

Payments for Ecosystem Services

CRAE

October 2011

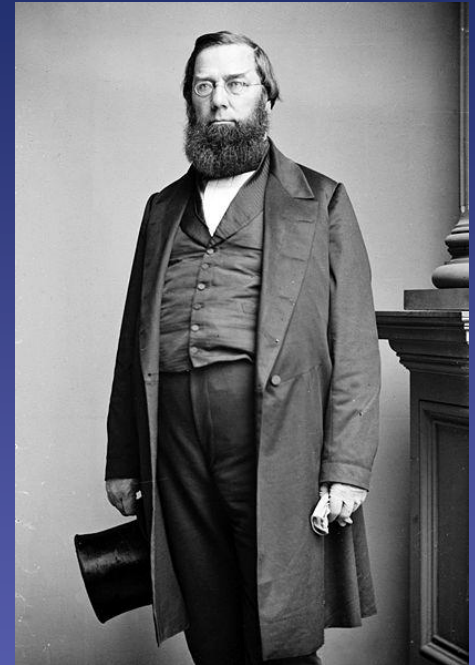


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Everything old is new again?

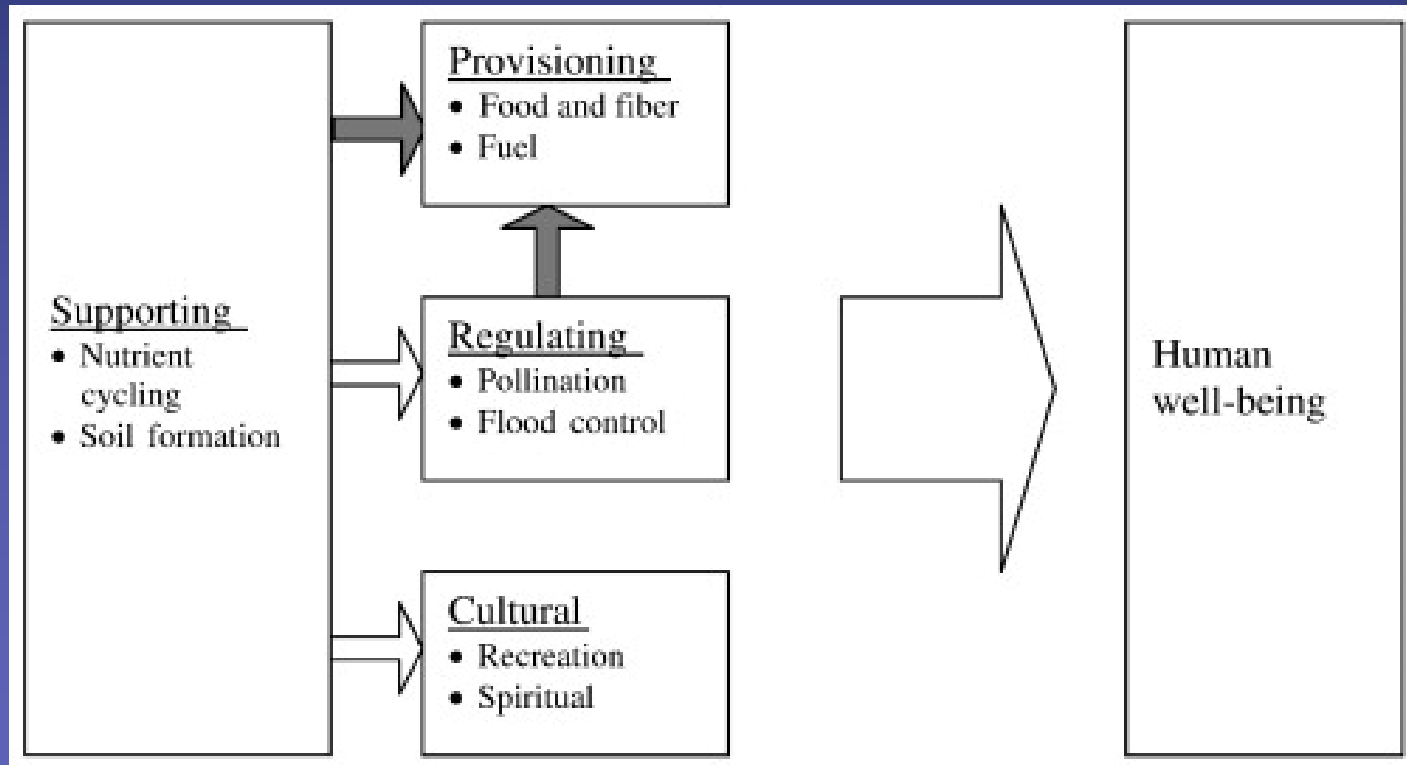
- George Perkins Marsh (1864): *Man and Nature*
 - “explored the loss of regulatory ES provided by forests for water purity, water flow, local climate, and soil nutrients, as well as the risks of invasive species.” (Swinton, 2006)
- Soil Conservation and Domestic Allotment Act of 1936: payments to agricultural producers to change practices (shift from grains to grasses or legumes) to accomplish an environmental goal (avoid soil depletion).
- The ES literature has only recently (~5 years) reached agriculture (Swinton, 2006)



