

Payments for Ecosystem Services: lessons from terrestrial experience

E.J. Milner-Gulland
Imperial College London



What is a PES?

- a *voluntary* transaction where
- a *well-defined* ES (or a land-use likely to secure that service)
- is being 'bought' by a (minimum one) ES *buyer*
- from a (minimum one) ES *provider*
- if and only if the ES provider secures ES provision (*conditionality*).

(Wunder 2005)

i.e. a direct and positive incentive-based approach

Some key issues

- Conditionality implies adequate monitoring
 - Can lead to substantial transactions costs
 - Power to detect change in provision can be weak
- Should payment be input or output based?
 - Which is better under which circumstances?
- How should transaction be structured
 - How does it fit within broader landscape of conservation interventions and society?
 - Communal or individual providers of ES?
- Can additionality be demonstrated?
 - What are the baseline and counterfactual?

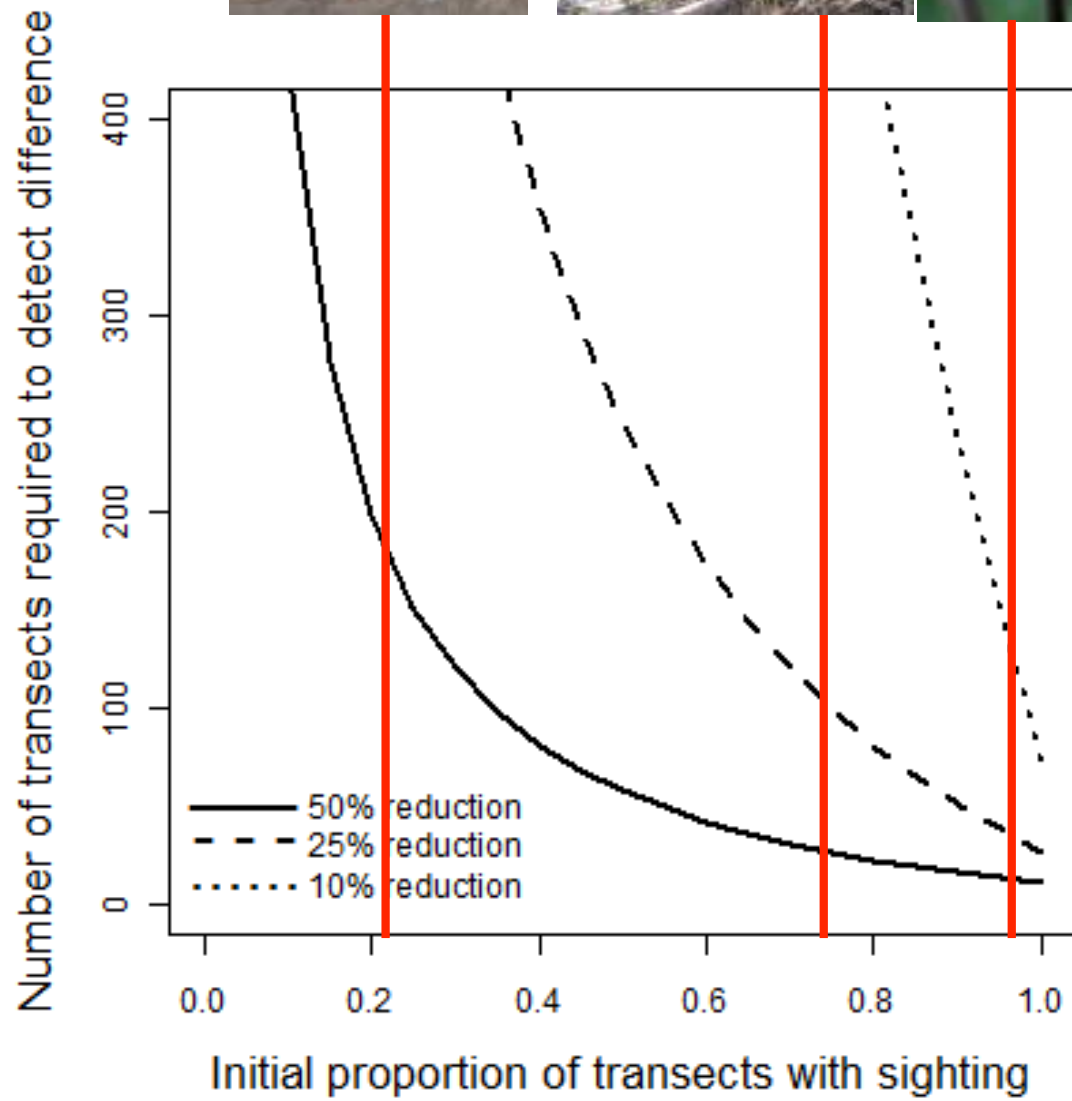
Three case studies

- A competition between 10 villages in Madagascar, Durrell Wildlife Conservation Trust
 - Work with Matt Sommerville, Julia Jones
- A theoretical model of agri-environment schemes in Europe
 - Work with James Gibbons, Julia Jones, Emily Nicholson
- Three PES schemes in two protected areas in Cambodia, Wildlife Conservation Society
 - Work with Tom Clements



Conditionality implies adequate monitoring

- Community-based monitoring within a PES competition – low tech but engages people
- Needs to detect reliably differences between 4 villages in provision of services important to Durrell, in order to distribute payments
- Durrell annual transects = 1 per village
- We did 40x1.5km transects per village, recording all services important to Durrell (22 animals, 4 plants, 12 threats)
- Then sub-sampled to model power to detect difference between villages and change over time



Should payment be input or output based?

- In a perfect world this shouldn't matter (payment for the biodiversity service itself would therefore be the most direct approach)
