Designing and Implementing Payments for Environmental Services – Part 2 –

Stefanie Engel, Professor of Environmental Policy & Economics, ETH Zurich, sengel@ethz.ch

Starting October 1, 2014: Alexander-von-Humboldt Professor of Environmental Economics, University of Osnabrueck

Outline

1. PES vs. Other Policy Instruments
2. PES and Poverty
3. Advanced Issues in PES Design
    1. PES under weak property rights
    2. Payments to groups
    3. Behavioral concerns

Readings

- Pagiola, S., Arcenas, A., and Platais, G., 2005. Can payments for environmental services help reduce poverty? An exploration of the issues and the evidence to date from Latin America. *World Development*, 33:237-253.
- Engel, S., Pagiola, S., and S. Wunder. 2008. “Designing Payments for Environmental Services in Theory and Practice – An Overview of the Issues.” *Ecological Economics 65:* 663-674.

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1. **PES vs. Other Policy Instruments**
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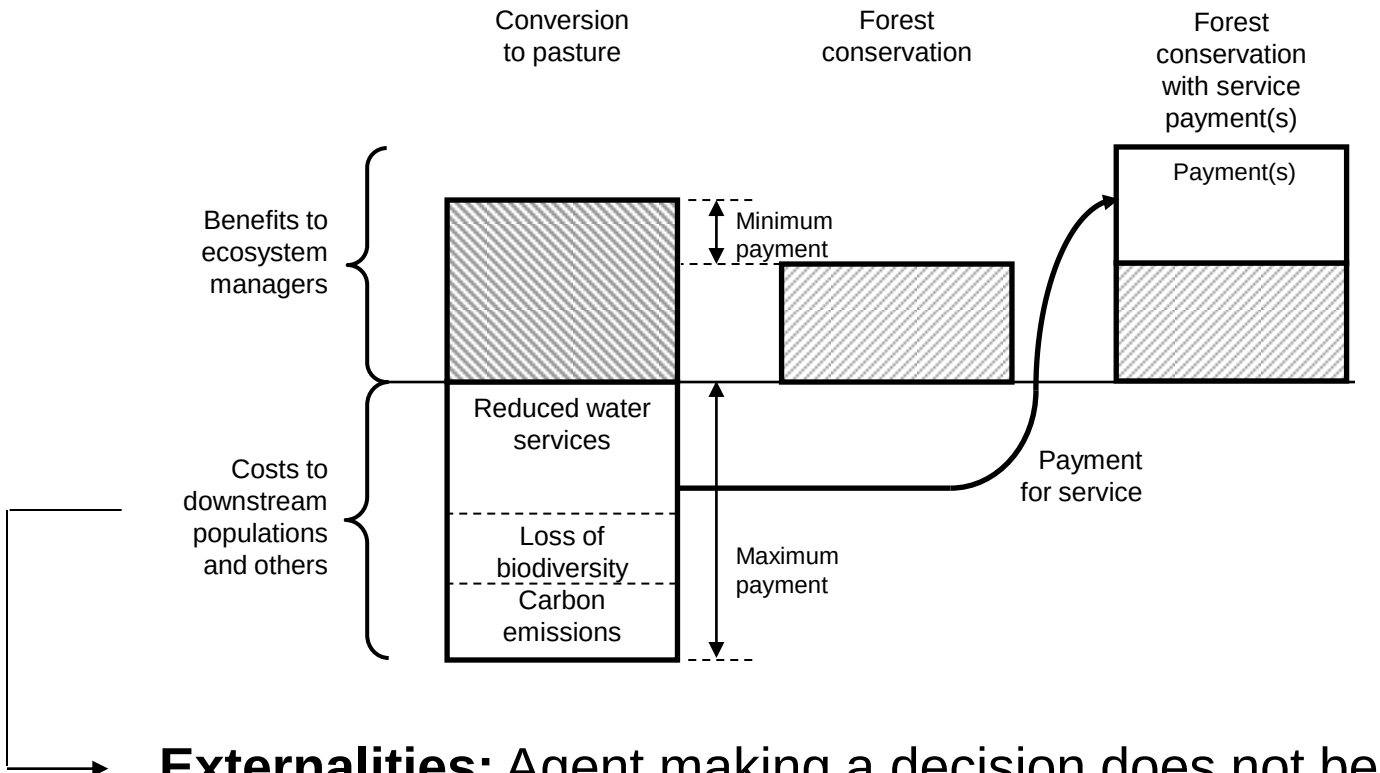
The Logic of PES



Externalities: Agent making a decision does not bear all of the consequences of his action

Don’t hammer a nail with a screwdriver…

Ecosystems may be mismanaged for reasons other than externalities, in which case PES is not likely to be the best approach

For example:

- **Lack of awareness or information** about land use practices that are in the private landholder’s own financial interest to adopt ⇒ **education/awareness building** more adequate
- **Capital market imperfections** preventing landholders from adopting privately profitable technologies/practices that enhance ES provision ⇒ providing **access to credit** as most promising approach
- **Conflicting policies** inducing incentives for environmentally harmful behavior (e.g., subsidies on damaging activities or inputs) ⇒ most appropriate approach would be to **eliminate such policies**

When is PES an appropriate approach? (cont.)