Marsh (around 1860)

Ecosystem Services (ES)

- “the conditions and processes through which natural ecosystems, and the species that make them up, sustain and fulfill human life” (Daily 1997)



Policy for ES provision: challenges & research gaps

Research gaps (Swinton, 2006)

1. the relationships between ecosystem function and production of ES
2. measurement and valuation of ES, and
3. design of effective incentives for provision of ES that are not currently marketed.

Selections from

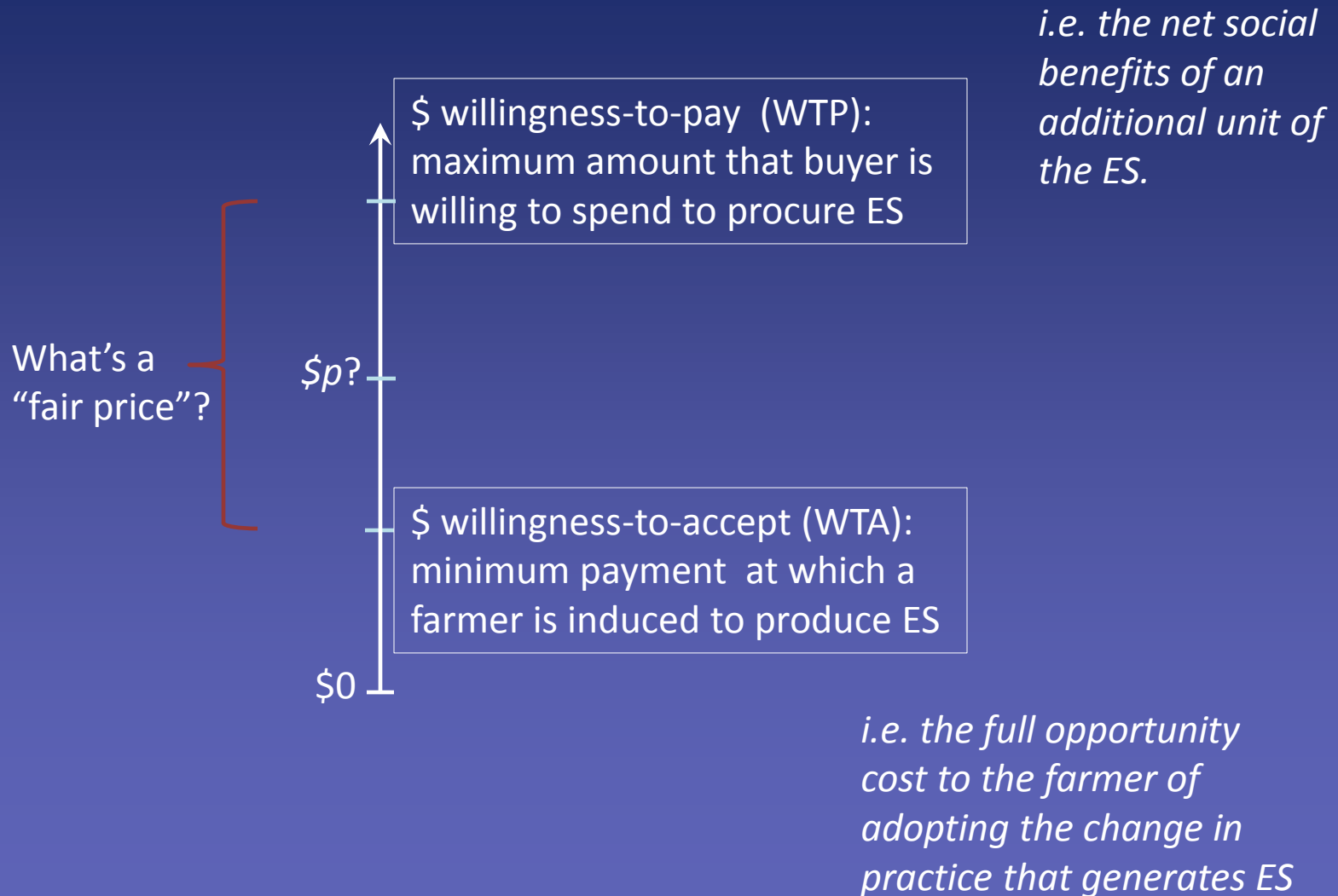
"Summary of Key Discussion Points, September 1, 2011"

- Stacking credits
- Challenges of quantification
- Risk
- Role of the state

"Stacking credits: Can landowners receive two payments for different services from same action/activity?"

