Pan-European Approach to valuation of ecosystem services

Forest Europe Expert group meeting, Madrid, Spain

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Forestry Commission
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What have trees ever done for us?!
Signs of fundamental change?

Millennium Ecosystem Assessment

The Economics of Climate Change
The Stern Review

Climate Change Act 2008

UK National Ecosystem Assessment

The Natural Choice: securing the value of nature
Background to UK forestry

Economy

- c12% of land cover (2.8m has), >50% conifer at UK level
- > 29,000 jobs, c£300 GVA, relatively small share of total GVA
- c9Mt timber/yr (5% hardwood), >1.5Mt/yr woodfuel (incl. recycled, imports)
- 80-85% of wood products imported
- other ecosystem services:
  - c350 million leisure visits to GB forests
  - carbon sequestration: 13Mt CO$_2$/yr (post 1990: 3MtCO$_2$/yr)
  - estimated >£2m/yr (recreation, biodiversity, landscape, carbon seq.

Policy

- major changes, particularly since 1980s
- wider objectives, more focus on non-market goods and services
Forestry is multi-purpose...
• Valuing ecosystem services
• Research and analysis
• Impact assessment process in UK
• Conclusions
Valuing ecosystem services
The concept of economic value

- measuring wellbeing – trade-offs & marginal changes
- market goods – prices (often) reflect value
- non-market goods – unpriced but concept of trade-offs & opportunity costs remain
  ⇒ methods to estimate monetary value of non-market goods
    incl. revealed preference, stated preference, value transfer

- series of Forestry Commission studies in past 20 years
  single benefit (1990s)
  ⇒ multiple benefits (2000s)
  ⇒ integrated approach (2010s)
Types of forest economic value?

- Woodland resource
  - Use
    - Direct
      - e.g. timber
    - Indirect
      - health, recreation
  - Non-use
    - Bequest
      - future generations
    - Existence
      - biodiversity preservation

Total market benefits

Total non-market benefits
Ecosystem services concepts

**Ecological assets**

*‘Stock’ of potential services in natural environment (i.e. ‘wealth’ of the ecosystem)*

**Ecosystem services**

*Flow of services provided ecological assets*

**Primary & intermediate ES**

*Ecological functions and services that generate further ecosystem services*

**Final ecosystem services**

*Aspects of natural environment that affect human wellbeing; ‘final’ item in chain of natural processes*

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**Physical/human capital**

**Goods**

*Generates human wellbeing - use & non-use values*

**Benefit**

*Change in human wellbeing generated by a good; value depends on context and timing of delivery*
Research and analysis
**ANNUAL VALUES (£ MILLIONS)**

<table>
<thead>
<tr>
<th>Region</th>
<th>Recreation</th>
<th>Landscape</th>
<th>Biodiversity</th>
<th>Carbon</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>England</td>
<td>354</td>
<td>124</td>
<td>363 (445)</td>
<td>43</td>
<td>885</td>
</tr>
<tr>
<td>Scotland</td>
<td>25</td>
<td>19</td>
<td>19 (220)</td>
<td>41</td>
<td>104</td>
</tr>
<tr>
<td>Wales</td>
<td>14</td>
<td>7</td>
<td>4 (73)</td>
<td>9</td>
<td>34</td>
</tr>
<tr>
<td>GB</td>
<td>393</td>
<td>150</td>
<td>386 (738)</td>
<td>94</td>
<td>1023</td>
</tr>
</tbody>
</table>

Landscape – appr.39% residential, remainder from commuting
Biodiversity – appr.80% ASNW, remainder CF and BL
Research lessons

- some limitations of Willis et al. 2003
  - methods (e.g. CV) relative reliability of values
  - individual vs. social values
  - aggregation (marginal values more robust)
  - net benefits, and costs

- population of relevance
  - for different benefits
  - distance decay

- knowledge of factors affecting economic value
  - characteristics of the good, population (segments)
  - availability of substitutes
  - spatial sensitivity (⇒ value transfer?)