- PES is potentially appropriate if ecosystem management is due to the presence of externalities
- **But: There are other approaches to addressing externality problems**, e.g., environmental taxes, …
- One important difference is that…
  - …Environmental taxes put a price on environmental services by charging for loss of services) (‘Polluter-pays-Principle’)
  - …PES pays for provision of services (‘Steward-rewarded-Principle’)

Disadvantages of environmental subsidies vis-á-vis taxes

- May suffer from **lack of additionality** (i.e., paying for activities that would have been conducted anyway) and **leakage** (i.e., shifting environmentally damaging activities elsewhere in space) ⇒ Requires careful assessment of baseline
- May create **perverse incentives** (e.g., inducing an expansion of environmentally destructive activities to obtain higher subsidies later on) ⇒ May be avoided by setting a baseline from a period prior to PES design
- Raise profitability of the subsidized activity relative to other activities and thereby may lead to **expansion** of the subsidized activity ⇒ problem if the subsidized activity then displaces others that are environmentally preferred
- May be misused for **protectionist** purposes

Advantages of environmental subsidies/PES vis-á-vis taxes

- **Distributional concerns** often militate against the use of environmental taxes
  - Developed countries: politically powerful agricultural producers have often been able to direct policies towards environmental subsidies rather than taxes
  - Developing countries: ES providers generally thought to be worse off than ES users, posing strong equity argument for environmental subsidies rather than taxes
- Practical issues of monitoring **compliance**: easier to secure cooperation from land users when ‘offering them carrots’ than when ’threatening them with a stick’

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Main source for this section: Pagiola et al. 2005

PES and Poverty

- **Distributional arguments are a major argument commonly made for PES**
- **Idea:**
  - Providers of ecosystem services in developing countries are often poor
  - Prohibiting or taxing resource use would be detrimental to their livelihoods; social equity concerns
  - PES provides alternative income source to local resource users
  - Promise that PES alleviates poverty attracts donor funding

So: Can PES ‚kill two birds with one stone'? (i.e., achieve environmental quality and poverty alleviation)

Preliminary thoughts

- **Tinbergen Rule**: Better to have as many instruments as objectives (killing two birds is easier with two stones!)
- Primary objective of PES: Improve efficiency of natural resource management
- There are more direct ways to address poverty
- But from a practitioner perspective linking PES to poverty alleviation can help raise funds
- So does PES have positive impacts on the poor?

Pick an example from your country where PES is or could be implemented

Who are ‚the poor' that may be affected by PES?

- Ecosystem service providers (e.g., upstream landholders)
- Service users (e.g., downstream water users)
- Other groups
  - People employed in agriculture
  - People collecting forest products
  - Consumers of agricultural products

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Impact of PES on ecosystem service providers

- Depends on whether poor
  - Are **eligible** to participate in PES
  - **Want** to participate in PES
  - Are **able** to participate in PES

Impact of PES on ecosystem service providers

- Depends on whether poor…
  - Are eligible to participate in PES
  - Want to participate in PES
  - Are able to participate in PES

When PES is implemented only in selected areas that are important ecologically,

question is whether poor landholder‘s are located in these areas.

Are the poor likely to be eligible for PES?

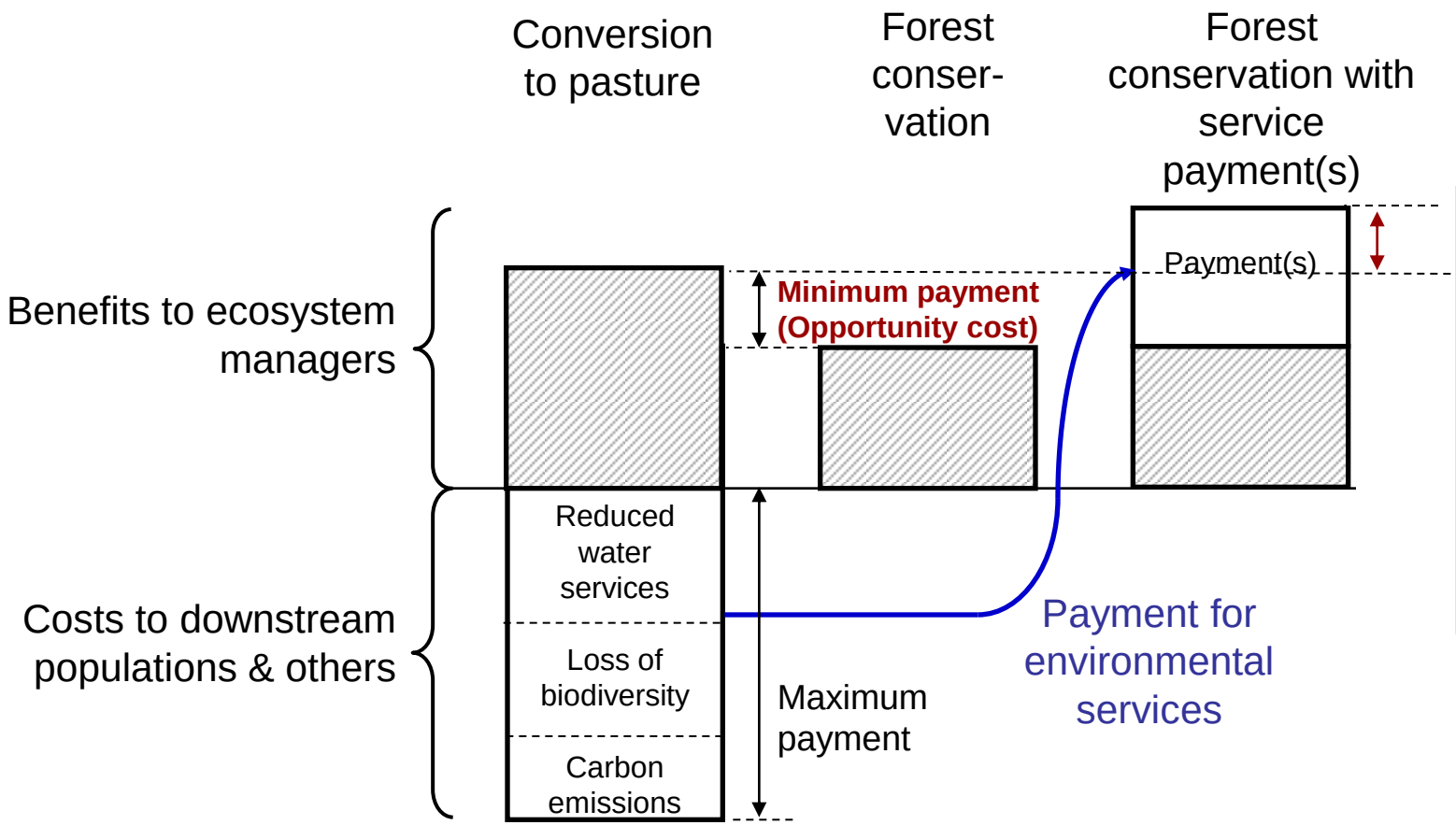
- **YES**: Poor tend to live in rural areas, particularly marginal areas such as steep slopes of upper watersheds (77 most sensitive watersheds in Guatemala had poverty rate of 70%; Nelson/Chomitz 2002)
- **NO**: ES restoration in longer-settled watersheds may be particularly important for hydrological services (Many landowners in Costa Rica‘s Cordillera Volcanica Central are relatively well-off urban dwellers)
- **MAYBE**: For highland Guatemala, Pagiola et al. (2007) found no correlation between importance of an area for water ES provision and incidence or density of poverty