- Case for:
 - spur participation when single project insufficient
 - higher quality projects
 - perceptions of fairness
- Case against:
 - complex accounting
 - additionality (overpayment/inefficient)
 - perceptions of fairness

WTP versus WTA



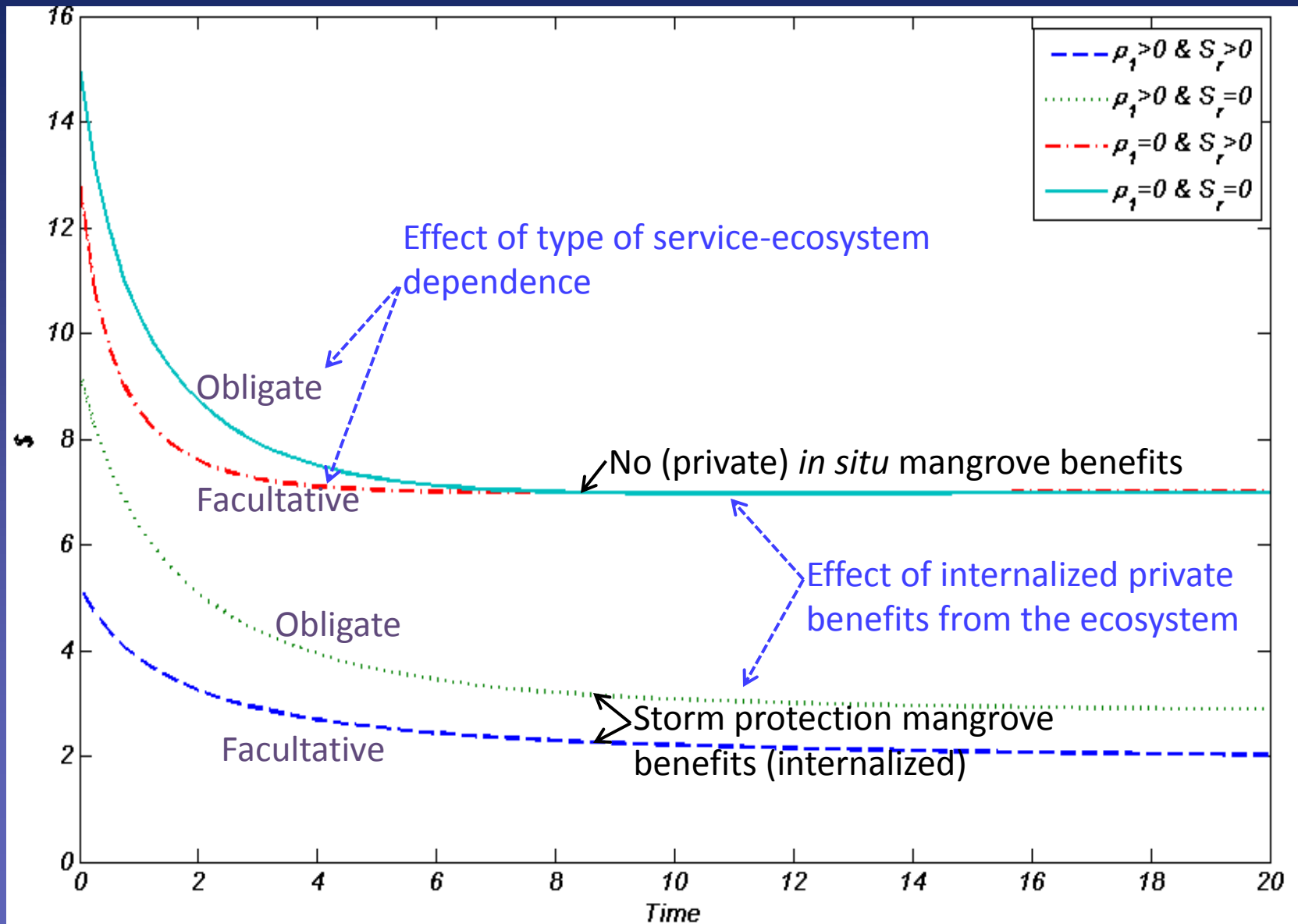
ES provision: Bioeconomic example in fisheries

Environ Resource Econ (2011) 48:243–267
DOI 10.1007/s10640-010-9410-5

How to Get There From Here: Ecological and Economic Dynamics of Ecosystem Service Provision

James N. Sanchirico · Michael Springborn

Optimal dynamic PES



"Challenges of quantification"

- Estimating abatement from land management:
 - less straightforward than in the standard point-source, “end-of-pipe” measurement setting (King and Kuch 2003).
- ES outputs from agriculture will be harder to monitor and quantify
 - e.g. GHG emissions, nitrogen and pesticide runoff
- Incentive payments for environmental performance in agriculture:
 - Ideally: based on performance itself
 - Reality: based on “proxies for performance, such as the adoption of certain auditable practices” (Tilman et al. 2002)

"Who holds the risk?"

