



Farmer experimental games in the community of Orcobuayta, Lampa, Puno, Peru.  
Credit: Bioversity International/Adam G. Drucker

# Farmer experimental games for informing incentive mechanisms related to the conservation of agrobiodiversity in collective action contexts: Preliminary results

Adam G. Drucker

*Policy implications arise from the fact that design features of incentive mechanisms can involve an apparent trade-off between the costs of investing in social equity dimensions (in terms of procedural and distributional equity) and the benefits of obtaining more effective conservation outcomes.*

## Why realize experimental games with farmers?

The application of framed field experiments can provide valuable insights into the multiple layers (individual-, group- and incentive-level) relevant to understanding collective action in conservation (Cardenas et al, 2004) and the pathways through which conservation behavior is affected by external institutions. To learn about people's preferences and decision-making in real resource and group contexts, research in real field contexts is needed (Cardenas, 2000; Swallow et al, 2005). There is a growing body of literature analyzing cooperative behavior in the management of natural resources in field framed experiments conducted in developing countries (Cardenas and Carpenter, 2008; Cardenas, 2009).

However, there has only been limited application (Narloch et al, 2012; Midler et al, in press) in the context of (i) managing agrobiodiversity, and (ii) the impact of reward systems, such as payment for ecosystem services (PES). This emerging body of literature suggests that although individual

rewards (i.e. rewards proportional to effort) are likely to be more effective and less sensitive to social factors than collective (i.e. egalitarian) rewards, the latter might have a positive effect on conservation when they are shared within socially closely-related groups and in situations where communication and deliberation about collective action is possible.

**Behavior in the farmer experimental games suggests that understanding farmer perceptions of fairness can have important implications for the design and implementation of conservation incentive mechanisms,** particularly given the important influence of such perceptions on the pro-social behavior that underlies much de facto conservation. Incentive mechanisms, such as payments for agrobiodiversity conservation services (PACS), that can, in the words of Bowles (2008) "support socially-valued ends not only by harnessing selfish preferences to public ends but also by evoking public-spirited motives" are also more likely to be sustainable over the long-term.



Farmer experimental games in the community of Moro, district of Paucarcolla, Puno, Peru. Credit: Bioversity International/Adam G. Drucker

As the Peruvian government moves closer to implementing an up-scaled PACS scheme<sup>1</sup>

for quinoa, amaranth and other crops, the importance of gaining improved understanding of how such a scheme may be designed *in practice* to be both effective and account for procedural justice (including the recognition of perceptions of fairness) has become increasingly critical.

## Setting up the experimental games

This new round of games explores how effective (in terms of conservation outcomes) individual/proportional rewards are compared to collective/egalitarian rewards, depending on whether the way those rewards are to be shared is imposed exogenously (top-down) or endogenously (bottom-up). In the bottom-up endogenous approach, groups have the

opportunity to decide collectively which payment (proportional to effort or egalitarian) method they prefer to receive via a voting procedure. These two variables (group formation and type of reward) are designed to test if:

- different reward types would affect behavior in terms of conservation outcomes;
- involving farmers in the process of choosing the reward type to be implemented would impact conservation outcomes; and

- the constitution of groups – random or autonomously selected – affected conservation outcomes.

## Carrying out the experimental games

Games were carried out between February and March 2016 in seven Aymara and eight Quechua communities around the Titicaca basin in Peru, involving 252 participants in total. The communities were selected with the assistance of local experts covered communities known to be interested in the maintenance of quinoa landraces. The games were applied to community groups of 12-20 participants, divided into a number of sub-groups of four each.

Each participant in each community sub-group played a sequence of three games. Each sequence is called a treatment. Four treatments were played with sub-groups formed randomly (treatments 1 to 4) and two with farmers allowed to autonomously select their own sub-groups (treatment 5 and 6). Table 1 summarizes treatment combinations.

Following the experimental game, a socioeconomic survey was conducted with each participant, collecting a range of data including demographic information, landholdings, and family relations, distance between group members, and frequency of collaboration.

**Table 1. Experimental Games Sequence/Treatment Combinations**

TREATMENT	SUB-GROUP FORMATION	GAME 1	GAME 2 (REWARD TYPE)	GAME 3
1	Random groups	Baseline	Baseline	Baseline
2	Random groups	Baseline	Top-down Egalitarian reward	Baseline
3	Random groups	Baseline	Top-down Proportional reward	Baseline
4	Random groups	Baseline	Bottom-up reward	Baseline
5	Autonomous selection	Baseline	Top-down Egalitarian reward	Baseline
6	Autonomous selection	Baseline	Top-down Proportional reward	Baseline

<sup>1</sup> Developed at the request of the Peruvian Ministry of Environment (MINAM) and with a number of preparatory elements/recommendations now incorporated into MINAM's 2015 programme of work, see: Drucker, A. G. 2014. Incentivos para la Conservación de los Recursos Genéticos de la Agrobiodiversidad: Perfil de un Programa. Lima, Peru. MINAM/MEF/Euro Eco Trade.



Farmer experimental games in the community of Moro, district of Paucarcolla, Puno, Peru. Credit: Bioversity International/Adam G. Drucker

## Main findings

- When imposed by an external entity, proportional rewards increase conservation effectively while egalitarian rewards do not.
- When farmers have the possibility to choose between both types of rewards, they prefer the egalitarian one. As a result, they end up making lower levels of conservation and thus have lower payoffs.
- When farmers can choose their preferred reward type, the egalitarian one performs better than when it is imposed. This suggests that allowing farmer communities to determine their own group reward mechanisms/ conditions may be expected to increase their willingness to participate and thus undertake conservation activities.
- When farmers can choose their group peers, they conserve/ cooperate more than when their group is randomly assigned.