Impact of PES on ecosystem service providers

- Depends on whether poor…
  - Are eligible to participate in PES
  - Want to participate in PES
  - Are able to participate in PES

Depends on whether PES practice is profitable & fits in farming system

The Logic of PES



Net gain in Profits

-> depends on opportunity costs and also transaction costs

Is PES practice profitable and fits in farming system of the poor?

- For given payment, landholders with lower-productivity land more likely to participate as they have lower opportunity costs (= profits lost when participating in PES)
- These may or may not be poor
- Payments themselves are not good measures of the amount of benefits received. Need to consider costs of participation.

Impact of PES on ecosystem service providers

- Depends on whether poor…
  - Are eligible to participate in PES
  - Want to participate in PES
  - Are able to participate in PES

Depends on tenure issues, ability to finance investment costs, technical difficulties, transaction costs

Are the poor able to participate in PES?

- Lack of formal title may be a hurdle for the poor (e.g. initially a problem in Costa Rica)
- PES may lead to the powerful muscling out poorer land users lacking secure tenure (e.g. Colombia)
- Poor may lack savings and access to credit to fund investment costs (e.g. for silvopastoral practices)
- Poor may lack education or access to technical assistance
- Transaction costs (e.g., management plan) disproportionately high for small farmers (may be alleviated through collective contracting)

Empirical evidence on participation of the poor in PES

- **Mixed evidence**
- Some studies in **Costa Rica** found that many participants in the PSA program are well off (Miranda et al., 2003; Zbinden and Lee, 2005), while others have found substantial participation by poor households (Muñoz, 2004)
- Pagiola et al. (2007b, 2008) examine the extent to which poorer households are able to participate in a pilot PES program in **Colombia and Nicaragua**
  - No evidence for lower participation of the poor
  - Higher transaction costs likely to be much greater obstacles to participation of poorer households than the households' own limitations

Who are ‚the poor' that may be affected by PES?

- Ecosystem service providers (e.g., upstream landholders)
- **Service users** (e.g., downstream water users)
- Other groups
  - People employed in agriculture
  - People collecting forest products
  - Consumers of agricultural products

Who are the service users?

- For water-based PES: Urban residents with access to electricity and piped water usually better off then most rural residents
- But: Poor may be disproportionately affected by risk of flooding
- Participation may not be fully voluntary as contracts often made with intermediaries like hydroelectric power producers, water utility companies, or irrigation water user associations (may pass on costs to consumers)
- Adverse impacts may be reduced by increasing block pricing

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Which other groups are affected by PES?

- **WORKERS:** Employment impacts depend on difference in labor demand between current land use practices and those promoted under PES
  - Problematic when payments are made for activity reduction. For ex.: Maintaining forest cover may require less labor than conversion to agriculture.
  - Less problematic when payments are made for activity creation. For ex.: Silvopastoral practices may increase farm labor use (betw. 8-100% according to World Bank, 2002)

Which other groups are affected by PES?

- **Customary resource users:** PES may affect availability of and access to resources
  - Silvopastoral practices likely to result in substantially increased availability of fuelwood, fodder, fruits
  - PES enrollment of community forest lands may curtail use for fuelwood collection and grazing important to the poor, while payments may not necessarily be distributed in proportion to lost benefits
  - PES enrollment of state or private forest land may lead to stronger restrictions on customary users
  - When property rights are weak: Introduction of PES increases chance of recentralization (Phelps et al. 2010, Engel et al. 2011) or capture by commercial actors (Engel et al. 2013)

Which other groups are affected by PES?

- **Consumers of food:** PES could potentially affect food prices.
  - Impact likely to be negligible when PES areas are relatively small.
  - But could become an issue for REDD+.

PES & Poverty – Conclusions I

- PES are not a magic bullet for poverty reduction and should not be seen as such

Don‘t hammer a nail with a screwdriver: Different causes of environmental degradation require different policy approaches

1. Lack of information	← Awareness building
2. Subsidies on destructive activities	← Remove/redirect subsidies
3. Poverty	← Poverty alleviation
4. Insecure rights	← More secure rights
5. Lack of access to credit	← Microcredit
6. External effects	← PES, ecotaxes etc.

