The Price of Nature Valuing and Using Ecosystem Services in Decision Making

Peter Glaves
Division of Environmental Management
Northumbria University

The Ecology and Economy Group

northumbria UNIVERSITY

Paying for Nature?

What is your view on Paying for Nature

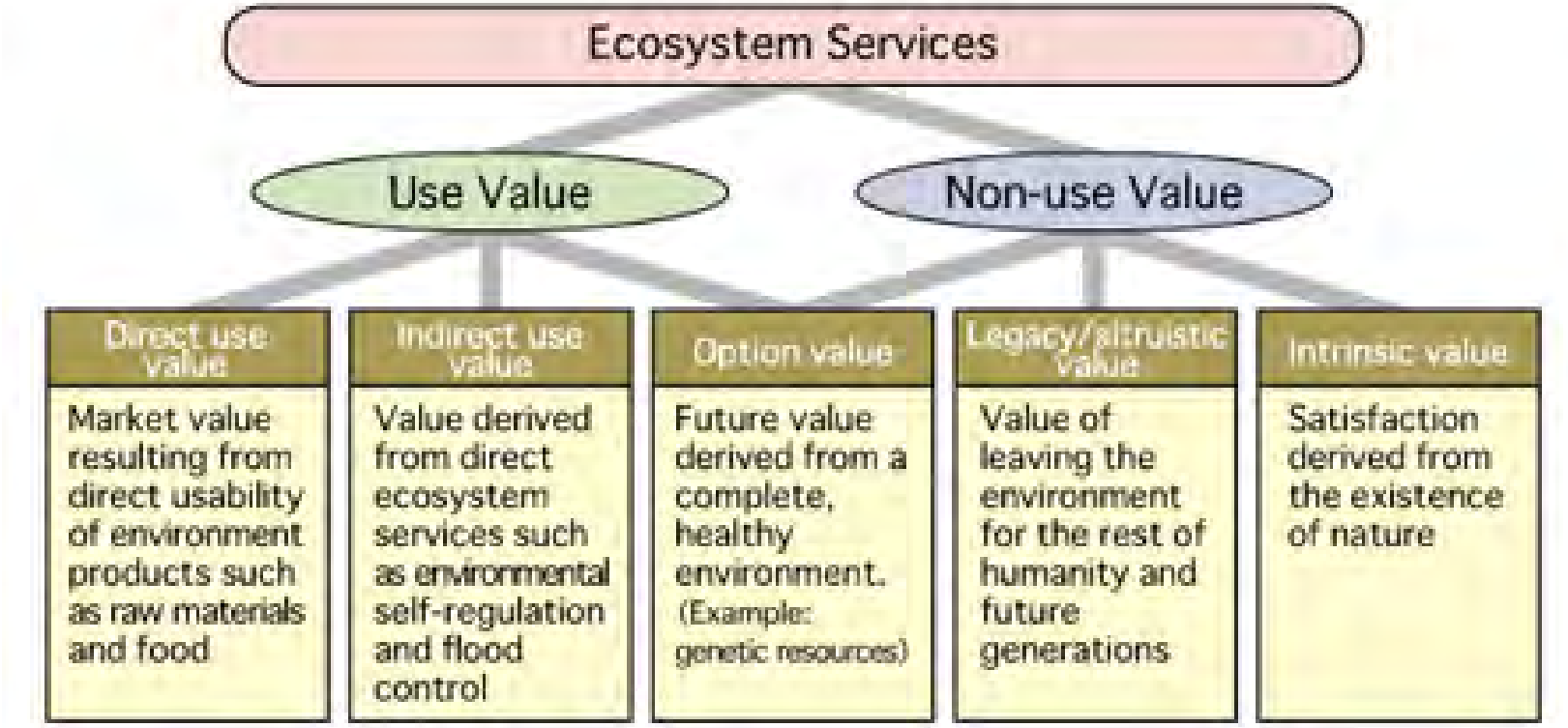
- Positive aspects?
- Negative aspects?

