

Exploring the role of choice experiment in ecosystem accounting and management: A simulated exchange value approach

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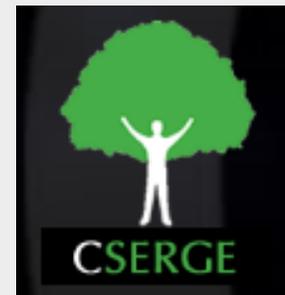
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Policy Relevance – natural capital accounting

Natural capital accounting role in supporting environmental policy and management

Asymmetry between economy and environment



- ✓ Integrating System of National Accounts
- ✓ Accounting and monitoring links

Uncertainty in environmental policy making



- ✓ Targeting and assessing policies
- ✓ Spotlighting cost of depletion and degradation

Divide between different sectoral policies



- ✓ Informing local level management
- ✓ Linking sustainable development objectives

Policy Relevance – 25 Year Environment Plan and Pioneer Projects

25 YEP and Marine Pioneers

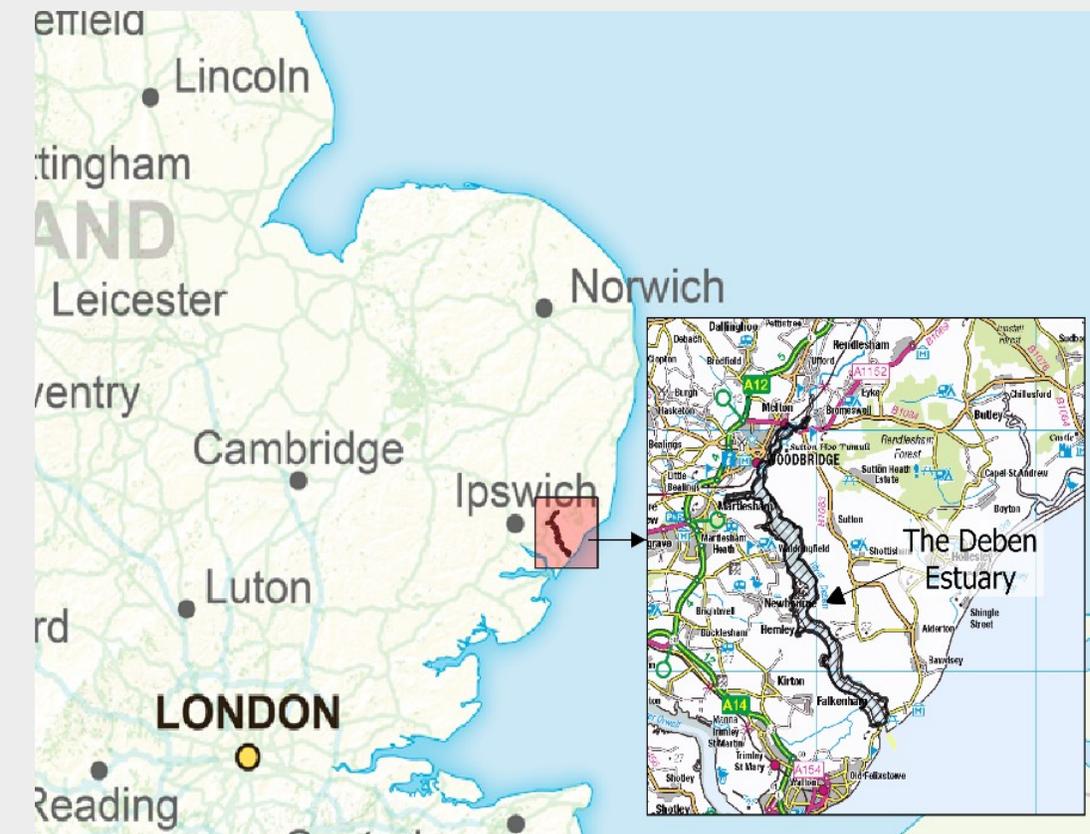
- Apply natural capital approach in the marine environment
- Identify local environmental priorities
- Prioritise investment in natural capital
- Develop and implement innovative finance opportunities

Suffolk Marine Pioneer

- Create local natural capital account for saltmarsh habitat
- Create biophysical and monetary baseline assessment

Deben Estuary

- Saltmarsh area estimated to be 175-230 ha
- Special Area of Conservation and Site of Scientific Interest
- Coastal erosion affecting saltmarsh areas
- Small-scale restoration and managed realignment



Policy Relevance – limitations to accounts uptake

BUT

Actual use of natural capital accounts for informing **real-world** policy making has been **limited, particularly** at the **local government level**

SOME POSSIBLE MOTIVATIONS...