PES & Poverty – Conclusions I

- PES are not a magic bullet for poverty reduction and should not be seen as such
- But synergies may exist when local conditions are favorable and program is well thought out

PES & Poverty – Conclusions II

- Potential implications for PES Design to avoid negative impacts
  - Poverty as targeting criterion? (May conflict with benefits to ES users)
  - Keep transaction costs low (Ex: Costa Rica: allow for group applications, lower requirements on proof of formal title)
  - Aim to counteract negative effects (e.g., work programs for conservation on public lands to offset negative employment effects)
  - Support poor land users through technical assistance, access to inputs and credit

Outline

1. PES vs. Other Policy Instruments
2. PES and Poverty
3. **Advanced Issues in PES Design**

Two perspectives

Conventional economist

- Effectiveness
- Cost-efficiency
- Poverty alleviation

➢ Lessons for design

➢ Trade-offs

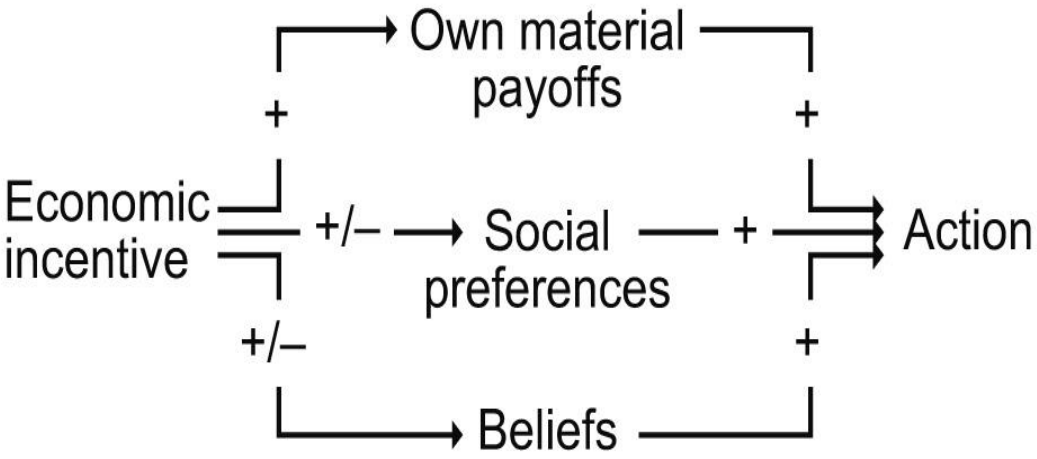
Behavioral economist

- Impact on intrinsic motivations
- Crowding effects

➢ Consideration of indirect effects

➢ e.g. via perceived fairness, control

The behavioral economics of PES



➢PES as economic incentive may reduce **(crowd out)** intrinsic motivations to act for the public good. This may reduce or even counteract the effectiveness of PES.

Sources: Figure extended from Bowles and Polonîa-Reyes 2012; Some sources on crowding effects in other contexts: Frey & Oberholzer-Gee 1997; Cleaver 2000; Gneezy/Rustichini 2000, Frey/Jegen 2001; Fehr/Falk 2002; Heyman/Ariely 2004, Reeson/Tisdell 2007/8, Vatn 2009, Muradian et al. 2012)

Selected issues in PES design

a. Conditionality
b. Targeting across space (including additionality)
c. Targeting across time (permanence)
d. Group PES
e. PES under weak property rights
f. Leakage

Conditionality: The conventional view

- Conditionality of payments is **THE defining feature and strength of PES** (Ferraro/Simpson 2002, Ferraro/Kiss 2002, Engel et al. 2008, Kinzig et al. 2011)
- Advantage over Integrated Conservation and Development Programs (Ferraro/Kiss 2002)

Conditionality: The conventional view

- PES can be conditional on outcomes (results-based) or on activities (Engel et al. 2008)
- What if factors out of control of land user and difficult to observe affect results?
  - Results-based payments resolve hidden action problem, but put all risk on service providers
  - Mix of conditionality on outcomes and on activities may be preferable (Derissen/Quaas 2013)
  - Relative performance payments - Ex: Some agri-environmental payments in Germany based on amount of nitrogen found in each participant's soil sample relative to the average of all other scheme participants (Zabel/Roe 2009)

Conditionality: The behavioral view

- Conditionality requires monitoring and sanctioning
- This may trigger **control aversion** (Bowles/Polonía-Reyes 2012)
- Literature on work contracts suggests that it may be optimal to make only a part of payments conditional (Lindenberg/Foss 2011)
- If factors out of control of land user affect results, could be **perceived as unfair** (Pascual et al. 2010, Corbera/Pascual 2012)
- Could this be reduced by relative performance payments or by making payments at least partly conditional on activities rather than outcomes?
- Crowding effects depend on how **social meaning of payments** is constructed (Muradian et al. 2012)

Experimental evidence on crowding effects of PES

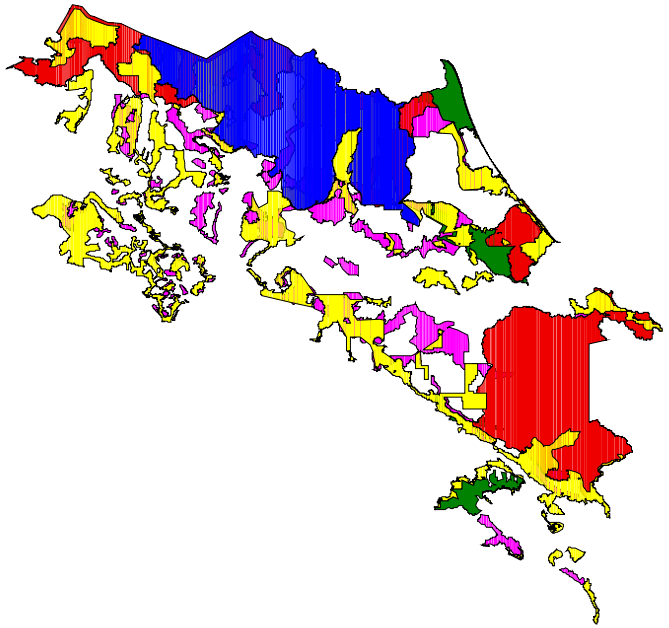
(Cardenas et al. 2000, Vollan 2008, Travers et al. 2011, Narloch et al., 2012, Kerr et al. 2012, review in Rode et al. 2013)

- Effect of PES re. crowding is highly location and context specific
- Frameworks developed in close interaction with stakeholders show less crowding out than top-down regulations
- ‘Pay enough or don’t pay at all’
- Crowding out more likely in a context of strong social norms, trust and reciprocity -> less likely to be a problem where PES is most needed?