- In the real world there are complications, e.g.:
 - Relationship between level of action and biodiversity provision non-linear and varies between locations/providers
 - Baseline level of biodiversity varies between locations
 - Relative costs of monitoring biodiversity or actions vary between locations
 - Agency doesn't have perfect knowledge of these functional forms

Agri-environment schemes in Europe



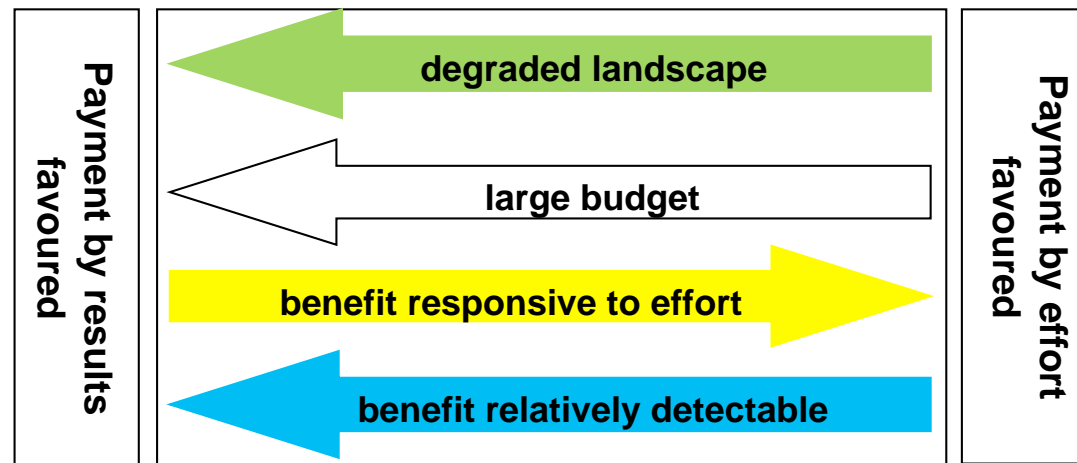
A model to explore these issues

- Agency seeks to maximise biodiversity service gain across the landscape for a given budget
- Providers seek to maximise individual net income
- Providers have perfect knowledge of their action-biodiversity function and starting biodiversity (which vary)
- Providers join if payment $>$ cost of providing service/doing action (or non-compliance + expected fine)
- Agency visits farms and detects either biodiversity (paying by results) or non-compliance (paying by action)
- Monitoring level fixed to ensure compliance or 95% chance of detecting biodiversity
- Agency's only decision is the level of the payment offered

Gibbons et al. (2009) *Journal of Applied Ecology*

If degraded, there are a few high-response patches – owners will join if they can use private knowledge to get results.

If benefit responds well to effort, self-selection is less important because actions generally produce good results



Benefit increases continuously with budget if paying by results – paying by effort it reaches a threshold at full participation

If benefit costly to detect then better to pay for effort given limited budget

Overall assessment

- Payment by output:
 - Incentivises those able to provide biodiversity most cost-effectively to participate
 - Produces a direct measure of policy impact useful for evaluation (through output monitoring)
- But it is less good in terms of:
 - Placing the risk onto providers rather than agency
 - Requiring specific measurable outputs (less good for bundled or less tangible ES)

How does PES fit within broader context?