- scientific understanding essential
  - integration of economics with other disciplines
Independent & peer-reviewed assessment of the state and value of UK’s natural environment and ecosystem services

http://uknea.unep-wcmc.org/
Economic values that would arise from a change of land use from farming to multi-purpose woodland in Wales (£ per year) (1)

a) Potential loss of agricultural value
b) Potential value of timber
c) Potential value of carbon storage

£/ha/yr

<table>
<thead>
<tr>
<th>Value Range</th>
<th>£/ha/yr</th>
</tr>
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<tbody>
<tr>
<td>&gt;-50</td>
<td></td>
</tr>
<tr>
<td>&lt;-600</td>
<td></td>
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<tr>
<td>&gt;150</td>
<td></td>
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<tr>
<td>&lt;50</td>
<td></td>
</tr>
<tr>
<td>&gt;75</td>
<td></td>
</tr>
<tr>
<td>&lt;-100</td>
<td></td>
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</tbody>
</table>
Economic values that would arise from a change of land use from farming to multi-purpose woodland in Wales (£ per year) (2)

- **d) Potential value of recreation***
  - £/site/yr
  - $\geq 300,001$
  - $< 60,000$

- **e) Net benefits**
  - £/ha/yr
  - $\geq 100$
  - $<-600$

- **f) Current Forestry Commission woodland**
Valuation of ecosystem services provided by UK woodlands
(supporting paper by Valatin & Starling 2011)

- Avr. sequestration of 5.2tCO$_2$/ha
- £680m in 2009 (DECC social prices)
- £239/ha vs. £66/ha for softwood timber

social value vs. market value
Impact assessment in the UK
“Is the proposal worth the resources that would be allocated to it?”

Appraisal (before)  Evaluation (interim, after)

systematic process for examining alternative uses of resources, focusing on assessment of needs, objectives, options, costs, benefits, risks, funding and affordability
The Green Book: Appraisal & Evaluation

“The Government is committed to continuing improvement in the delivery of public services. A major part of this is ensuring that public funds are spent on activities that provide the greatest benefits to society, and that they are spent in the most efficient way. “

The Magenta Book: guidance for evaluation

“...the ability to obtain good evaluation evidence rests as much on the design and implementation of the policy as it does on the design of the evaluation.”

www.greenbook.treasury.gov.uk/
Types of economic appraisal

- a. cost effectiveness analysis (CEA)
  - alternative ways of producing the same/similar outputs

- b. cost utility analysis
  - as for CEA plus evaluates benefits through scoring, weighting...

- c. cost benefit analysis
  - quantify (in monetary terms) as many costs and benefits as possible (incl. non-market outputs)

- Note: a financial appraisal is a complement, not an alternative
The ‘ROAMEF’ cycle

**Rationale**

“Our aim is to increase the economic, environmental and social benefits of Scotland’s forests and woodlands through implementation of the Scottish Forestry Strategy.”

**Objectives**

What you aim to achieve

**Feedback**

Telling others what you learnt

**Evaluation**

Did we achieve objectives?

What did you learn? FC’s Learning value.

**Appraisal**

Different ways of achieving this.

Is this value for money?

**Monitoring**

Did we achieve objectives?
Key stages of economic appraisal

• justify the need for action
• set objectives
• identify possible options
• review the options
• select the best option
• implement the preferred option
• evaluate
• Biological growth cycles
• Long-term activity – discount rates
• Multiple benefits – synergies and trade-offs
• Non-market benefits – valuation methods

Plus
• New paradigm of the ecosystem service approach
• Each option should include a calculation of its “Net Present Value” (NPV)

• The calculation of NPV
  
  • allows direct comparison of options with different profiles of benefits and costs over time
  
  • provides a key measure for selecting between options, after consideration of factors that cannot be valued in money terms
• This is the discount rate at which the net present value of a proposal equals zero.