Payment design across space

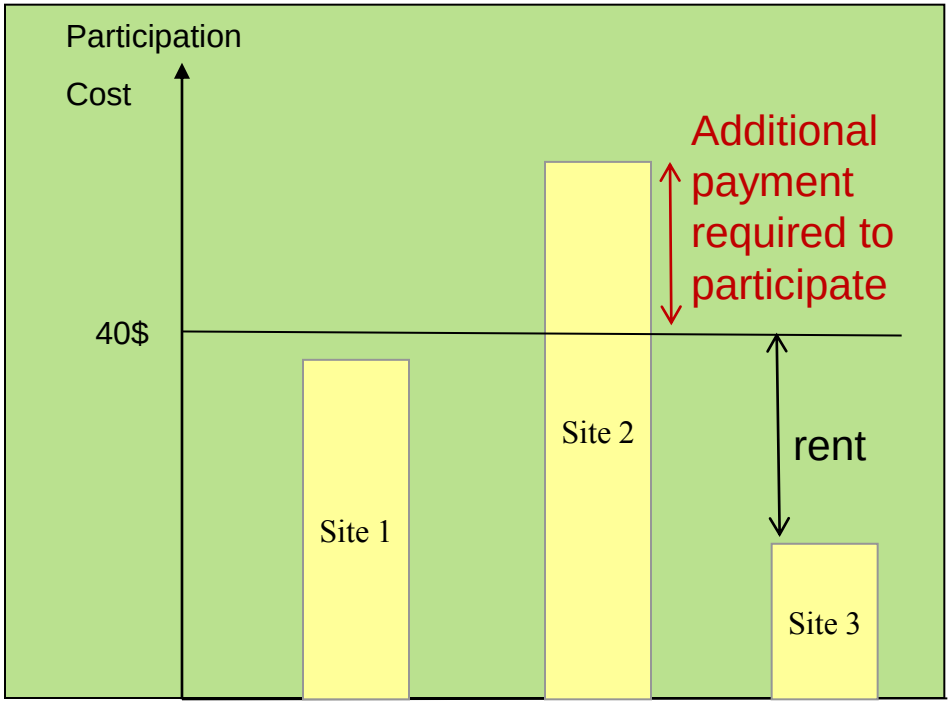
Example Costa Rica (Wünscher/Engel/Wunder 2008)

- # of applications >> available budget (800,000 ha pending at end of 2004)
- Site selection on first-come-first-serve basis based mostly on priority areas
- Fixed payment amounts, regardless of ES provided and costs of providing them
- Low additionality (e.g. Sills et al. 2005,; Pfaff et al. 2007; Sanchez-Azofeifa et al. 2007; Arriagada et al. 2009)



Payment design across space

- Fixed payments give high production rent to land managers with low participation costs
- Paying site 3 less and site 2 more could increase total ES, particularly if site 2 is rich in ES and highly threatened to be deforested



Wünscher/Engel/Wunder 2008: Simulate ES provision for Nicoya peninsula (Costa Rica) when payments are variable and when site selection and payment amounts consider

(i) benefits (ES per ha)
(ii) threat (additionality of ES provided)
(iii) participation costs

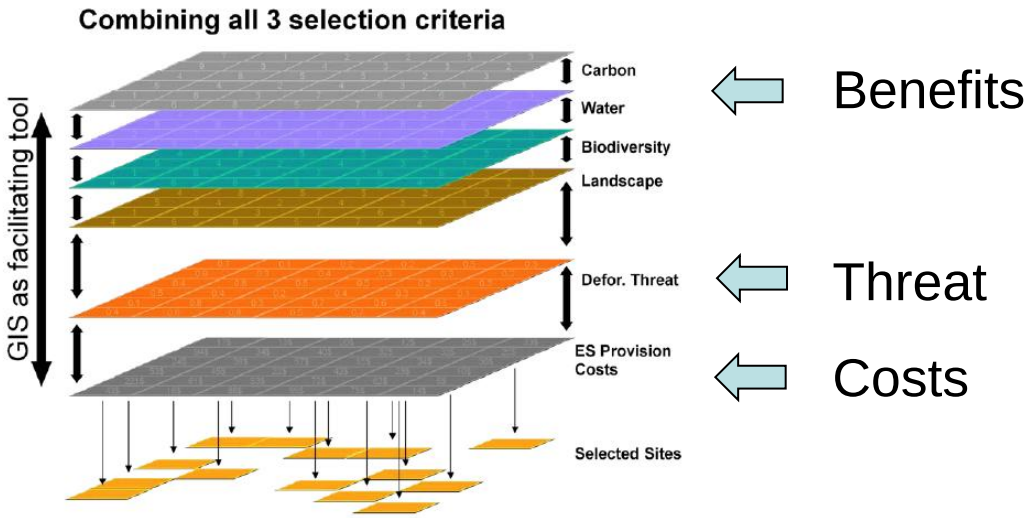
Combining all 3 targeting criteria:

- maximize $\sum(\underbrace{\text{ES} * \text{Probability of deforestation}}_{\text{ES additionality}} \text{ w/o PES})$
- s.t. Payment ≥ Participation cost

  Sum of payments ≤ Given total budget

- Allowing for flexible payments

Results



- ES ~ **double** with given budget
- Similar results in various other studies (Alix-Garcia et al. 2008, Armsworth et al. 2012, Wätzold/Drechsler 2005, Barton et al., 2003, Ando et al. 1998, Polasky et al. 2001, Johst et al. 2002)
- **Is it worthwile the increase in implementation costs?**
  - Costa Rica: LIKELY YES. ~ 0.24% of total PSA budget
  - Hanley et al., 2012: YES. 49-100% increase in biodiversity benefits through targeting & payment differentiation outweighs increase in implementation costs up to 70% of budget.