Can you think of a specific planning/policy decision where payment for nature would have helped?

Paying for Nature?

- Valuing Nature
- Beyond Value or Valueless Nature

Total Economic Value TEV



Ecosystem Services

‘services provided by the natural environment that benefit people.’

Ecosystem Services

What are the key Ecosystem Services of a Woodland?

Types of Ecosystem Services and Valuations

Types of Ecosystem Services:

- Provisioning Services
- Regulating Services
- Cultural Services
- Supporting Services

Adapted from Millennium Assessment

Levels of Valuation

Level 1 – Qualititative

- Identify important/significant

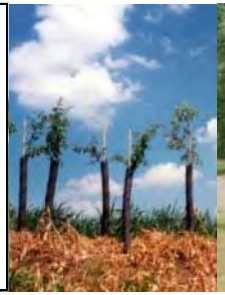
Level 2 – Semi-quantitative

- existing area data and indicative values

Level 3 - Quantitative and verified

- new targeted surveys

Approach to Valuing Ecosystem Services



Valuation approach needs to be:

- Robust
- Representative
- Transferable

Valuation contributes to:

- Policy
- Planning
- Decision Making European, National, Regional, Local

Ecosystem Service Valuation Approach

Biophysical Structure or Process

(e.g. woodland habitat or net primary productivity)

→

Function

(e.g. slow passage of water, or biomass)

→

Service

(e.g. flood protection or harvestable products)

→

Benefit (Value)

(e.g. willingness to pay for woodland protection or for more woodland or harvestable products)

Capital Types

Assets, stocks etc

→

Use of Capital Assets

→

Service Gained

→

Economic Value of Benefit

Ecosystem / Land Types

Physical / Geographical

Historical

Cultural/ Aesthetic

Land Use

Direct uses

Indirect Uses

Non-use /Existence

Provisioning

Regulating

Cultural

Support

Actual / Market Value

Transfer of a Proxy Value

Ordinal / Indicative Value

Narrative / Descriptive Value

Total Economic Valuation Approach Approach

True value

Benefits

Gross / Total Economic Value		
Direct Use	Consumptive Use	Products harvested
	Non-Consumptive Use	Cultural / Spiritual; Recreation / Tourism; Health; Education; Information
Indirect Use	Supporting / Regulating Ecosystem Services	Nutrient Cycling; Flood Control; Water regulation
Non-Use	Option	Resilience; Bio-prospecting
	Existence	Cultural; Stewardship; Bequest

Example Values

Ecosystem Type	Ecosystem Service Type	**England** £ million per annum 2007 prices	**East of England** £ million per annum at 2007 prices
Farmland	Food	8,213	
	Non – food produce	1,119	
	Other agricultural/non-agricultural activities	984	
	Total	10,316	1856.88
	Sports shooting	Expenditure: 1,098 GVA: 204	Expenditure: 110 GVA: 30
Freshwater wetland	Food (fishing and fish farming)	401	36.09
Coastal and floodplain	Flood control and storm buffering	1,243.04	241.33
Wetlands	Carbon sequestration	4.583	0.902
Woodland	Fibre (logging)	392	43.12
	Carbon sequestration	997.98	110.25
	Air quality regulation (health benefit)	17,950 - 645,190	2,998 – 106,864

Additive Total ES Values

Total Value (V) of Ecosystem Services ES in € ha^{-1} yr^{-1} for ecosystem type k is $V(ES)_k$

$$V(ES_k) = \sum_{i=1}^{n} A(LU_i) \times V(ES_{ki})$$

Where $A(LUi)$ = Area of i (Land Use in hectares)

$V(ES_{ki})$ = Annual value of k ES (Ecosystem Services) for each i LUi (€ ha^{-1} yr^{-1}).

Economic Valuation Methods

Revealed preferences

- Market values – current and future

Stated Preferences

- Contingent valuations - Willingness to pay
- Travel cost methods etc.

