

Project title...

‘Investigating embedding effects in valuation of forest environmental goods:

**Fatemeh Bakhtiari ,Thomas Lundhede,Niels Strange,James Gibbons,
Jette Bredahl Jacobsen**

Erasmus Mundus Joint Doctorate programme

FONASO - Forest and Nature for Society



Education and Culture

Erasmus Mundus



Outline

- **1-Introduction to theoretical context**
 - 1-1 embedding effects in CE
 - 1-2 The choice experiment method (CE)
- **2-Objective and hypothesis**
- **3-Methods and results**
- **4-Discussion and feedback**



Forest values

- **1-Attribute identification:**

Using qualitative methods such as focus group discussion and individual interviews , coding strategy for data analysis



**Peace and
quietness**

'recreational aspect'

**Presence of natural
dynamic**

'naturalness of forest'

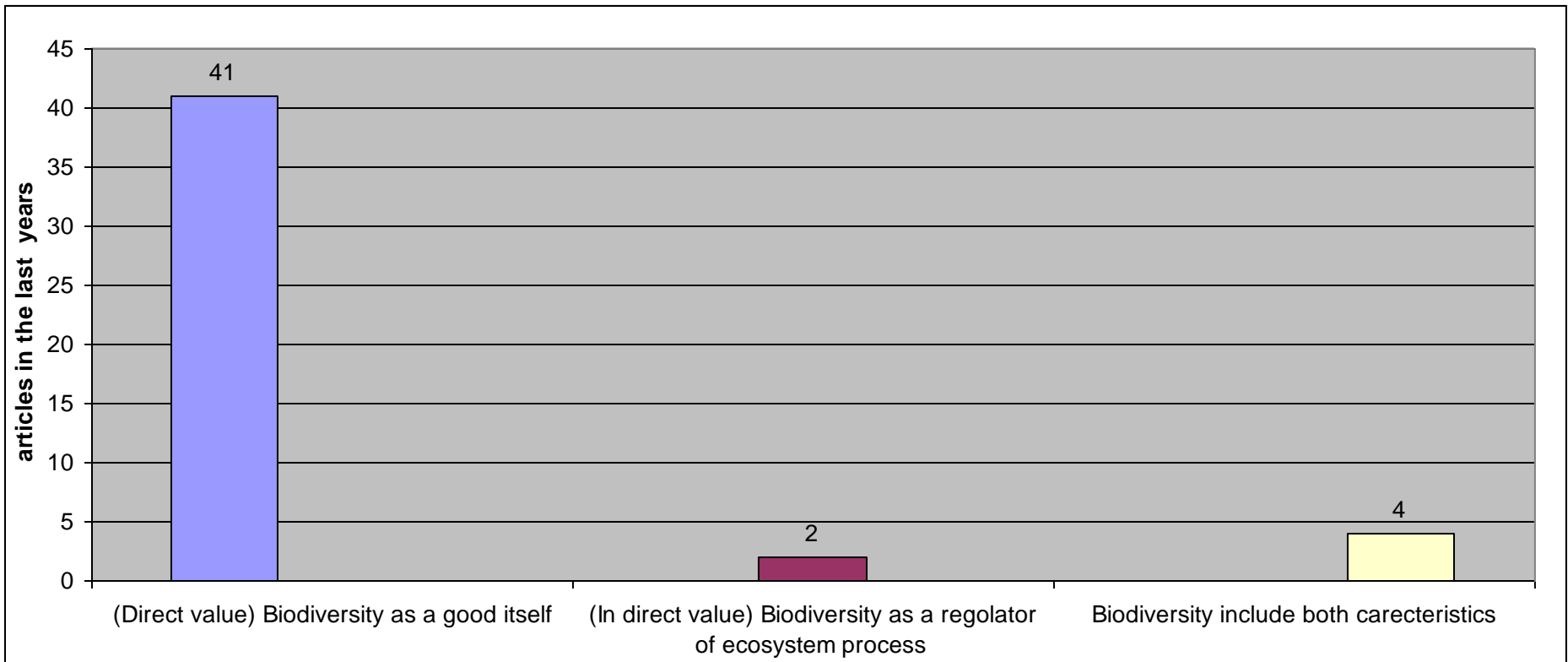
Biodiversity

Biodiversity as a
good itself

Biodiversity as a **regulator
of ecosystem process**

(resilience of ecosystem)

Review of articles in the last years for biodiversity valuation



So,

what is the value the public places on biodiversity and how should we present biodiversity as an attribute in CE to get a valid WTP ?

