heavy-metal-contaminated agricultural soils
- Preference for dense vegetation cover to promote biodiversity and ecosystem services, with a fixed choice effect
- Waiting time for the safe reuse of restored land emerged as a key factor influencing decision-making, particularly if it exceeded 20 years

Variable	Model 1	Model 2	Model 3
	Attributes only	Attributes + socio-demographic	Attributes + socio-demographic + perception
	Coefficient	Coefficient	Coefficient
FIXED COEFFICIENTS			
Cost	**-0.008*** **	**-0.008*** **	**-0.008*** **
Moderate level land reclamation	**1.959*** **	**1.912*** **	**1.925*** **
Phytoremediation on 50% land	**1.181*** **	**1.126*** **	**1.134*** **
Medium vegetation cover	0.299	**0.574** **	**0.585** **
High vegetation cover	0.299	**0.536** **	**0.516** **
Implementation period (> 20 years)	-0.229	**-0.330***	**-0.337***
Implementation period (between 10 to 20 years)	-0.136	-0.131	-0.143
RANDOM COEFFICIENTS			
High level land reclamation	**2.323*** **	**2.351*** **	**2.398*** **
Phytoremediation on 75% land	0.049	0.08	0.081
Log-likelihood	-530.154	-433.438	-425.489
LR Chi2(5)	85.65	67.24	66.62
Prob > Chi2	0.000	0.000	0.000

Statistical significance: ***1%, **5%, *10%

Land rehabilitation attributes	WTP (GH₵ household^{-1} month^{-1})	
	Moderate	High
Land reclamation	244.88	290.38
Phytoremediation	147.63	8.88
Vegetation cover	37.40	37.43
Implementation period	-17.00	-26.13
Aggregate WTP	412.91	310.56

1 USD equals 7,75 GH₵

4. CONCLUSION

- Findings underscore the importance of tailored approaches to engage rural communities in land restoration projects that prioritize physical reconstruction
- It also highlights the need to educate community members about the health risks associated with soil contaminated through ASM and to promote sustainable remediation strategies with market opportunities
- It is essential to emphasize the time required for successful restoration to secure community buy-in and ensure the long-term success of such projects

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