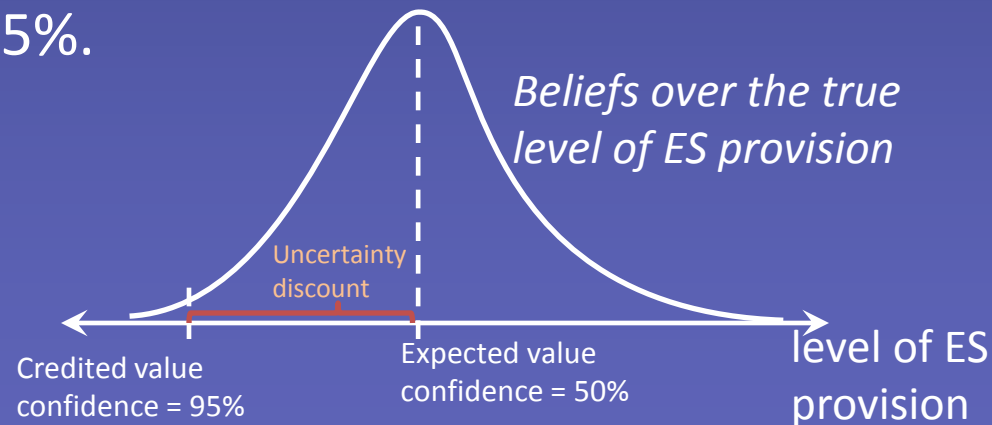
- Dealing with uncertainty
 - Science: improve models (reduce uncertainty)
 - Behavior: hold producers liable for shortfalls
 - Pooling: bundling of an ES over space
 - Constrain: margin of safety crediting (related: uncertainty ratios)

Risk/Uncertainty

- Why *exactly* do we care about uncertainty?
- At what *scale* does uncertainty really matter?
 - Fine scale—farm; air-/watershed level
 - local threshold effects (hypoxia in waterways)
 - Large scale—state/national/international
 - minimal or no-local non-linear effects in damages, e.g. greenhouse gas emissions.
- Is it reasonable to *trade off* uncertainty over space?

Risk/Uncertainty

- One framework for setting rules with respect to uncertainty: margin of safety/“uncertainty discount”
- Policy maker states: *the true amount of ecosystem service provided must be no less than the amount credited with X% confidence.*
 - X% confidence: typically informed by levels from scientific hypothesis testing: e.g. 95%.



GHG offsets: Kurkalova 2005;
Mooney et al. 2007, Kim et al.
2009, Rabotyagov 2010.

Risk/Uncertainty

- The scale at which rules for handling uncertainty are imposed can have surprisingly strong implications for how stringent the policy is (i.e. how large the uncertainty discount).
- Suppose we impose a confidence of 95% for each bundle of offsets:
 - There are just two bundles
 - resulting confidence overall is 99%
 - If there are 10 bundles:
 - Implied overall confidence is 99.99999999%.

"What is the role of the state in PES schemes?"

- Why should the state be involved?
 - Market failure (public good/externalities)
 - Reduce the transactions costs of bringing together buyers and sellers of ES.

Role of the state

- Poor policy performance can stem from failure to address:
 - measurement problems (Breetz et al. 2004)
 - the social context of producers (Breetz et al. 2005)
 - “fear that entering into a trade is an admission that their farms pollute, exposing them to citizen complaint or future regulation (King and Kuch, 2003; King, 2005; Breetz et al., 2004).” (Ribaudo et al. 2008)
- Encourage participation
 - profit potential (Cary and Wilkinson 1997)
 - social networks; physical proximity to other adopting farmers (Lindner et al. 1982)
 - NGOs or agencies (Curtis 1997)
 - farmer demographics [age (Rogers 2003), farm size, and farmer education (Feder et al. 1985)]

"What is the role of the state in PES schemes?"

- Ensure good governance (Salzman, 2009)
 - Public participation (public support)
 - Transparency and access to information (trust, ensure openness)
 - Accountability and the Rule of Law (mitigate corruption, undue influence of groups)
 - Remedies and dispute settlement (ensure compliance, minimize transaction costs)

Thanks

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Role for the state--

ES: market and non-market values

- Public good/Externalities problem: non-market values will often be ignored in the choices of private individuals.
- Perspectives:
 - Estimate the values and set policy to achieve an ideal level of ES
 1. Mangroves-fishery example
 - Create a market in the previously non-marketed good to incentivize its production
 2. Greenhouse gas offsets in California agriculture