Targeting: Challenges

- **Complex to implement**
  - Data and institutional requirements
  - Decision support tools (Wätzold et al., 2012)
- **May face political and administrative hurdles**
  - Difficult to change a system once in place
  - Less relevant for new programs
  - Latent objectives (e.g., PSA as compensation for strict legislation rather than for achieving additional environmental benefits)
- **Asymmetric information on participation costs**
  - Auctions as a potential approach to elicit costs (Ferraro 2008, Whitten et al., 2012)
  - Ex: Conservation Reserve Program in the US, Australian Bush Tender

Targeting: Challenges

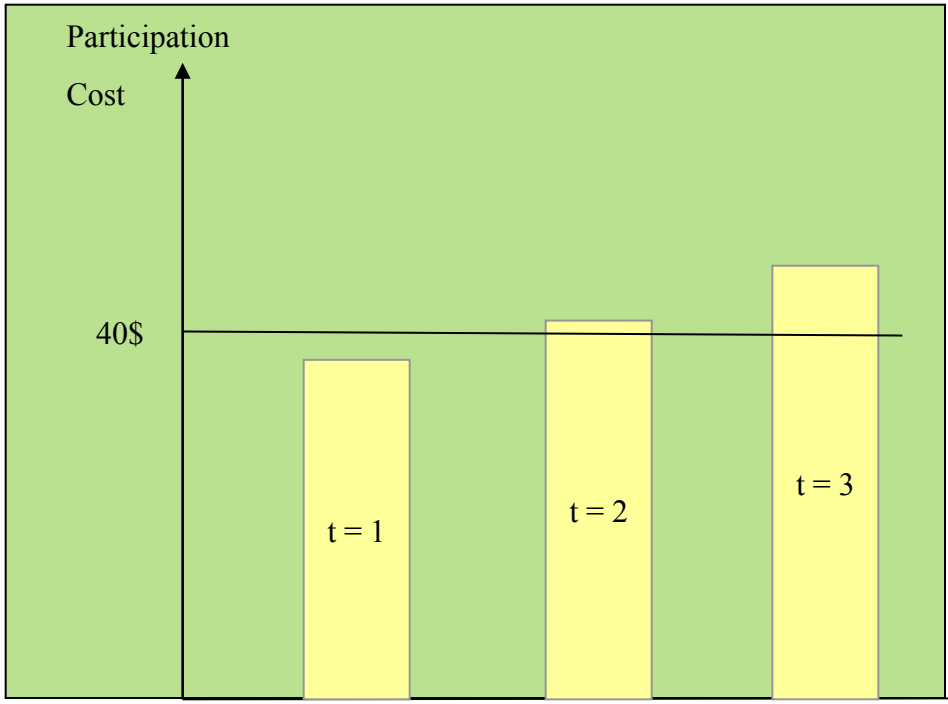
- Weighing/aggregating different ecosystem services
  - Normalized scores (Wünscher et al. 2008)
  - Multi-criteria decision analysis with stakeholders
- Accounting for spatial interactions (e.g. connectivity)
  - Proximity to protected areas or other bids as **higher benefit** (Wünscher et al. 2008; Windle et al. 2009; Barton et al. 2009)
  - **Agglomeration or coordination bonus/payment** (Parkhurst et al. 2002; Goldmann et al. 2007): Premium paid for spatially coordinated action; ex. in NL, Oregon, CH, UK
  - **Combinatorial auctions** (Reeson et al. 2011): multiple rounds, information spreading on location of other bids, preferential selection of connected bids as incentive

Targeting/ additionality: Behavioral view

- Perceptions of procedural or distributive unfairness can undermine the effectiveness of economic incentives (Fehr and Falk, 2002, Vatn, 2010, Thibaut and Walkers 1978; Folger 1977; Kanfer et al. 1987, Sommerville 2010)
  - Targeting according to additionality -> Those who contributed in the absence of payments reduce their contribution (Alpizar et al. 2013)
- Many open research issues, e.g.:
  - Ex. Costa Rica: Land owners conserving forests on lands with low production potential – would they really start deforesting just to protest?
  - What is considered fair/unfair? Targeting could be considered fairer.
  - Do auctions reduce perceived unfairness because payments amounts are proposed by land owners themselves?

Targeting across time (permanence)

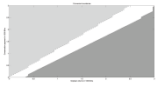
- Permanence in emission reductions a major concern regarding REDD+
- At risk due to increasing opportunity costs (growing world demand for food and biofuels)
- May induce land managers to breach REDD+ contracts



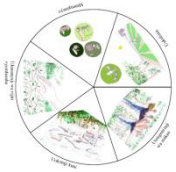
- Idea of linking REDD+ payments to agricultural price index (Benítez et al. 2006, Dutschke/Angelsen 2008)
- Caveat: If opportunity costs increase too much, paying for the activity may no longer be socially optimal (Gregersen et al. 2010, Karsenty et al., 2013)

Targeting across time - Evidence

- Mixed evidence:



Real options model and simulation for Brazil (Engel et al., in press): Payments indexed to opportunity costs (ag commodity prices) more cost-effective than those linked to carbon prices, but only marginally (1-6% savings)



