



The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

No endorsement of AgEcon Search or its fundraising activities by the author(s) of the following work or their employer(s) is intended or implied.

Pay, Talk or ‘Whip’ to Conserve Forests: Framed Field Experiments in Zambia

Hambulo Ngoma, Amare Teklay Hailu, Stephen Kabwe, and Arild Angelsen

Introduction:

Forests supplement household incomes for a large share of rural people, and contribute to national incomes. If left standing, they sequester and store carbon, and thereby help mitigate climate change. Forests are also important havens for biodiversity, and perform a myriad of other ecosystem functions. Yet forests are overexploited and degrading, threatening the products and services they provide. In Zambia, out of the 50 million hectares (ha) or 66% of the total land area covered by forests (FAO 2010; Kalinda et al. 2013; FAO 2015), between 167,000 and 300,000 ha or 0.3 - 0.6% is lost due to deforestation annually. Forest loss threatens to erode the nearly 4.7% contribution of forests to national income in Zambia (Turpie, Warr, and Ingram 2015). Therefore, addressing deforestation and forest degradation – both to reduce greenhouse gas emissions and to enhance the economic benefits of forest resources – is high on Zambia’s forestry and climate change policy agenda (GRZ 2014; GRZ 2016). It is the main thrust of the country’s REDD+ strategy (Matakala, Kokwe, and Staatz 2015), but it is less clear how to do so effectively and efficiently.

Various policy instruments have been promoted for forest conservation and climate mitigation. This paper assesses the impacts community forest management (CFM), command and control (CAC) and payments for environmental services (PES) on forest conservation, relative to open access (OA). OA represents the scenario where access to forest is open to all and use is unregulated, also known as unregulated OA. CFM typifies cases where forest resources are managed, regulated and controlled by the local community. CAC in this context refers to policies that use rules

Key Findings

- 167,000 – 300,000 hectares of forest are lost every year in Zambia, and different policies are in place or have been proposed to contain forest loss. But, there is limited evidence on the effectiveness of these policies.
- We conducted framed field experiments with actual forest users to test *ex-ante* the impacts of community forest management, command and control, and payments for environmental services on forest conservation in Zambia.
- Relative to open access, community forest management and payments for environmental services to individuals led to more forest conservation, implying that both monetary and non-monetary motives matter for forest conservation.
- Forest reliance, measured by whether the participants sold any forest product in the month preceding the survey, significantly increased harvest in the experiment.
- Female participants had significantly higher harvest rates than males. This result runs counter to assertions suggesting that females are more pro-conservation.
- These results imply that better conservation outcomes might be achieved by some combinations of community forest management and individual payments for environmental services, provided the transaction costs can be kept at acceptable levels.
- Thus, Zambia’s community forestry management will need to provide individual households with clear material benefits in order to compensate for the loss from reduced forest use.

and regulations such as limits or bans on harvesting, and sanction rule-breakers through fines. PES is a mechanism that seeks to incentivize and compensate forest owners or users for providing public goods, such as carbon sequestration and storage.

Methodology and Data

The framed field experiments were designed to mimic how local dwellers use forests in real life. In economic experiments, participants receive material payments based on their (and others) choices in the experiment, giving an incentive to reveal their true preferences and to mimic real world behaviour. Our experiment was framed as a common pool resource game: participants harvest trees from a common pool, and derive private benefits from that. Collectively, however, a tree is worth more if left in the forest through the public goods it provides. This creates a social dilemma: each individual participant is in the OA scenario better off if he or she harvests the maximum allowable number of trees, yet the overall group reward is higher if everyone leaves the trees in the forest.

A random sample of 191 forest users drawn from four villages in Mpika and Serenje Districts, the actual localities where they make forest use decisions participated in the experiments. We used actual tree branches as the commodity in the task of harvesting trees. A total of 24 groups, each with eight participants played the experiments and made harvest decisions for ten rounds.

The first five rounds were played with open access, while treatments (policies) were introduced from round six.