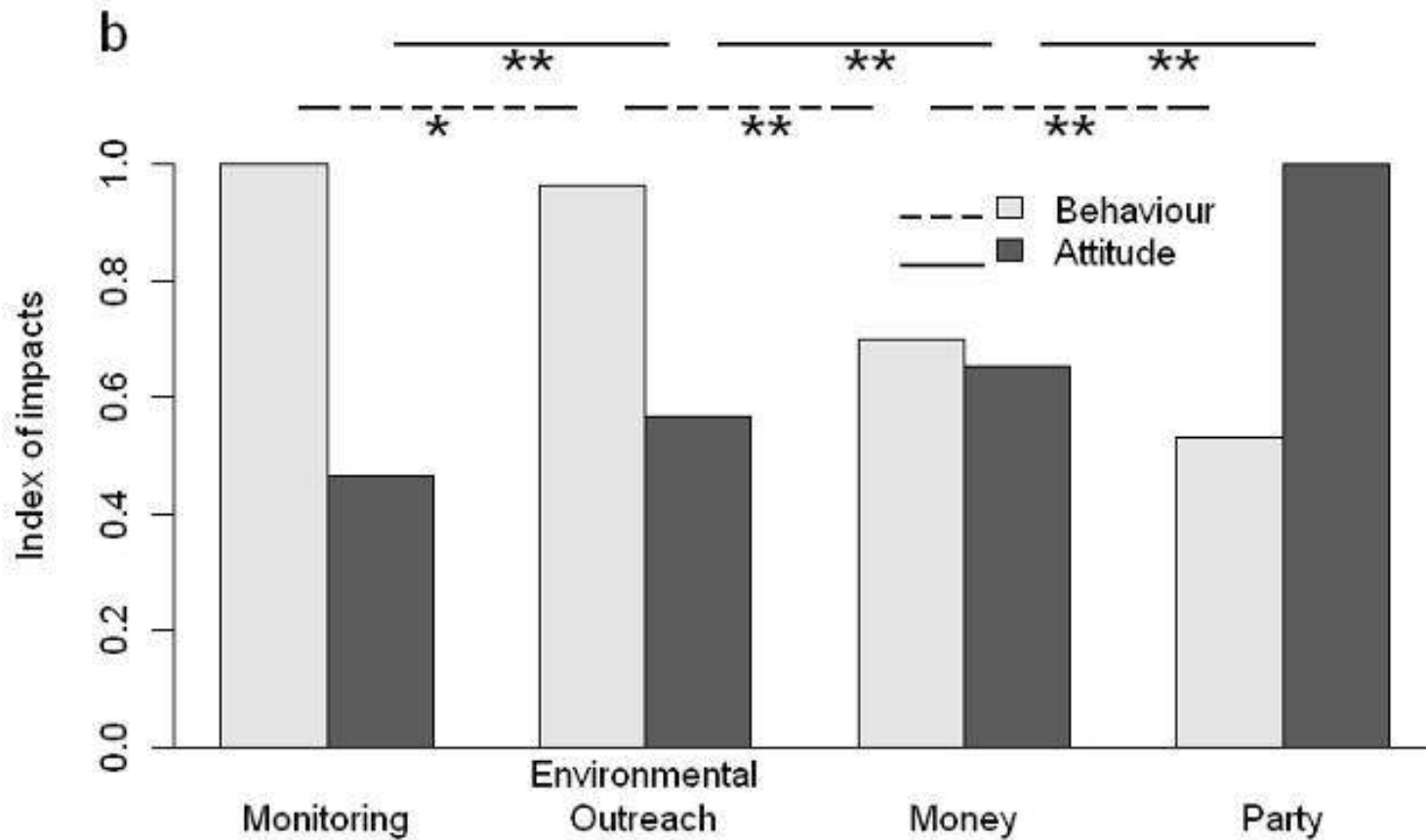
- No conservation intervention happens in isolation, nor is it an external driver – conservation is part of the system
- Social context affects responses to PES, hence its success
- Illustrate with the Madagascar and Cambodia case studies



What positive actions does Durrell do in the village
(open question, n=96)

Actions	%
Environmental Education	21
Party	20
Monitoring forest	17
Meetings	14
Economic incentives	12
Visit village	4
Strengthen forest association	3
Other	5

What most influences your behaviour?