- Hedonic pricing

- Replacement costs

- Travel cost method

- Losses forgone

Non-economic valuation

- Consultative methods

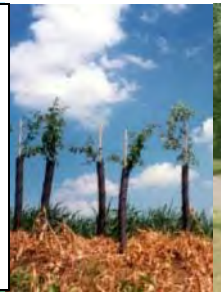
- Deliberative methods

Relative or Absolute Values?

- Gross Added Value

- Nett added Value
  Marginal costs

Translating Ecosystem Valuation into Practice



Translation of ecosystem service valuation

from a broad policy commitment

into a practical local decision making tool now (2010).

Ecosystem Service Valuation

Concerns:

- Implications of placing economic values on some services
- Many ecosystem services had not previously been valued - questions the validity of the values
- The robustness of the values gained can be questioned

A single off the shelf approach to Ecosystem Services Valuation is not recommended. The approach needs to be fit for purpose

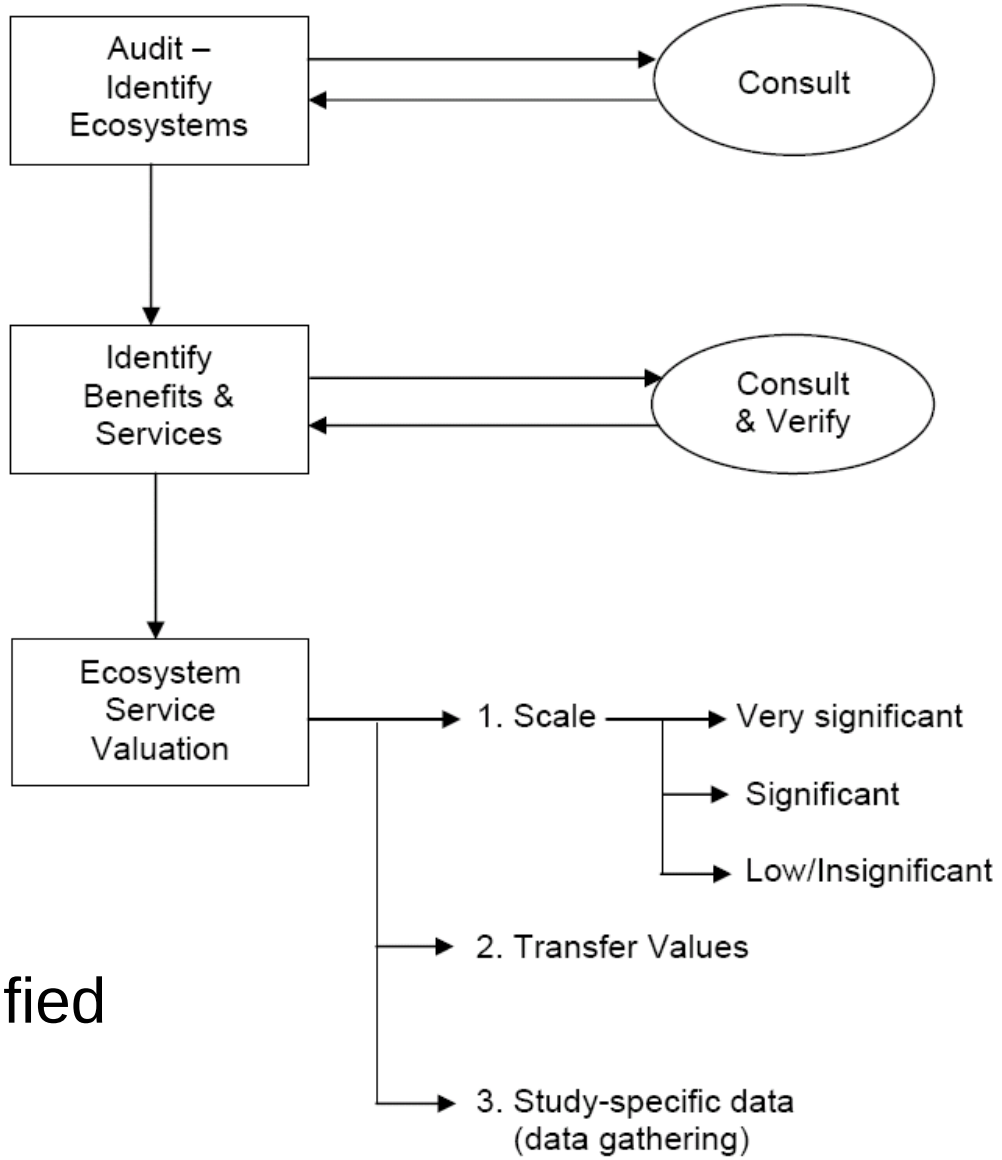
Level of approach depends on – objectives, timescale, budget