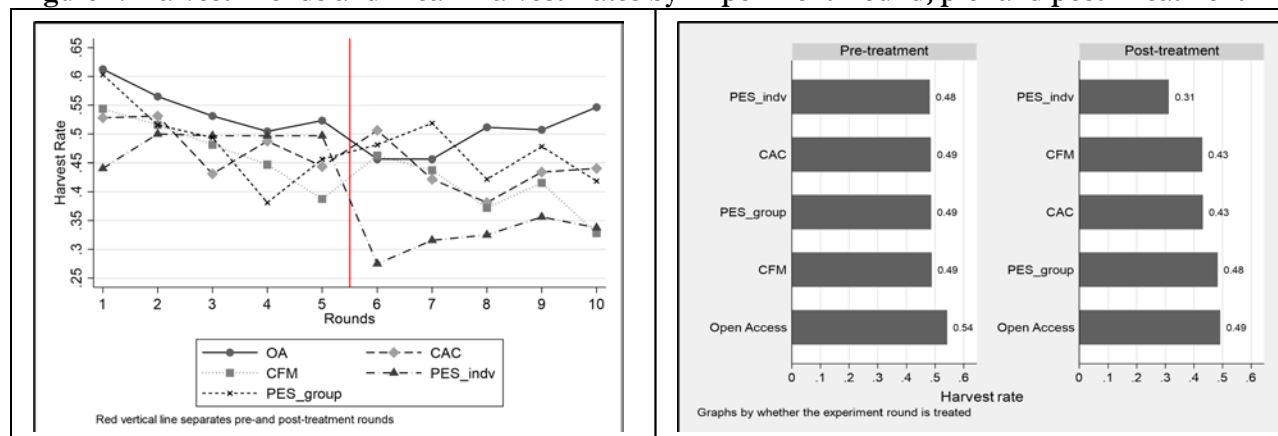
We allowed communication (cheap talk) about harvest rates and anything else under CFM, for a maximum of three minutes at the start of each of rounds 6 – 10. Individuals with harvests above the community rule were penalized with fines under CAC. There was a 25% chance of being inspected. If a player is indeed inspected and found in violation of the community rule, they were penalized by giving them a zero harvest (in private) and such a player could not partake in the group benefits for standing trees from that round. We used two variants of the PES treatment. Individuals under PES were paid an additional 80% of the private benefits for every standing tree as long as their harvest is below the average from the first five rounds. Group PES invoked the 80% additional payment (shared equally among group members) if the average group harvest was lower than the average in the first five rounds.

We collected social-economic and forest dependence information and measured individual self-assessments of risk, social and time preferences using Likert-scale type questions in the post-experiment survey.

Key Results:

While harvest rates declined throughout the experiment rounds, the decline was larger in the treated second stage, i.e., rounds 6-10 (Figure 1).

Figure 1. Harvest Trends and Mean Harvest Rates by Experiment Round, pre- and post-Treatment



Source: Authors.

From highs of > 50% in the pre-treatment rounds (1 – 5), harvest stabilized at about 40 – 50% by the fifth round and further reduced to about 30 – 45% by the tenth round for all treatments, but the control (OA). Relative to OA, PES to individuals reduced harvest by 17 percentage points while each of CAC and CFM reduced harvest rates by 6 percentage points. Communication in the CFM treatment improved cooperation, possibly though igniting non-pecuniary, prosocial and other – regarding choices among our participants.

The large effect of individual pay suggests that there is merit in paying the actual individuals or forest users in incentive-based schemes and supports the core REDD+ idea. This however, depends on the transaction costs incurred in actualizing individual payments. Free and easy-riding and uncertainty on how others will respond dampens the positive effects of group pay on forest conservation, as do externally imposed sanctions in command and control. Reductions in harvest rates without treatment under OA suggest that there were some pro-social or pro-environmental behavior which drove conservation among participants. Figure 2 shows the impact of treatment on forest harvest by risk, time and social preferences. Results indicate that risk loving and impatient behaviour might be associated with high harvest rates while pro-social behaviour might be pro-conservation. Except for ‘I do not know’ category, harvest rates were higher among the very risk loving participants, especially under CAC (and PES group) treatment, but lower for the very risk averse (Figure 2, i). OA had relatively higher harvest under all risk preference categories. With