Data limitations

Valuation methods

Scalability

...AND A POSSIBLE OUTCOME

undermine robustness and credibility of accounts

because of the variety of different approaches (from very complex to fast track)
not ensuring coherency and consistency

Research objectives

- Test the use of observational data from choice experiments (simulated exchange value) versus fast track approach in a NCA setting
- Estimate accounting values for area of saltmarsh in Deben – recreation benefits
 - better mirror local environmental conditions and characteristics
 - improve reliability of NCA coherently with international frameworks
 - provide policy makers with more stable and solid evidence

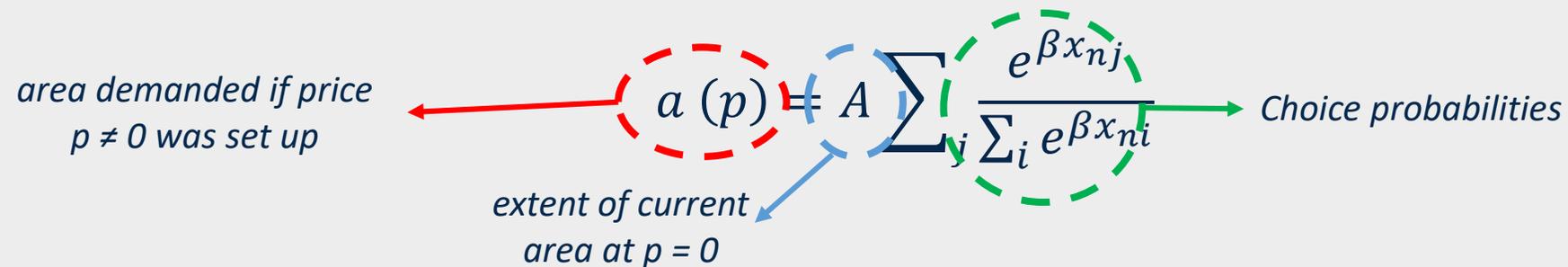
Simulated Exchange Value approach

- Introduced by Caparrós et al. (2017) for **contingent valuation** and **visits to recreational sites**
- **Simulated exchange values** for non-market ecosystem services for which **no similar market** exists
 - Estimating the price that would realistically be implemented *if* ecosystem services were internalized (i.e. **as if a market existed**)
- **Demand and supply curves** for ecosystem services making assumptions on the price that would be charged under different institutional settings

Simulated Exchange Value approach

Deriving demand function for area of saltmarsh at different price levels
 Determine the optimal extent of the saltmarsh area a given the price p

- **Probability** of choosing alternative offering provision of ecosystem services (i.e. not the status quo) can be used to derive the demand function (MNL case)