Levels of Approach

Level 1 – Qualititative
- Identify significant ES

Level 2 – Semi-quantitative
- existing area data
- indicative values

Level 3 – Quantitative & verified
- new targeted surveys



Ecosystem Based Valuation Approach

1. Identify the ecosystems present
2. Map - extent / characteristics each ecosystem
3. Identify the Ecosystem Services for each ecosystem
4. Identify significant ES
5. For significant ES identify local data*
6. Gap analysis - potential transferable values*
7. Establish benefit values*

* often difficult to do locally at this point in time

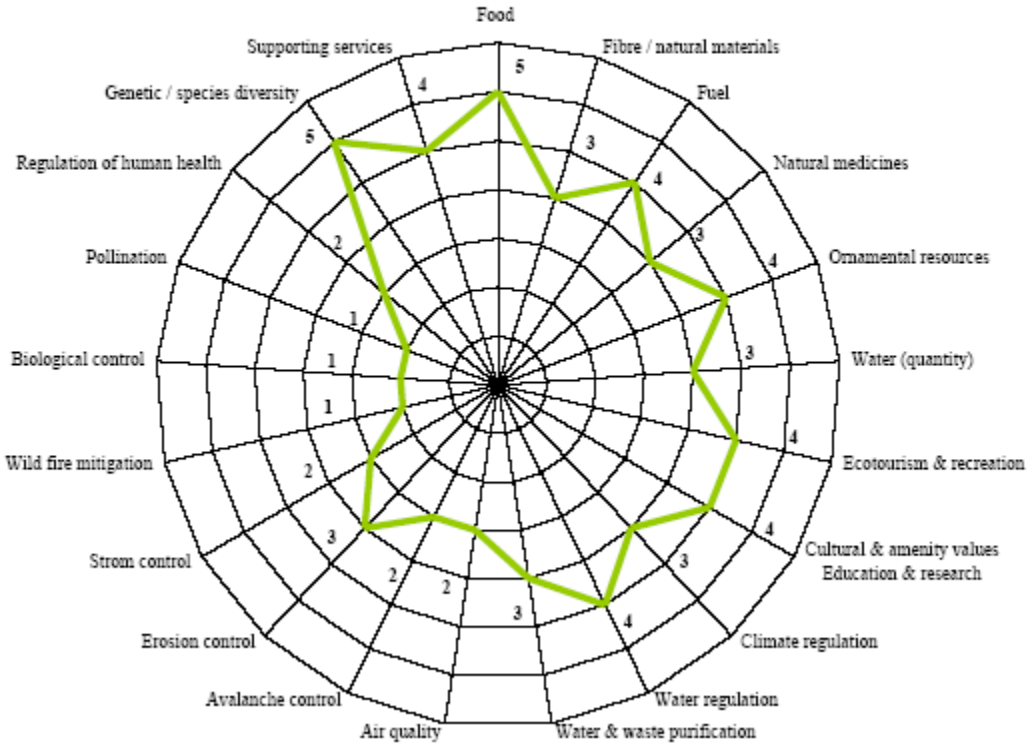
Example ES Valuation – Forest of Marston Vale

Valuing Ecosyster

IEEP approach – rapid assessment



EXAMPLE: Illustration of the importance of ecosystem services provided by a Natura 2000 site. (Importance on scale 0-5)



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Audit – Current Ecosystems



Woodland:

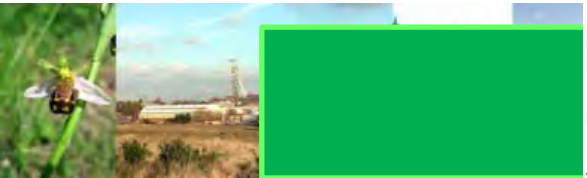
The area of woodland until recently only accounted for <4% of land cover. Through active management it is now just over 7%. Most historic woodlands are small fragments which are designated as ancient woodland sites.