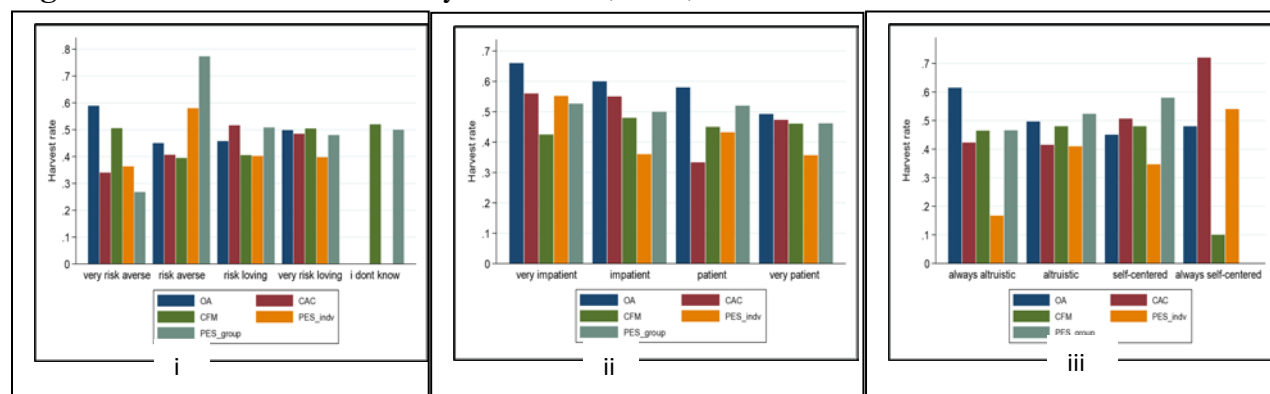
regard to the time preference, except for the CFM treatment, harvest rates increased with decreasing time preference; harvest rates were highest for the most impatient participants (Figure 2, ii). Harvest rates were substantially higher among the always self-centred (non-prosocial) participants and especially so, for the CAC and PES individual pay treatments (Figure 2, iii). Controlling for other factors, we found that forest dependence (measured by whether the participant sold any forest product in the month preceding the survey) significantly increased harvest as did being impatient.

Female participants in our experiments had significantly higher harvest rates than males. This result runs counter to assertions suggesting that females are more pro-conservation, but it is not unexpected for our sample: fuelwood (firewood and charcoal) is a women-dominated activity, and was the most collected/harvested forest product (used by some 85% of the sample).

Conclusion:

Reducing deforestation and forest degradation to both mitigate climate change and conserve biodiversity is high on national agendas. What is not clear is how. We designed framed field experiments to test *ex-ante* the impacts of payment for environmental services, command and control, and community forest management (three common policy instruments) on forest conservation in Zambia and payment for environmental services to individuals led to better forest conservation.

Figure 2. Mean Harvest Rates by Treatment, Risk, Time and Social Preferences



Source: Authors.

The latter effect was threefold larger than the former. We can speculate that communication in the community forest management treatment might have improved cooperation and in some ways ignited non-pecuniary, pro-social and other behaviors in our participants. The large effects of individual pay, on the other hand, suggests that there is merit in paying the actual individuals or forest users in incentive based schemes and supports the core REDD+ idea.

This however, depends on the transaction costs incurred in implementing individual payments. Free and easy-riding and uncertainty on how others will respond dampens the positive effects of group pay on forest conservation as do externally imposed sanctions in command and control. We, therefore, conclude that individual pay outperforms group pay and that while community forest management might have the desired results, its impacts are smaller than individual, pecuniary incentives. Our results imply that better conservation outcomes might be achieved by some combinations of community forest management and individual payments for environmental services.

