Dealing with Uncertainty and Scale in Valuation

Interdisciplinary quantitative ecosystem services team: INQUEST
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Aim
- How can we value what we take from nature (e.g. food, water, visiting the mountains or relaxing on a beach)?
- How certain can we be of that value?
- How can we use that value, and our understanding of its uncertainties, to help society make better decisions?

Findings
- Our stakeholders commonly use uncertainty in their normal business decision processes, and, as it is always possible to estimate uncertainty, ecosystem services valuations should provide that information.
- Ecosystem services data will often not be available at the spatial and temporal scale of the valuation, and it was difficult to change scales for many sets of ecosystem services where there were multiple interactions – e.g. changing water flow also changes the physical, chemical and biological responses of many services.
- Hierarchical statistical models and improved GIS (geographical information system) provide possible solutions to these problems.
- Sometimes the only data available came from expert judgement rather than formal measurements and often the values for ecosystem services in our studies were not monetary.
- Bayesian Belief Networks are a decision tool which, in a traceable fashion, can combine different types of data and values, use measurements alongside expert judgement, and provide a rigorous estimate of uncertainty.
- The main limitation in applying BBNs is the loss of detail when including the more complex ecological or social models relevant for some ecosystem services.

Research
8 academics, 8 research scientists and 6 stakeholders formed the team investigating two specific challenges in valuing nature:
1. How can you account for uncertainty?
2. How to factor in scale differences over time and space?

We collected evidence from stakeholders in the Tamar Estuaries Consultative Forum and from two different land managers within the Cairngorms National Park.

Conclusions
- The task of valuing nature is possible, but generating a rigorous comprehensive value is difficult. Valuing change is more achievable than providing an absolute value.
- It is misleading to provide (a) a value for the benefits from nature that pretends to be more accurate than it really is, or (b) one that is actually relevant for a different area or time than the decision that you want to make.
- Stakeholders understand the problems of scale and uncertainty in ecosystem services, and can use relevant information on both to improve future decisions.

Next steps
- Further development of tools for rescaling data and implementing models better within BBNs would be relevant to any manager or policymaker with a requirement to provide values for human use of natural resources.

Lists of ecosystem services from the Cairngorms National Park Partnership Plan 2012-2017

The Cairngorms National Park, 450,000 ha (left); commercial farm at Balliefurth, 170 ha (top); RSPB Abernethy National Nature Reserve, 14,000 ha (bottom)

A preliminary BBN for a management policy to improve Capercaillie numbers within the RSPB Abernethy National Nature Reserve. Delivery of two selected ecosystem services (blue) are embedded within a series of options to improve the habitat for the birds.

Lists of ecosystem goods and services were identified within the RSPB Abernethy National Nature Reserve.

www.valuing-nature.net/projects/uncertainty-scale