Since 1991 600 ha woodland – one million trees and shrubs - have been planted, including small farm woodland and larger wooded blocks. Future plans are for 30% woodland cover, mainly on farmland.

Farmland:

Open intensive arable production dominates the area – accounting for 73% cover. Most of the agricultural land in the vale rated as Grade 3a, with areas of grade 2 land in the north-west (Kempston Rural) and the east (Willington and Cople)

Changes in farm management, including creation of large fields in the 1960s, 1970s and early 1980s, and decline of spring crops has had an impact on farmland. 30% of farmland was managed under environmental stewardship.



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Identification of Services

Current ecosystem services classified:

	Highly significant ecosystem service type
	Moderately significant ecosystem service type
	Low significance/insignificant ecosystem service type

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Significant Service Identification



	Main Ecosystem Types							
Types of Service	Woodland	Farmland	Grasslands	Freshwater wetlands	Riverine	Parks and Gardens	Urban Green Space	Brownfield Sites
Provisioning services								
Food		Wheat, barley, rape, linseed, beans	Some grazing					
Fibre and Fuel	Firewood Timber – currently small but growing	Fuel crops Stubble as biofuel						
Biodiversity/Genetic resources	Conservation of local genetic resources. Community Tree Trust - collection of seed, nurture & plant (commercial potential)	Conservation of local genetic resources	Conservation of local genetic resources Biodiversity of farms – 30% stewardship Declining farm species	Conservation of local genetic resources Important metapopulations of protected great crested newts	Conservation of local genetic resources	Conservation of local genetic resources	Conservation of local genetic resources	Conservation of local genetic resources
Biochemicals, natural medicines, pharmaceuticals								
Ornamental resources	Some very small scale traditional markets							
Fresh water		Aquifer on green sand ridge	Aquifer on green sand ridge	Maintenance of water table	Maintenance of water table	Aquifer on green sand ridge		Disused Clay & Gravel Pits – see freshwater
Saline water								
New environmental products/markets		Biofuels						New nature conservation sites
Others	Coppice – small but increasing Woodland burials?							

DELPHI ANALYSIS

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Detailed Breakdown of Significant Benefits

	Current Significant Service Types	Details
Woodland		
Provisioning	None identified	
Regulating	Buffer / connectivity	Buffer to agricultural land and water/wetland
Cultural	Recreation and tourism	Important for walking cycling and game shooting, and events e.g. annual wood fair
	Aesthetic values	Ancient woodlands as part of historic landscape,
	Scientific	Ancient woodland SSSIs
Supporting	Primary production	Small area but important functionally
Farmland		
Provisioning	Food	Wheat, barley, rape, linseed, beans
Regulating	None noted	
Cultural	Employment	Arable employment, mutual support of farmers within farming communities, landscape, arable biodiversity
Supporting	Primary production	Crop yields, commercial shooting
Grassland		
Provisioning	None noted	
Regulating	None noted	
Cultural	Aesthetic value	Traditional grasslands, landscape
	Scientific	SSSIs and county wildlife sites
Supporting	Soil formation	Soil fixing and stabilising
	Primary production	For grazing