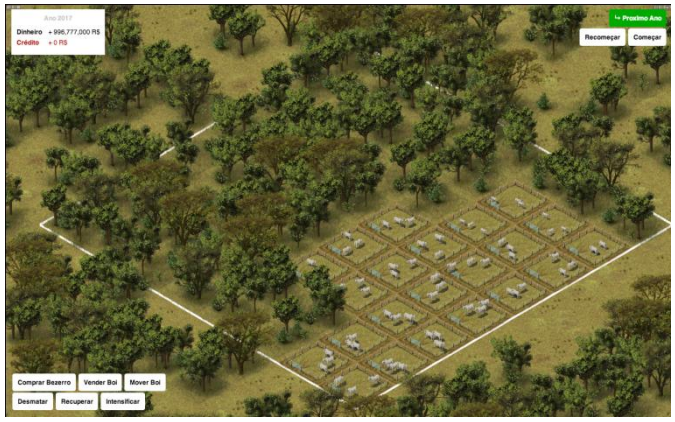
Choice experiment for Kenya (Veronesi et al. 2014): Indexed payments can sustain reduction in charcoaling even when opportunity costs become very high

Computer-game based experiment in Brazil (Reutemann et al. 2014): No significant difference in deforestation between fixed and indexed payment

- Indices are imperfect measures of opportunity costs
- Indexing introduces an additional source of uncertainty for the land user
- **Indexing payments may not yield as strong cost efficiency benefits as expected; depends on index**

Targeting across time – Behavioral view

- When faced with highly complex decision making under uncertainty, people use simple yet smart heuristics (Rabin/Thaler 2001, Gigerenzer/Selten 2002)
- May explain why indexing does not have much effect and risk preferences play less of a role than expected in our Brazilian study (Reutemann, in progress)
- More studies needed



Group payments

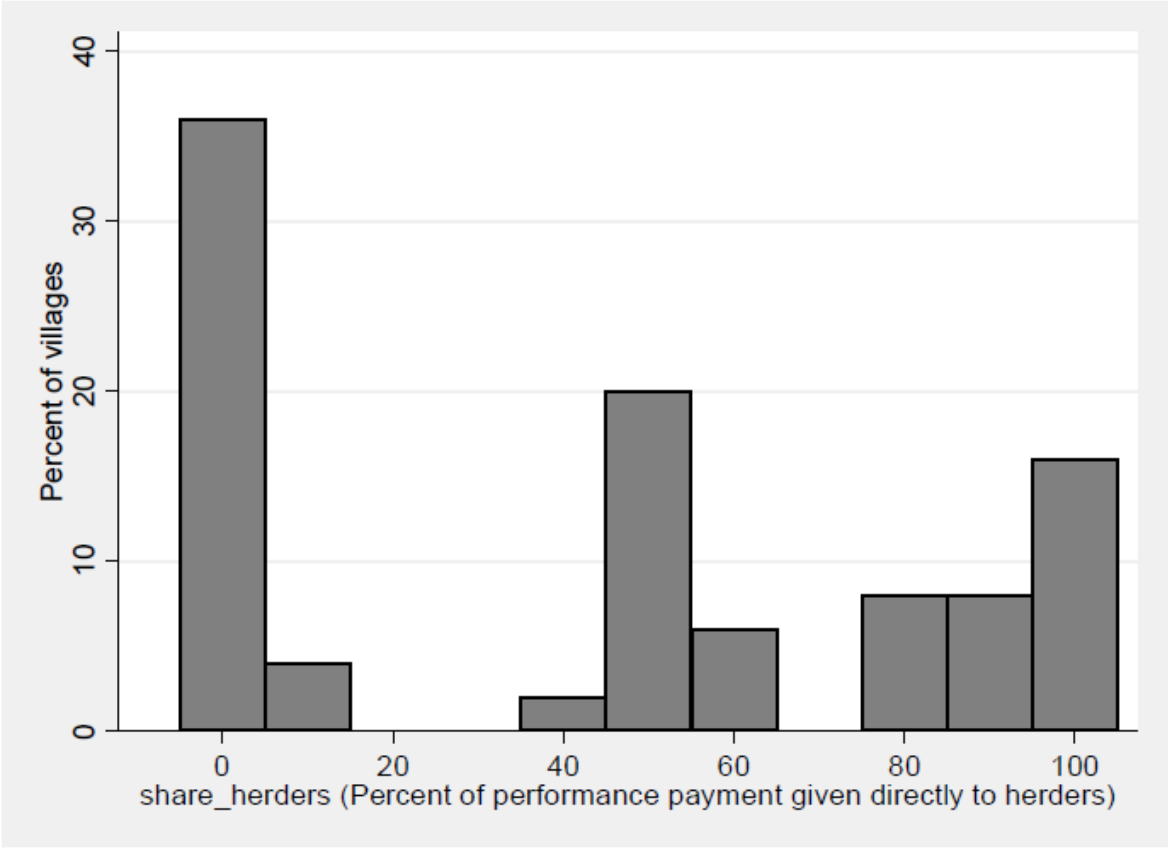
- Payment made to group of people
- **Relevance** of group payments
  - Spatial coordination/Agglomeration bonus (Ex. Agri-environmental programs; Premium paid to group of farmers for spatially coordinated action; Ex: Netherlands; Parkhurst et al. 2002, Goldmann et al. 2007, Parkhurst /Shogren 2007, 2008, 2011; Banerjee 2011; Hanley et al. 2010, De Vries et al. 2012)
  - Joint property rights (Ex: developing country forests; *Niesten and Rice, 2004; Wunder et al., 2008, Missrie and Nelson, 2005*)
  - Environmental outcome observable only at group level (Ex. water quality, wildlife conservation; e.g., Zabel et al. 2013)
- **Complexities** of group payments
  - Group as collective ES seller faces commons dilemma (Gibson and Marks, 1995, cf. Ostrom 1990, Baland/Platteau 1996, Agrawal, 2001)