651 interviews in 8 intervention villages, about attitudes to Durrell activities and reasons for stopping illegal behaviours

Impacts of PES on local livelihoods and biodiversity in the Northern Plains of Cambodia



Clements et al. (2010) *Ecological Economics*, Clements et al. (2013) *Biological Conservation*, Clements et al. (in press) *World Development*

Conservation Interventions

Protected Areas

- Kulen Promtep Wildlife Sanctuary: declared in 1993
- Preah Vihear Protected Forest: declared in 2002
- Protected Area management & capacity building program from 2005-2012, with a budget of c.\$0.5-0.8 million/year

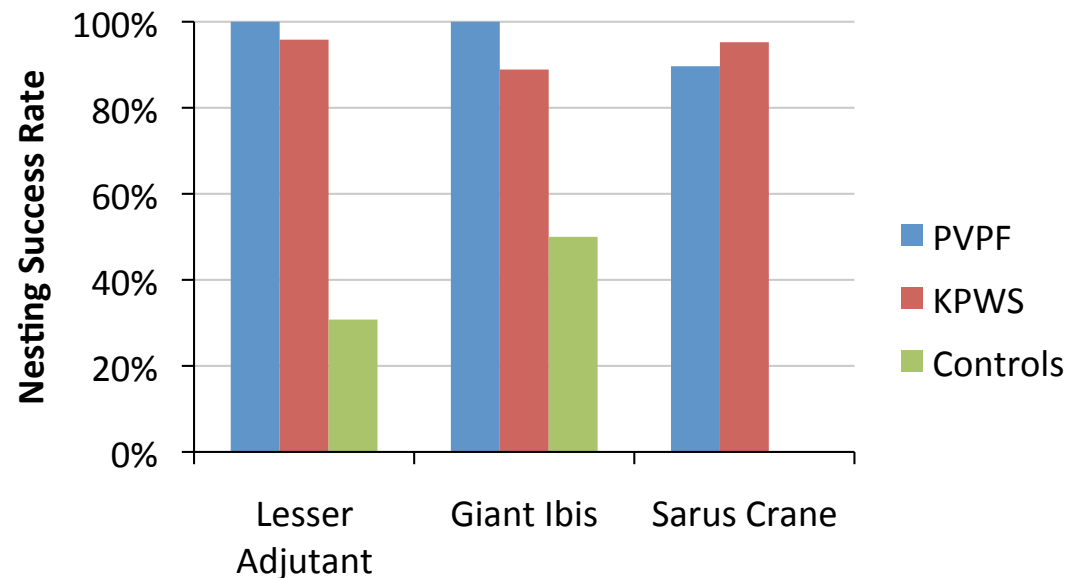
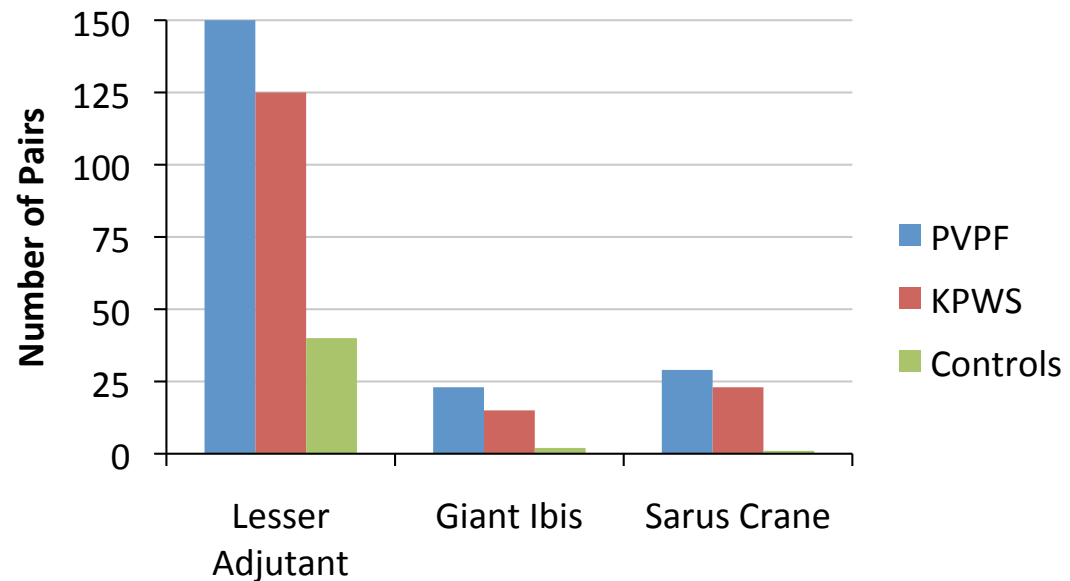
Payment programs