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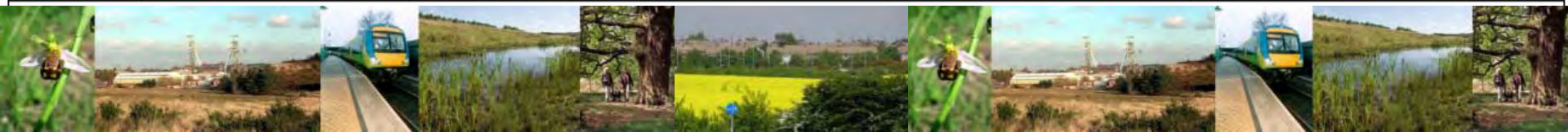
Ecosystem Service Values



	Service Type	Service Values where available	Details and Source of data	Textual Analysis
Woodland:				
Provisioning				Values currently small but growing
Regulating	Buffer and connectivity	Residents are willing to pay £7680 per household for views of broadleaved forests	Amion 2008	
	Climate regulation	Carbon sequestration £981/ha/yr	O'Gorman & Bann 2008	
	Air quality	Health related benefits of urban tree cover £29/ha/yr	O'Gorman & Bann 2008	
Cultural	Recreation and tourism	£1.66-2.78 per visit to woodland £2.00 per visit to woodland £34/ha/yr £14.50 for rural leisure visits £35.69 rural tourism visits	Amion 2008 Scarpa 2003 O'Gorman & Bann 2008 ELBS 2005 ELBS 2005	
	Aesthetic value	£5.18 (4.13-6.22) /ha/yr £8.27 (6.86-9.67) /ha/yr	Landscape value of trees Values of hedge trees ELF 2005	
	Scientific			Values included under aesthetic values and recreation values above.
Supporting		?		



Using Valuation in Future Planning

Pressure / Change

Change in Biophysical Structure or Process

(e.g. woodland habitat or net primary productivity)

Change in Function

(e.g. slow passage of water, or biomass)

Change in Service

(e.g. flood protection or harvestable products)

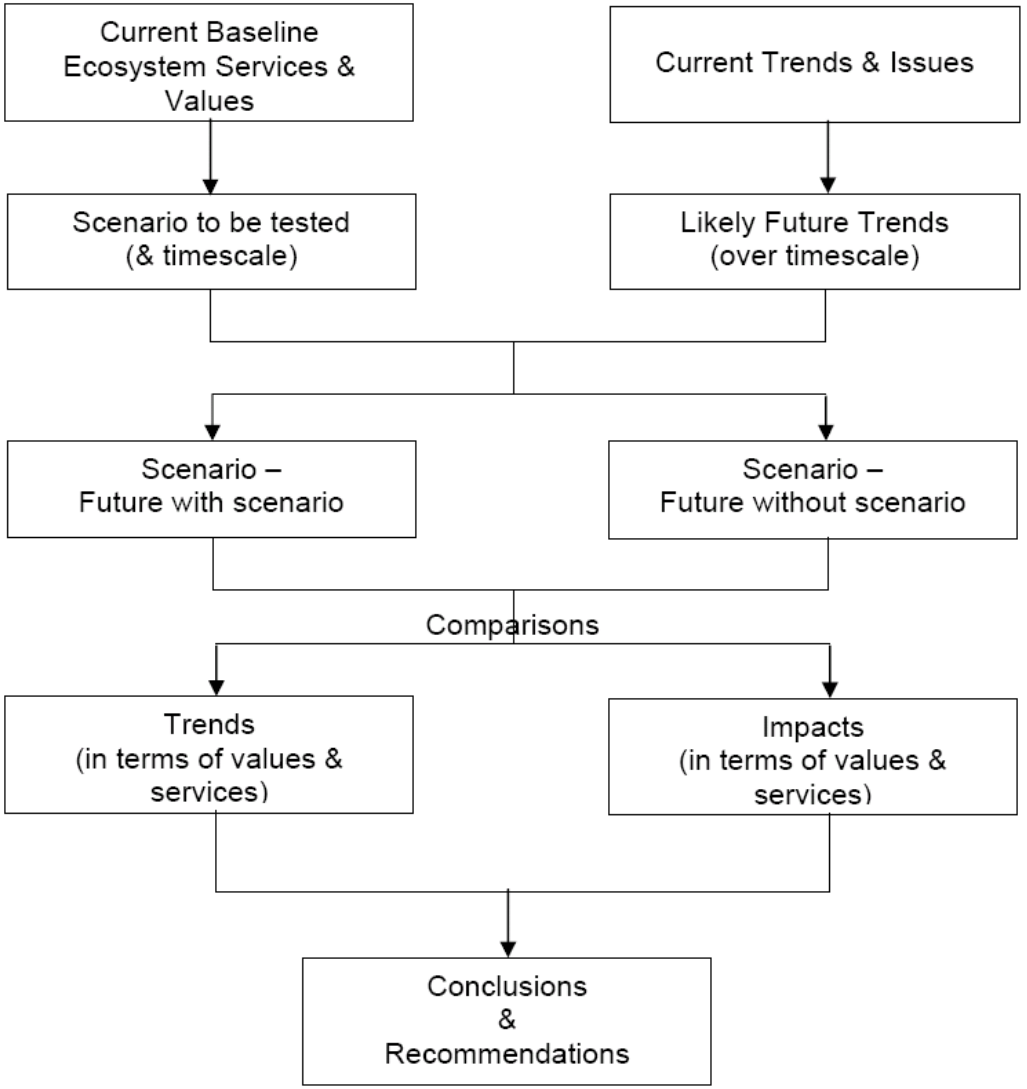
Change in Benefit (Value)