Recommendations:

We draw two implications for on-going community forestry interventions in Zambia. First, because both monetary and non-monetary incentives matter for forest conservation, individual forest users need to see tangible benefits in order to participate. Second, in order for forest users to 'see the forest for the trees', our study points to the need for benefit sharing mechanisms in Zambia's community forest management and its REDD+ policies that will provide individual households with clear material benefits in order to compensate for the loss from reduced forest use.

References

- FAO. 2010. Global Forest Resources Assessment 2010: Main Report. FAO Forestry Paper No. 130. Rome: FAO.
- FAO. 2015. Global Forest Resources Assessment 2015. Rome: Food and Agriculture Organization of the United Nations.
- GRZ. 2014. National Forestry Policy. Lusaka: Ministry of Lands, Natural Resources and Environmental Protection, Government of the Republic of Zambia.
- GRZ. 2015. Forest Act 2015. 4. Lusaka: Government of the Republic of Zambia.
- GRZ. 2016. National Policy on Climate Change. Lusaka: Ministry of National Development Planning, Government of the Republic of Zambia.
- Kalinda, T., S. Bwalya, J. Munkosha, and A. Siampale. 2013. An Appraisal of Forest Resources in Zambia Using the Integrated Land Use Assessment (ILUA) Survey Data. *Research Journal of Environmental and Earth Sciences* 5: 619-630.
- Matakala, P.W., M. Kokwe, and J. Staatz. 2015. Zambia National Strategy to Reduce Emissions from Deforestation and Forest Degradation (REDD+). Lusaka, Zambia: Ministry of Lands, Natural Resources and Environmental Protection and UN-REDD Programme.
- Ngoma, H., A.T. Hailu, S. Kabwe, and A. Angelsen. 2018. *Pay, Talk or 'Whip' to Conserve Forests: Framed Field Experiments in Zambia*. IAPRI Working Paper No. 140. Lusaka, Zambia: Indaba Agricultural Policy Research Institute.
- Turpie, J., B. Warr, and C. Ingram. 2015. Benefits of Forest Ecosystems in Zambia and the Role of REDD+ in a Green Economy Transformation. Nairobi, Kenya: United Nations Environment Programme.

This policy brief is based on FSP Research Paper No. 145 and IAPRI Working Paper No. 140 by Ngoma et al. and was originally published by IAPRI as Policy Brief No. 96 in October 2018.

ABOUT AUTHORS: At the time it was first published, Ngoma was Research Fellow and Kabwe, Senior Research Associate at Indaba Agricultural Policy Research Institute (IAPRI); Hailu was Lecturer at Mekelle University, Ethiopia and Måler Scholar at the Beijer Institute of Ecological Economics, Sweden; and Angelsen was Professor of Economics at the Norwegian University of Life Sciences (NMBU), Ås, Norway and Senior Associate with the Center for International Forestry Research (CIFOR), Bogor, Indonesia.

This study was made possible by the generous support of the American people provided to the Feed the Future Innovation Lab for Food Security Policy (FSP) through the United States Agency for International Development (USAID) under Cooperative Agreement No. AID-OAA-L-13-00001 (Zambia Buy-In). Additional funding support was also provided by the Swedish International Development Agency (SIDA) and the USAID Mission to Zambia through the Indaba Agricultural Policy Research Institute (IAPRI). The contents are the sole responsibility of the authors and do not necessarily reflect the views of IAPRI, USAID, the United States Government, or SIDA. The authors are grateful to the Ministry of Agriculture and Department of Forest for field guidance, and Albert Kasoma and Kenny Hatontola for providing excellent field assistance in conducting the experiments.

Copyright © 2019, Michigan State University and IAPRI. All rights reserved. This material may be reproduced for personal and not-for-profit use without permission from but with acknowledgement to MSU and IAPRI.

Published by the Department of Agricultural, Food, and Resource Economics, Michigan State University, Justin S. Morrill Hall of Agriculture, 446 West Circle Dr., Room 202, East Lansing, Michigan 48824.