- Three programs:
 - payments for bird nest protection (individual, direct payment)
 - payments for keeping agriculture within land-use plans ('Ibis Rice'; landowners + community cooperative)
 - community-based ecotourism (employment plus community payment)
- Implemented from 2007 to 2012 in 4 of the 16 villages within the Protected Areas



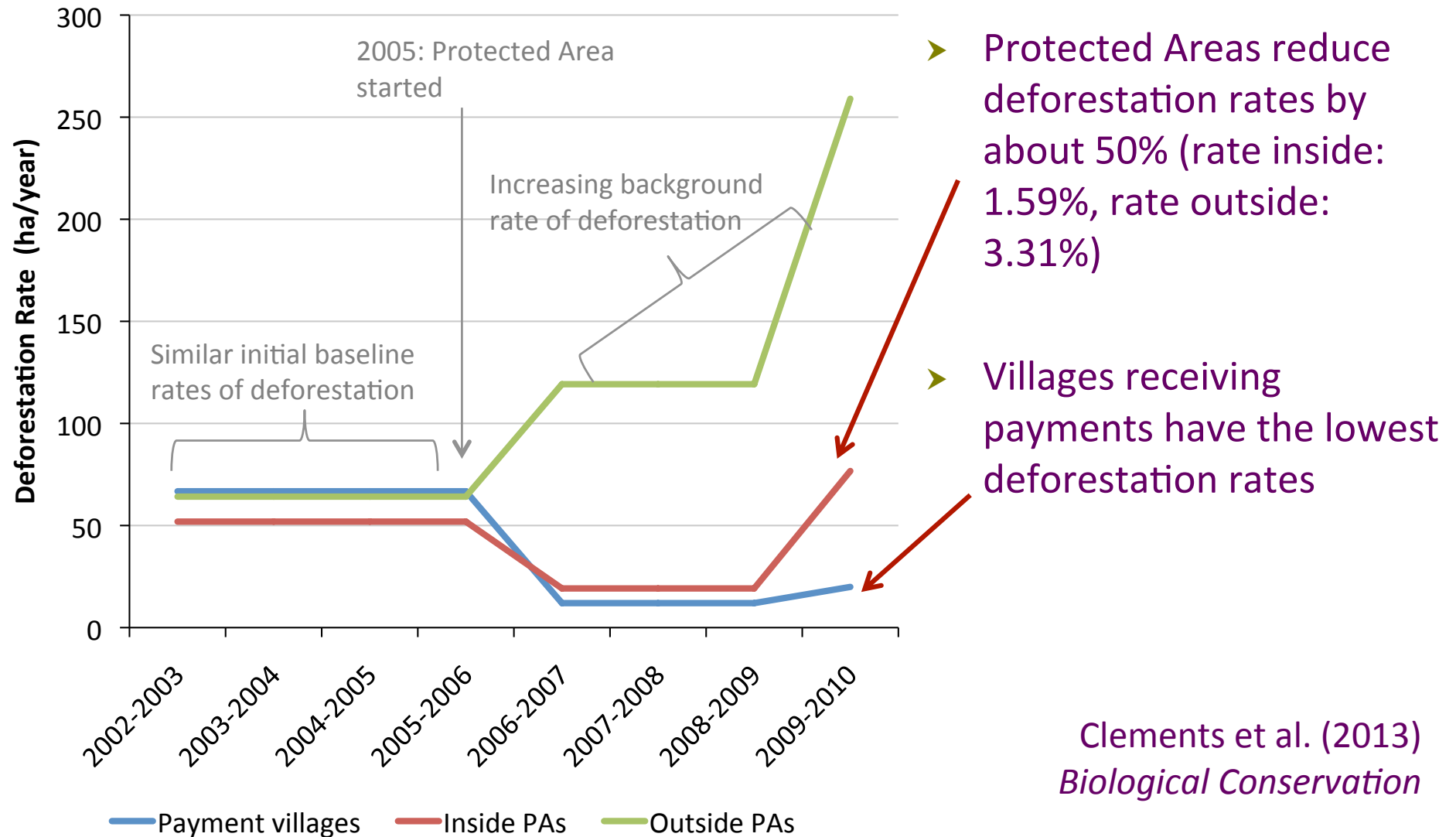
Clements et al. *Ecol. Econ.* (2010)