Inverse demand function

$$P(a) = p = \frac{\ln(a/m(A - a))}{\beta_p} - \frac{\beta_x \bar{x}}{\beta_p}$$

Development of the Choice Experiment

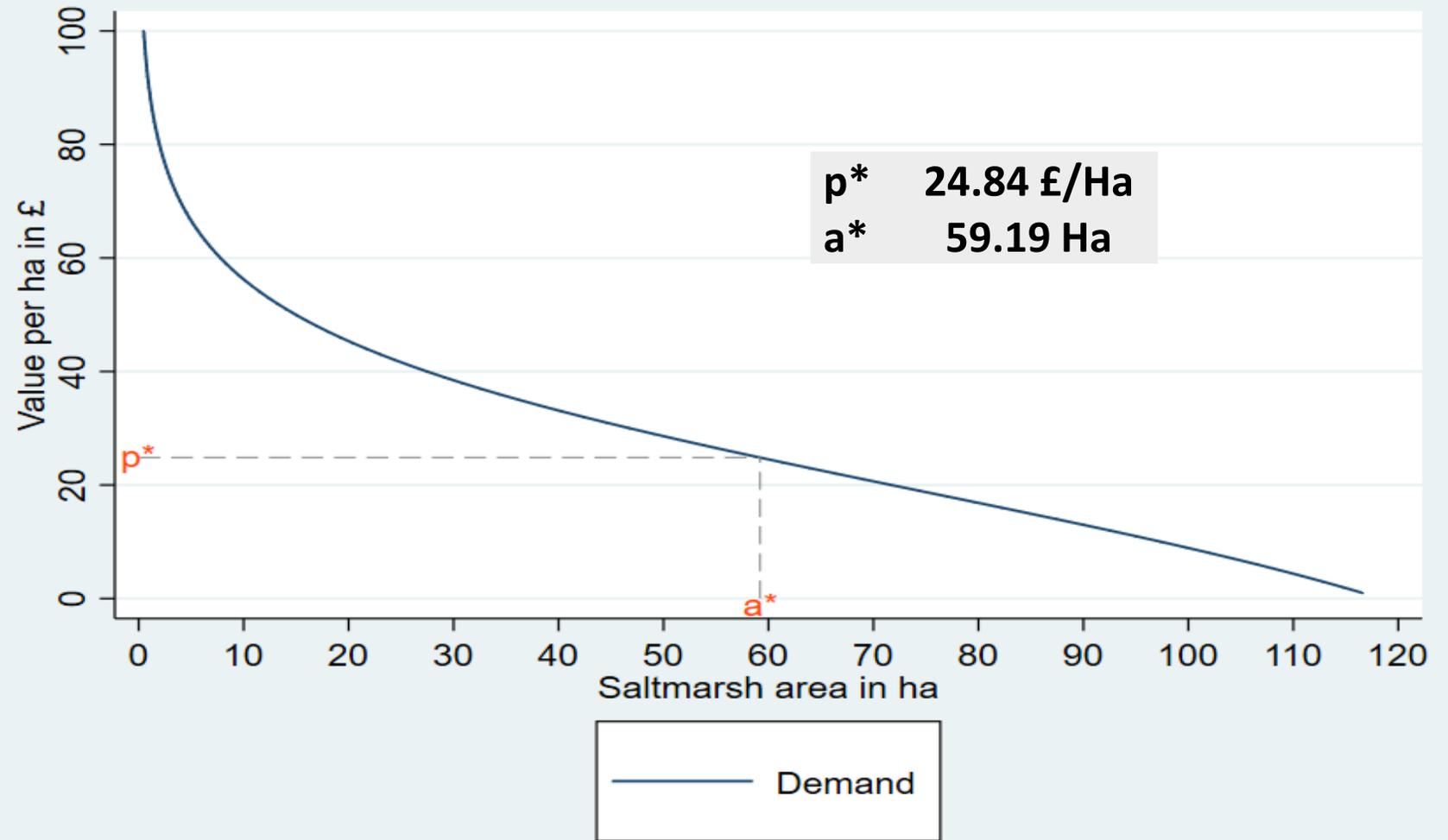
| Attributes | Levels |
|--|---|
| Area of new saltmarsh created | 10 ha, 30 ha, 50 ha, 70 ha |
| Number of endangered bird species | 2 species, 3 species, 4 species, 5 species |
| Distance from residence area | Peterborough area – 50 miles, 60 miles, 70 miles, 80 miles Essex area - 20 miles, 30 miles, 40 miles, 55 miles Suffolk area – 10 miles, 20 miles, 30 miles, 40 miles Norfolk area – 35 miles, 45 miles, 55 miles, 65 miles |
| Access to new saltmarsh | No, Yes |
| One-off council tax increase | £3, £6, £9, £12 |

- Online survey on stratified sample 417 residents East of England
- Bayesian D-efficient design – 24 tasks – 4 blocks
- Data analysed using a simple MNL model

Demand and SEV for area of saltmarsh – current situation

Scenario:

- Current extension 150 ha
- New saltmarsh restored 0 ha
- No bird species
- Average distance
- Access allowed