• Excel has a function for calculation of IRR

• The calculated IRR is compared with the discount rate to inform whether the proposal is worthwhile proceeding with.

• Weaknesses of IRRs
• The Annual Equivalent Value (AEV) is the value which, when summed over the lifetime of a proposal and then discounted, will give the Net Present Value.

• The AEV can be calculated by applying an annuity factor (obtained from an annuity table) to the Net Present Value.

• The AEV is useful for comparing proposals that have different lifetimes.
Key issues in UK Govt guidance

• 3.5% discount rate, longer term schedule of declining rates
• evidence-based adjustments for optimism bias
• greater emphasis on the valuation of benefits
• identification of tax implications for private and public sector delivery
• consideration of distributional issues
Discounting

Social Time Preference Rate

- Unbundling of discount rate so that it now reflects only one factor (social time preference rate of 3.5%)

- Lower rate than previously + declining rates introduced
  - increases the present value of future costs and benefits (encourage longer-term approach to appraisal)
  - proposals and options that deliver long term benefits will become relatively more attractive
Roles and responsibilities

- Policy divisions
- Economists/analytical support

- Make the guidance more accessible to specialists and non-specialists alike
- Training for ‘generalists’

- (economic) ‘Impact Assessments’ subject to peer review and senior manager/ministerial sign-off
Evidence on investment returns

- Financial/economic returns
  - new Investment Appraisal Model in 2012
    - integrates timber yield models with FR carbon models
    - shows returns to timber, carbon or both (IRRs, NPVs)

- Social and environmental returns
  - UK Social Return on Investment
  - Impact Reporting and Investment Standards (GIIN)
  ⇒ develop a UK forestry ‘impact’ rating?

Investors need confidence ⇒ standards, evidence
- Price signals to deliver enhanced ES
  - Agri-environmental & forestry payments
  - Carbon markets
  - Biodiversity-offsetting
  - Access payments
  - Water payments
- Natural Environment White Paper - actions to support PES
  - publish best practice guide to PES
  - review barriers & challenges
  - research fund to support PES pilots
Conclusions
Conclusions - research

- Powerful evidence e.g. recreation, carbon values...
- Some gaps e.g. health, water, air pollution, damage protection...
- Uses of non-market values
  - setting priorities
  - policy analysis
  - project analysis
  - establishing price signals, incentives and markets
  - legal damage assessment
  - green accounting
Conclusions – appraisal & evaluation

• Forestry has special needs!
  • biologically driven
  • multiple market and non-market values
  • long timescales

• Failure to capture non-market values (partial cost-benefit analysis) under-values the forestry contribution

• Using all ecosystem values in decisions ⇒ major land-use changes

• Cost-benefit analysis helps to build ‘natural capital value’ in decision-making
Conclusion - a sustainable vision

**Economy**

- New markets
- Incentives
- Cost-effective regulation
- Behaviour change
- Information

**GREEN ECONOMY**

- healthy environment
- underpinning socio-economic well-being

**Ecosystems**

- Natural capital

**“bottom line” - ecosystems have real values**
• Purpose
  • Why? e.g. drivers
  • Who for?
  • How?
  • What? e.g. values vs instruments
• Stocks (natural capital) vs flows (services)
• Marginal vs total
• Biophysical data availability e.g. spatial
• Context
  • other approaches (qualitative)
  • policy (EC)
  • cultural differences across countries
Other relevant work

- European Forest Institute
  - pan-European approach to forestry appraisal
    - guidance for policy-makers
    - technical guidance

- UK
  - Phase 2 of National Ecosystem Assessment
  - Valuing Nature Network
  - Natural Value Programme
  - Green accounting
  - Forest Research (e.g. optimisation models)
  - Cost-effectiveness
Outputs

• Toolbox
  • Common principles
  • Suite of methods...
  • Reference document

• Guidance rather than direction
Thank you

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