Impact: Bird populations



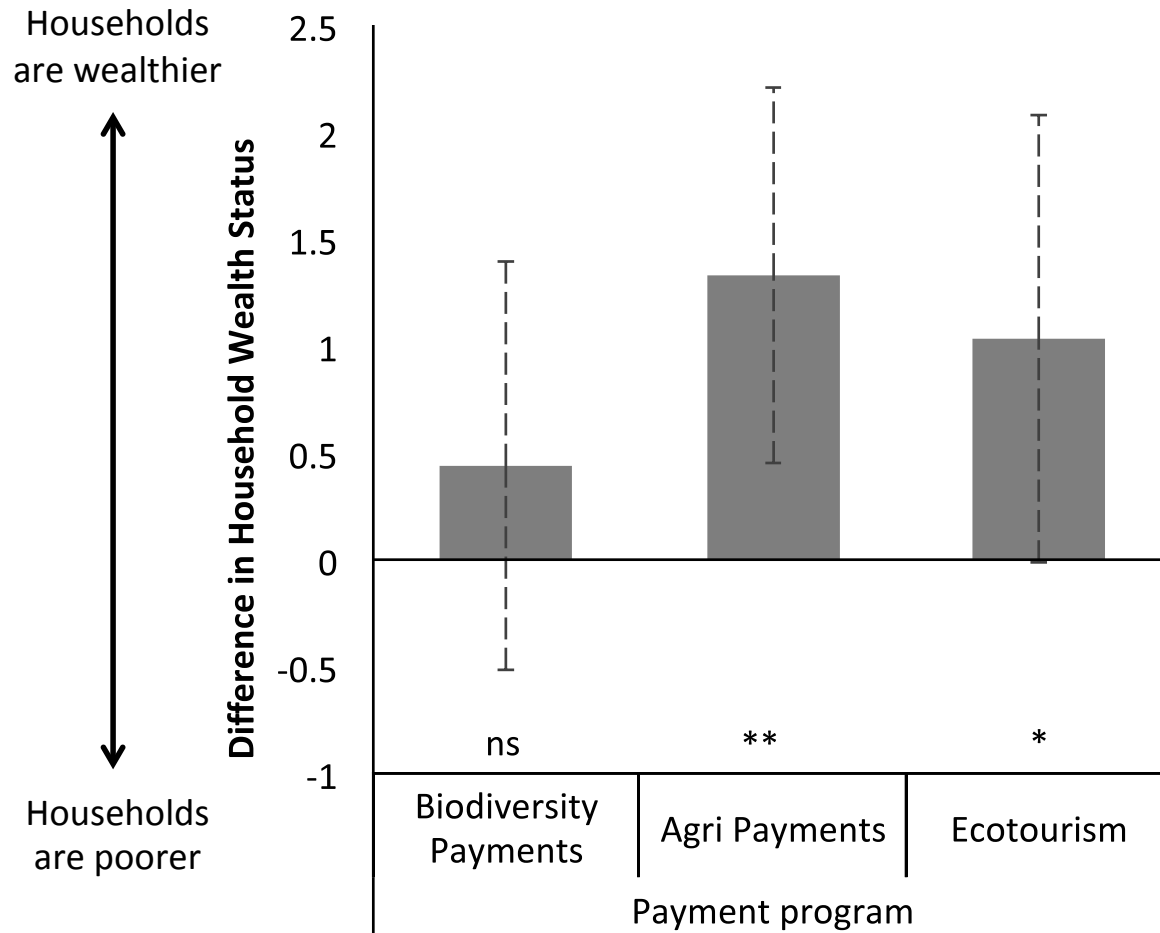
- Populations near villages with conservation programs are significantly greater than populations near matched controls
- Success rate is much higher near villages with conservation interventions
- **Most of this is due to bird nest payment system: 76% protected; 95% success rate**
- Hard to determine impact of conservation programme since target villages were chosen due to the important species present