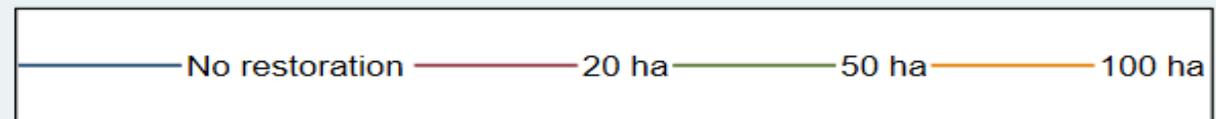
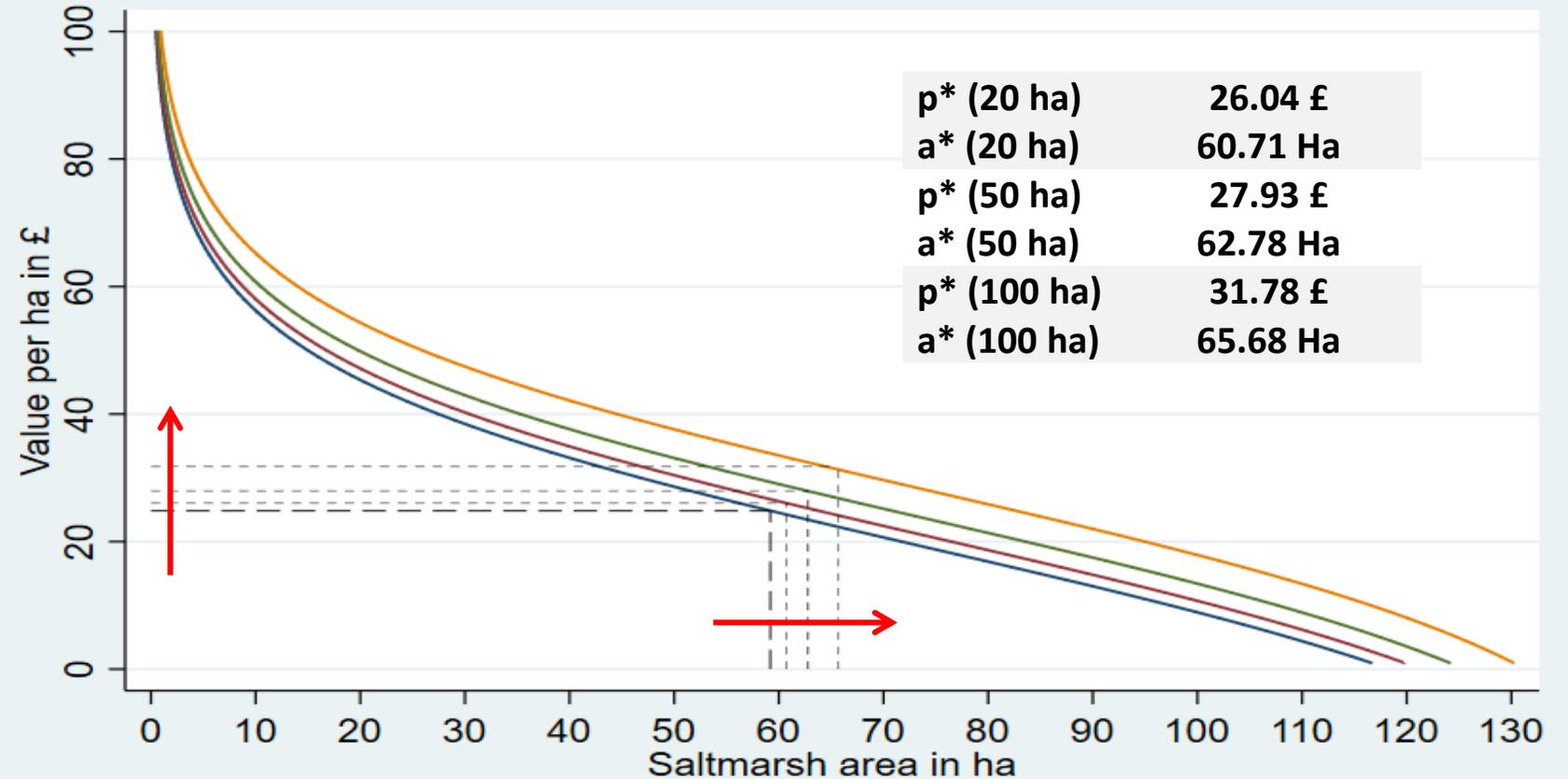
Simulated exchange value vs other approaches

| Application | Scale | Estimated value |
|--|----------------|------------------|
| This study – simulated exchange value | Local | 24.80 £/ha/year |
| Ricardo, 2016 – simple travel cost | National | 1.60 £/visit |
| Thornton et al., 2019 – simple travel cost | National | 3.70 £/visit |
| Sen et al., 2014 – meta-analysis (used in White et al., 2015 and Eftec, 2015) | National | 3.00 £/visit |
| Sunderland et al., 2019 – meta-analysis (derived from Sen et al.) | National/Local | 329.00 £/ha/year |
| Clark, 2017 – entrance fees | Local | 65.00 £/ha/year |
| EA, 2018 – avoided cost | Local | 110.00 £/ha/year |

Demand and SEV for area of saltmarsh – restoration policy

Scenario:

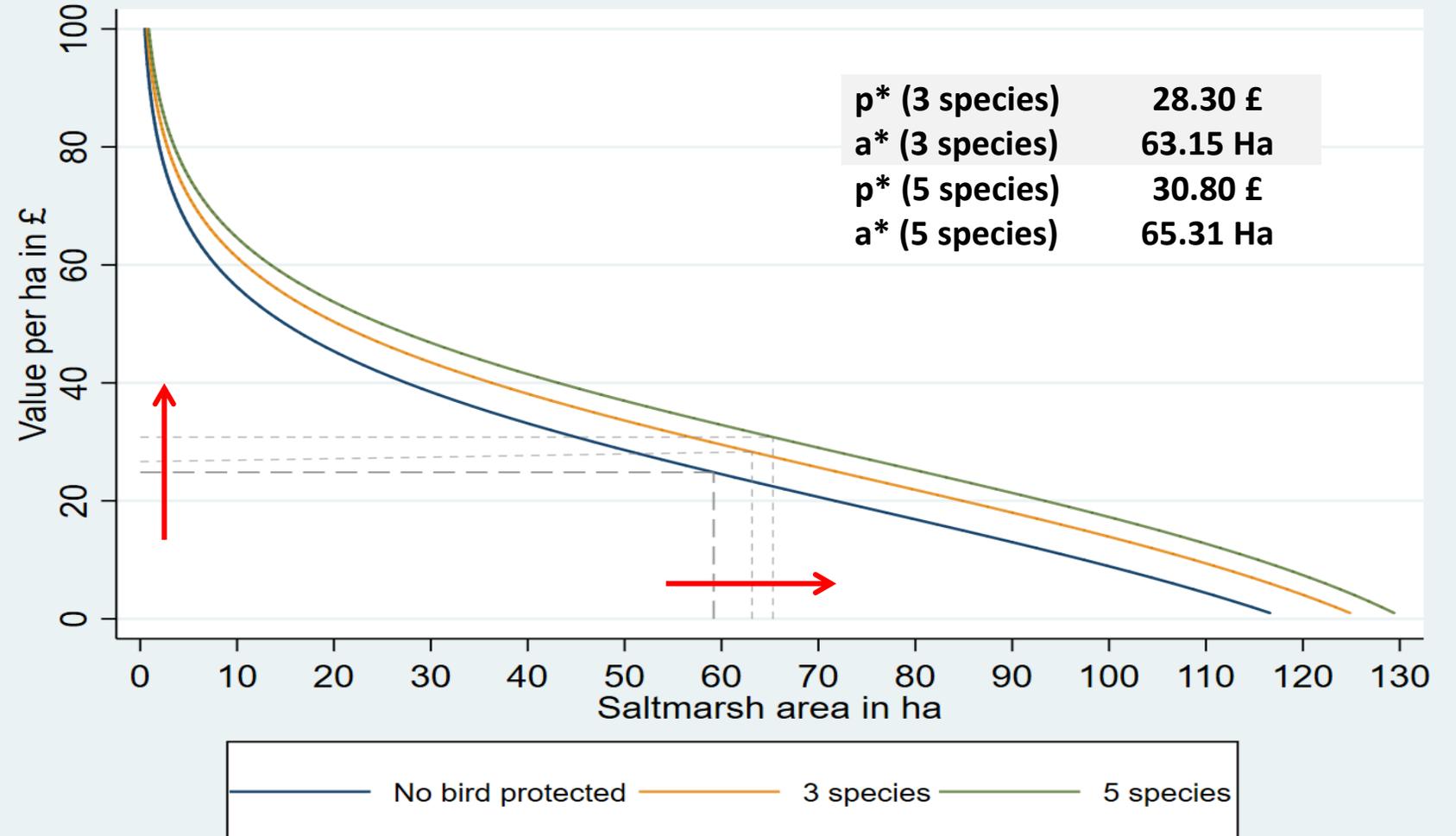
- Current extension 150 ha
- **New saltmarsh restored 20 ha, 50 ha, 100 ha**
- No bird species
- Average distance
- Access allowed



Demand and SEV for area of saltmarsh – biodiversity policy

Scenario:

- Current extension 150 ha
- New saltmarsh restored 0 ha
- **3 and 5 bird species**
- Average distance
- Access allowed



Main findings and policy implications

Main findings

- **Fast track approaches** exhibit **critical issues** when applied at the local level
- **Simulated exchange value** offer several **advantages**
 - Ecosystem characteristics and conditions internalised
 - Expand ecosystem services consistent with accounts
 - Flexibility with including policies and values
 - Consideration of beneficiaries values
 - Likely scalable and replicable for specific ecosystems

Policy implications

- Availability of **targeted NCAs** for reliable and consistent policy support
- **Inform land use planning and management** with more **comprehensive information**
- **Assessment possible policy interventions** ex-ante and ex-post
- More **rapid policy response** to ecosystem condition changes

Thank you!

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