(e.g. willingness to pay for woodland protection or for more woodland or harvestable products)

Valuation in Scenario Testing



Approach



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Scenario Testing

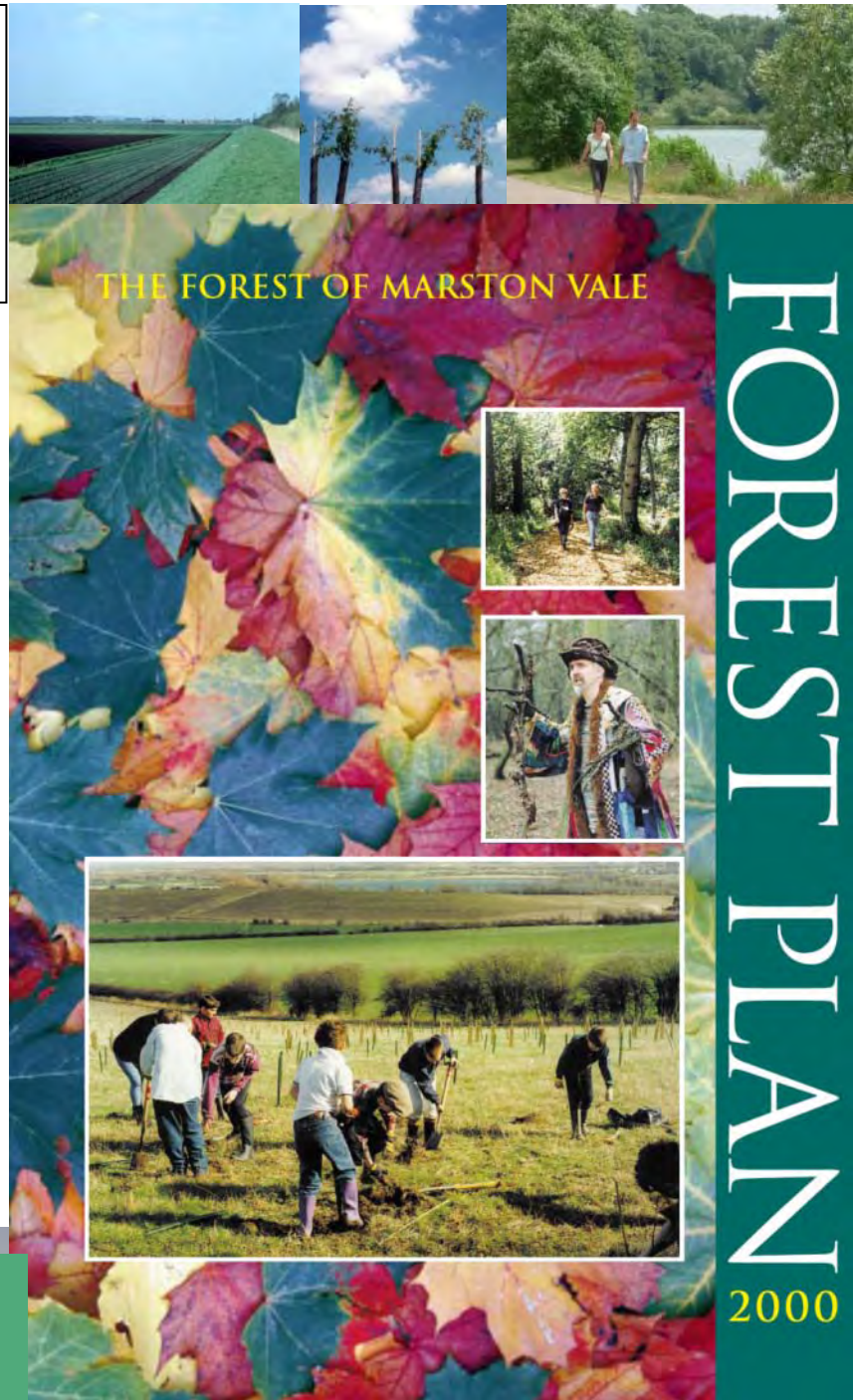
Impact on Ecosystem Services of Marston Vale Plan (to 2031)