Impact: Deforestation rates



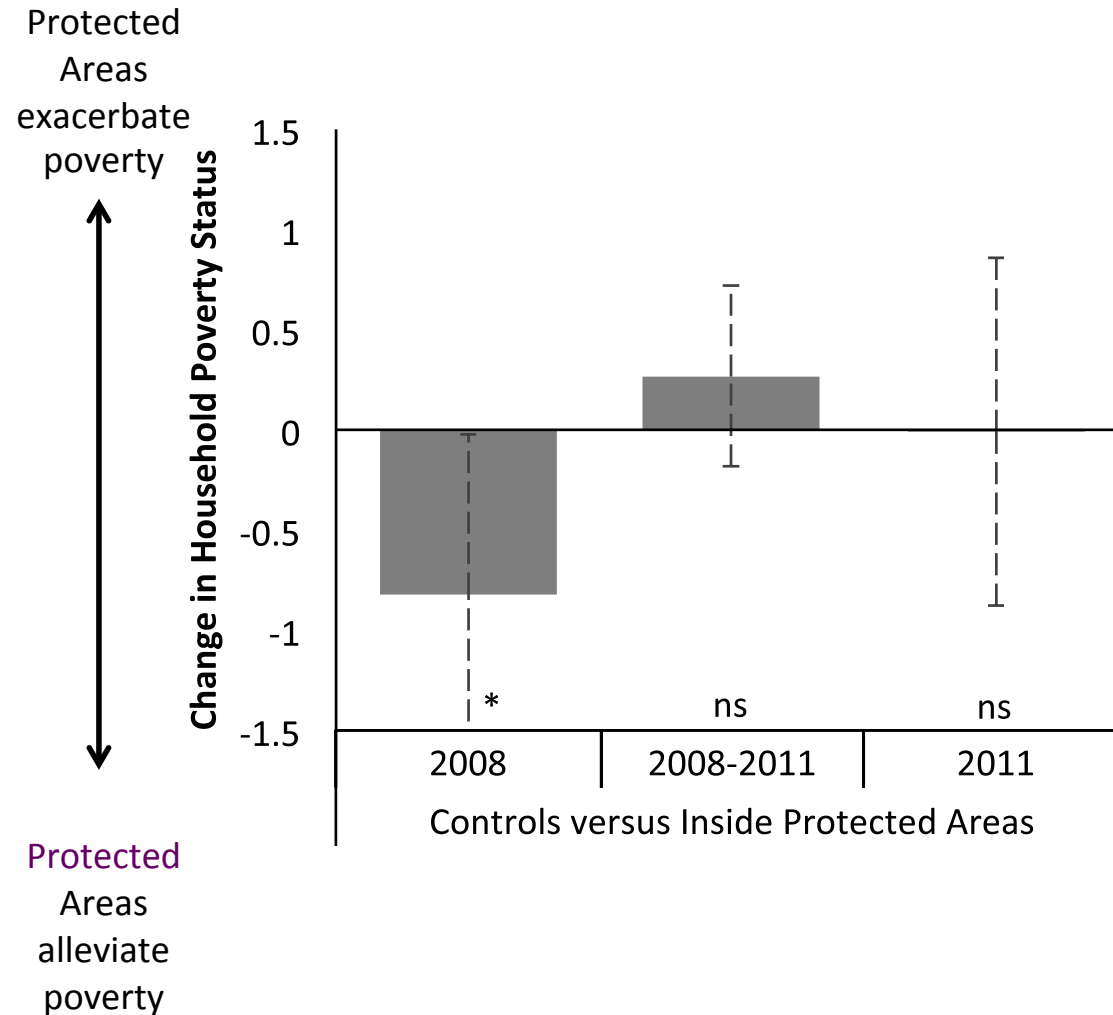
Clements et al. (2013)
Biological Conservation