Example Sweden (Zabel/Bostedt/Engel, 2013)

- **National PES scheme** for carnivore conservation
- **Wildlife-livestock conflicts**: Indigenous Sami reindeer herders vs. conservation of wildlife (lynx & wolverines) preying on reindeer
- **Performance payments** made to Sami villages based on carnivore offspring on village territory
- Varying conservation success

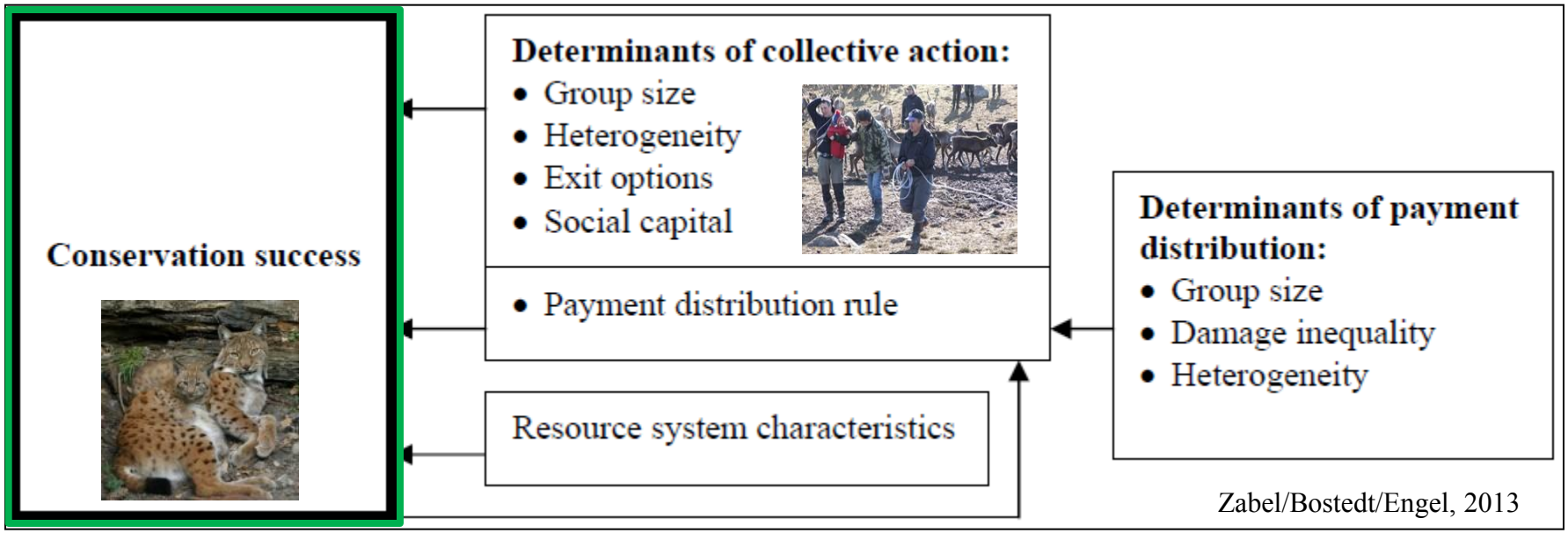
Intra-group payment distribution

Share of group payment redistributed to individual herders; remainder invested in village commons



Zabel/Bostedt/Engel 2012

Group payments – Ex. Sweden



- Besides classic determinants of collective action, **intra-group payment distribution rule** matters for conservation success.
- Groups which distribute payments to individual members proportional to expected damage (herd size) perform better than those investing in village commons.
- Should we impose more favorable distribution rule?

Group payments – The behavioral view

- When faced with collective action dilemmas, majority of people do not act as *homo oeconomicus*, but exhibit pro-social preferences (Ostrom et al. 1999; Fischbacher et al. 2001, Fehr & Gächter 2000, Fehr/Fischbacher 2003)
- Social preferences and beliefs play important role for cooperation and environmental outcomes (Fehr and Schmidt 1999, Fehr and Gächter 2000, Rustagi et al. 2010)
- **The potential for crowding effects of PES thus highly relevant for group PES!!!** (Oldekop et al. 2013)
- Imposing payment distribution rule top-down could trigger control aversion and be counter-productive

Leakage

- If PES reduces production of a good, production and environmental damage may be shifted elsewhere
- Options to deal with this
  - Discounting carbon credits for leakage (Murray 2009)
  - ICDP-PES hybrids producing equivalent output while reducing environmental damage

- Ex. Kenya: Ecocharcoaling to replace charcoaling, payment conditional on forest conditions

- Ex. Brazil: Rotational grazing to increase production per hectare, combined with PES for avoided deforestation

Concluding remarks

- PES is not a panacea nor a magic bullet $\Rightarrow$ Appropriateness in a given context needs to be carefully evaluated
- Impacts on poverty depend on local conditions and program design
- Trade-offs in PES design (poverty alleviation vs. environmental performance; different ecosystem services)
- Effective and efficient PES design is a complex task; many lessons to be learnt from existing schemes and studies
- Potentially high gains in effectiveness and efficiency from spatial targeting, considering differences in benefits and costs across sites and landowners

Concluding remarks

Such potential for better PES design should be explored particularly in settings where crowding effects are of less concern:

- payments to individuals, low social capital to start with, clearly defined property rights

- Spread of insights into practice has been low; could be partly driven by justified concerns about behavioral implications that should be taken seriously, particularly in contexts of
  - group payments
  - high social capital
  - strong intrinsic motivations

Concluding remarks

- Potential for crowding effects (negative, but also positive!) could be influenced by policy design
- **Research needed on more sophisticated PES design features** (degree of conditionality, monitoring/enforcement mechanisms, targeting/auctions)
- Frameworks developed in close interaction with stakeholders appear to show less crowding out than top-down regulations