- No crowding-in or crowding-out of intrinsic motivations relative to the baseline was found following removal of the incentive mechanism.

## Implications for designing conservation incentive mechanisms

- Improved understanding how group social dynamics and reward mechanisms affect conservation behavior, including through an exploration of issues of "fairness" (both distributive and procedural) and how this can impact willingness to participate in group reward schemes.
- Support for the current design of PACS schemes in Peru and elsewhere, with their high levels of "procedural justice" (i.e. farming communities free to choose to participate or not, select which of the priority landraces to conserve, identify specific farmer group participants and lands upon which to realize such activities, as well as

determine their own level of in-kind rewards and whether these will be distributed on an egalitarian or proportional basis).

- Findings point towards policy implications arising from the fact that there is an apparent trade-off to be overcome between the costs of investing in social equity dimensions (in terms of procedural and distributional equity dimensions) and the benefits of obtaining more effective conservation outcomes.
- Identification of new applied areas of research, for example related to what design features of incentive mechanisms that secure procedural justice minimize transaction costs and at the same time reap the benefits of more effective outcomes? Such possible tradeoffs may be important to account for and ways to do so can be sought through complementary framed field experiments and more qualitative focus groups with potential PES implementers and experts in the area who would be able to suggest ways in which transaction costs may vary through different farmer participatory methods.



Farmer experimental games in the community of Orcocohuyta, Lampa, Puno, Peru. Credit: Bioversity International/Adam G. Drucker

## References

Bowles, S. 2008. Policies designed for self-interested citizens may undermine “the moral sentiments”: Evidence from economic experiments. *Science* 320: 1605-1609.

Cardenas, J.C. 2000. How do groups solve local social dilemmas: lessons from experimental economics in the field? *Environment, Development and Sustainability* 2: 305–322.

Cárdenas, J.C. 2009. Experiments in environment and development. *Annual Review of Resource Economics* 1:157–182.

Cardenas, J. C., and J. Carpenter. 2008. Behavioral development economics: Lessons from field labs in the developing world. *Journal of Development Studies*, 44: 337-64.

Cardenas, J.C., T.K. Ahn, and E. Ostrom, E. 2004. Communication and cooperation in a common-pool resource dilemma: a field experiment. Working paper 03-15. Workshop in political theory and policy analysis, Indiana University, 513 North Park, Bloomington.

Midler, E., Pascual, U., Drucker, A., Narloch, U., Soto, L. (in press). Unraveling the effects of payments for ecosystem services on intrinsic motivations for collective action. *Ecological Economics*. 120: 394-405 DOI: 10.1016/j.ecolecon.2015.04.006

Narloch, U., Pascual, U. and Drucker A.G. 2012. Collective Action Dynamics under External Rewards: Experimental Insights from Andean Farming Communities. *World Development*. Vol. 40 (10): pp. 2096–2107.

Swallow, B., R. Meinzen-Dick, and M. van Noordwijk, M. 2005. Localizing demand and supply of environmental services: interactions with property rights, collective action and the welfare of the poor. CAPRI Working Paper 42, Washington D.C., IFPRI and World Agroforestry Centre.

## Acknowledgements

This brief is part of Bioversity International’s Economics of Agrobiodiversity Conservation and Sustainable Use programme of work. The Farmer Experimental Games component of this work has been supported by the CGIAR’s System-wide Program on Collective Action and Property Rights (CAPRI) and the CGIAR Research Program on Policies, Institutions and Markets. Thanks to Vincent Johnson for review of the text and Evelyn Clancy for design and layout. Special thanks to Kleny Arpazi (Regional Agrarian Directorate, Regional Government of Puno); Adam Gamwell (Brandeis University/USA); Guilherme Heiden (University of Pelotas/Brazil); Estelle Midler (University of Osnabruck/Germany), Unai Pascual (Basque Centre for Climate Change/Spain) and, in particular, the community members who participated in the experimental games.

*Correct citation:* Drucker, A.G. (2016). Farmer experimental games for informing incentive mechanisms related to the conservation of agrobiodiversity in collective action contexts: Preliminary results. Rome, Bioversity International. 4 pp.



Bioversity International is a CGIAR Research Centre. CGIAR is a global research partnership for a food-secure future. [www.cgiar.org](http://www.cgiar.org)

Bioversity International is registered as a 501(c)(3) non-profit organization in the US. Bioversity International (UK) is a Registered UK Charity No. 1131854.

## Contacts:

**Bioversity International**  
Via dei Tre Denari, 472/a  
00054 Maccarese (Fiumicino), Italy  
Tel. (+39) 06 61181  
Fax. (+39) 06 6118402  
[bioversity@cgiar.org](mailto:bioversity@cgiar.org)

For further information:  
Dr Adam Drucker at [a.drucker@cgiar.org](mailto:a.drucker@cgiar.org)  
[www.bioversityinternational.org/pacs](http://www.bioversityinternational.org/pacs)

[www.bioversityinternational.org](http://www.bioversityinternational.org)



Farmer experimental games in the community of Moro, district of Paucarcolla, Puno, Peru.  
Credit: Bioversity International/Adam G. Drucker