Scenario 1

With plan implemented

Scenario 2

Without plan



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Scenario Analysis Matrix

	Future ES Services WITHOUT Scenario – Plan			ES trends WITH Scenario / Plan	
	Current Significant Services	Trend		Changes to Ecosystem Service Value of Scenario	Trend
Woodland:					
Provisioning		0	+	Products from thinning, new coppice etc.	+
Regulating	Buffer and connectivity	0	+	Increased connectivity and buffering	++
	Climatic regulation	0	+	Increased woodland carbon sequestration	++
Cultural	Recreation and tourism	+		From larger areas of woodland	++
	Aesthetic value	0	+	As part of linked landscape and Brownfield planting	++
	Scientific	-		Maintenance of ancient woodland and enlargement of woodland area	++
Supporting	Primary production	+		Increased woodland cover	++

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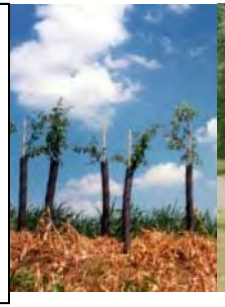
Marston Vale Fens without (-) and with (+) the Forest Plan (2031)

Main Ecosystem Types	Ecosystem Service types								Overall Ecosystem Service	
	Provisioning Services		Regulating Services		Cultural Services		Supporting Services			
	-	+	-	+	-	+	-	+	-	+
Woodland	→	↑	→	↗	→	↑	↗	↑	→	↑
Farmland	↘	→	↘	↗	↘	→	↘	↘	↘	→
Grasslands	↘	↗	↘	↑	↘	↗	↘	↗	↘	↗
Freshwater wetlands	→	↗	→	↑	↗	↑	↘	↗	→	↑
Riverine	→	↗	↘	↗	→	↑	→	↗	→	↗
Parks and Gardens	→	→	→	↗	→	↑	→	↗	→	↗
Urban green space	?	?	→	↗	→	↗	→	↗	→	↗
Brownfield	↘	↗	↘	↗	↘	↗	↘	↗	↘	↗

Ecosystem Services
a more sustainable approach?




- Ecosystem Services = constraint & opportunity
  - Realising services – gap/barrier analysis
- Wider coverage than existing approaches - SEA
  - Covers non-planning issues
  - e.g. Agricultural change



Buy in for Ecosystem Services



Need to be able to demonstrate how Ecosystem Services can:

- **Input** into existing approaches
- **Add value** to existing approaches
- **Simplify or replace** existing approaches