Elite capture of participation opportunities



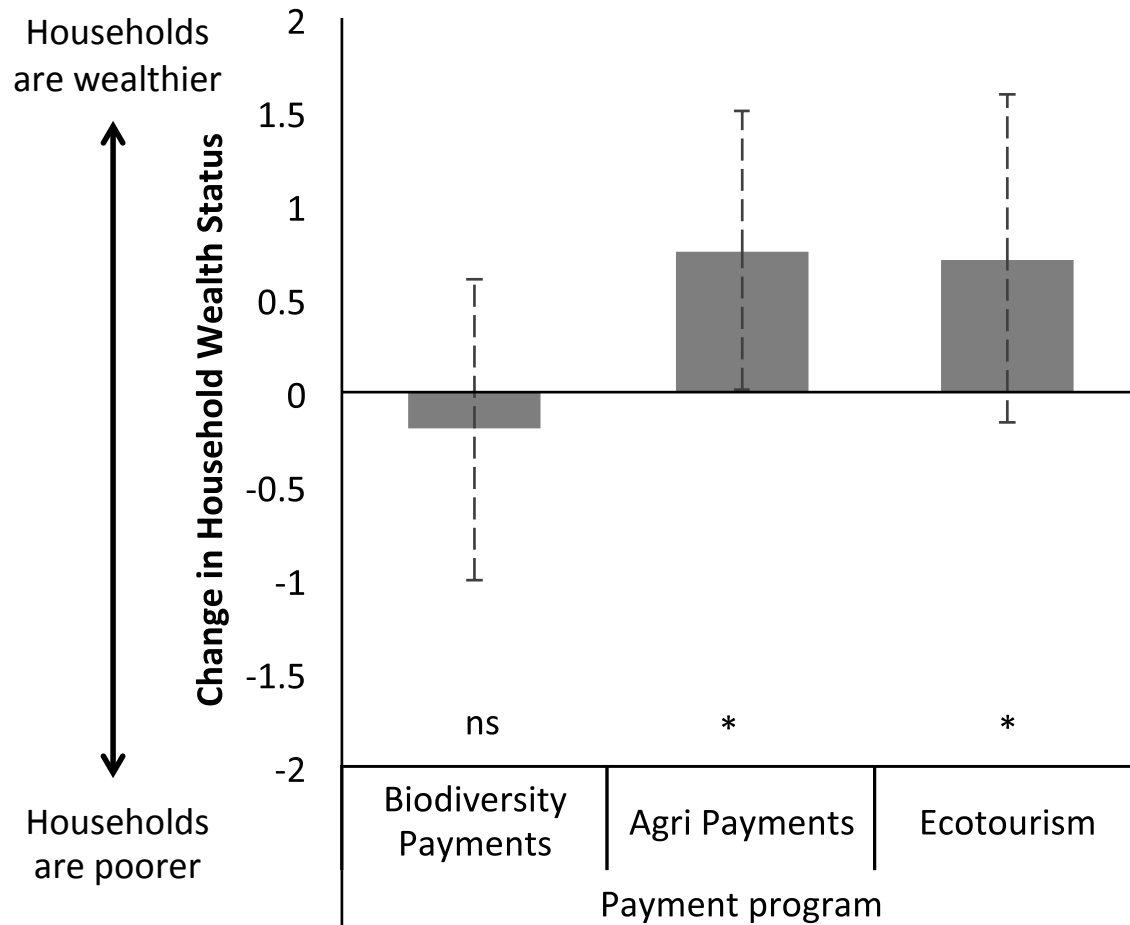
Households participating in agri payments or ecotourism were significantly wealthier than other households in the same villages, unlike those receiving bird nest payments

Protected area: change in poverty



- No evidence that PAs make people poorer
- Controls were poorer than people inside PAs in 2008 on BNS score
- Rate of change in poverty between controls and people inside PAs is similar
- Similar results for rice harvest and food security as for BNS

PES: Change in poverty



Households participating in agri payments or ecotourism increased in wealth faster than comparable households in the same villages
Households receiving bird nest payments changed in wealth at the same speed as comparable households in the same villages

	Community-based Ecotourism	Ibis Rice	Bird Nest Protection
Targets behaviour of:	Indiv & Village	Indiv	Indiv
Community Income (/village/yr)	\$1000-\$3500	>\$300	None
% hhs participating, av income/yr	9%, \$220	>17%, \$320	4%, \$120
Cost-Efficiency:			
Forest:	\$25-50/hectare	\$25-70/hectare	None
Species:	\$500/nest	\$500/nest	\$60-\$120/nest
Financial Sustainability?	Yes	Yes	No
Participation Fair?	Limited No	Potentially all Yes	Limited Yes
Poverty impact?	Positive	Positive	None
Collective Action?	Yes	Maybe	No

Reflections on lessons learnt

- PES requires monitoring of service provision
 - This is a large part of transactions cost and may not even be feasible when service is hard to detect
- One option may be to monitor actions rather than outcomes
 - Indirect relationship to impact may be an issue, and most likely to be less well targeted
- Evaluating impact requires demonstrating additionality
 - Counterfactual must be chosen with care



- PES needs to be evaluated as part of a suite of conservation interventions
 - Payments may legitimise the more behaviour-changing elements of the package
- Institutional structure needs to be carefully considered
 - Although direct targeted payments may have immediate impact, root causes may be better addressed by longer-term approaches that build incentives for collective action



These are general lessons that will be equally applicable to marine systems as to the ones I have worked on

- Thank you to my collaborators, especially Julia Jones, Tom Clements, Matt Sommerville (also for their photos)
- Thank you to our funders: the Leverhulme Trust, the Royal Society, WCS, Cambridge University.
- Find out more: www.iccs.org.uk, @EJMilnerGulland