Problem in valuation methods:

- Lack of knowledge on individual mental construct which causes **bias** such as **embedding effects**

Our objectives:

Try to reducing embedding bias
by

“Finding the best way of presenting attributes for layman
that is correspondent with their understanding “

Embedding effect ?

Kahneman and Knetsch (1992)

- Sometimes, according to empirical studies, consumer behavior is **inconsistent** with economic theory.
- This study investigates two aspects of embedding i.e. **contextual embedding** and **scope effect** within the different policy alternatives.



• If WTP(1)

<



WTP(4)

?

- Schulze 1998




Hypothesis

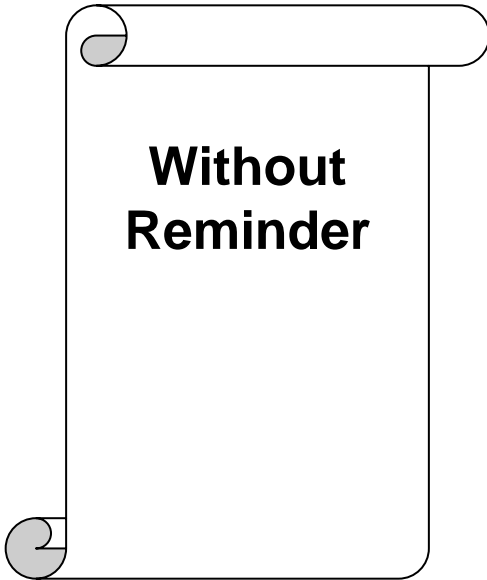
1- Contextual embedding

- H0: If WTP1 (without reminder and only species number) \neq WTP2 (with reminder about functionality of biodiversity)
- H1: If WTP1 (without reminder) = WTP2 (with reminder).

2-Scope sensitivity

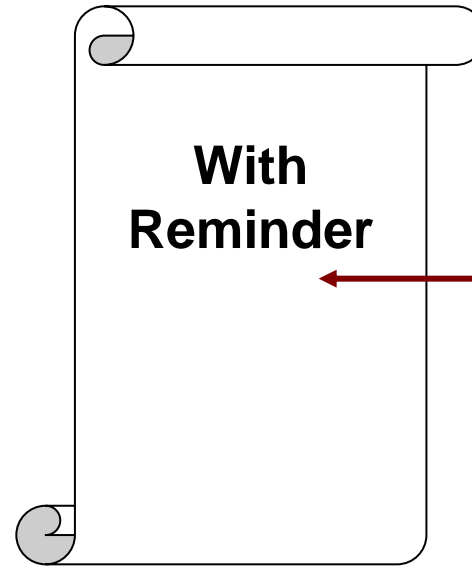
H0=Bbio1= Bbio2 = Bbio3 , **H1**=Bbio1 \neq Bbio2 \neq Bbio3.

	Current policy	Policy 1	Policy 2
Number of abundant species	1,000 	1,500 	2,000 



**Without
Reminder**

900 respondents



**With
Reminder**







900 respondents







**Reminder before
choice sets**

**Reminder inside
choice sets**

Forest Stability

There is a relation between health and stability of forest and biodiversity (different animals and plants). Having a high variety of animals and plants (high biodiversity) can decrease the level of disturbances in ecosystem .It may provide insurance, resistance and stability for forest to tolerate disturbances and environmental changes (such as drought or human degradation) better than forest with just one or few specie

	Current policy	Policy 1	Policy 2
Number of abundant species	1,000 	1,500 	2,000 
Forest stability and resistance against disturbance	low	medium	high
Presence of forest natural cycle	Dead wood occasionally left in forest 	<u>7</u> trees left in each hectare of forests 	<u>15</u> trees left in each hectare of forests 
Where new policy takes place	No extra improvement in any forest in Funen, Zealand, Scania	Zealand	Zealand
Annual income tax (Dkk /Year)	0 Dkk	500 Dkk	750 Dkk
Your choice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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WTP estimation using Choice modeling methods

Choice modelling attempts to model the decision process of an individual or segment in a particular context.

Theories behind of Choice Experiment:

1- Random utility theory (RUT)

Thurstone 1927, McFadden 1974 and Manski 1977

(maximization of a utility)

$$U_{ij} = v_{ij} + \varepsilon_{ij}$$

u_{ij} : Utility of individual i for alternative j

v_{ij} : deterministic component , can be calculated based on observed characteristics

ε_{ij} : a stochastic error component, which is unobserved

2- Lancasterian microeconomic approach *(Lancaster, 1966)*

Data collection:

Data will be collected through an **internet-based questionnaire** managed by the **survey institute** 'Analyse Danmark', using a sample from their internet panel, representative of the population. .

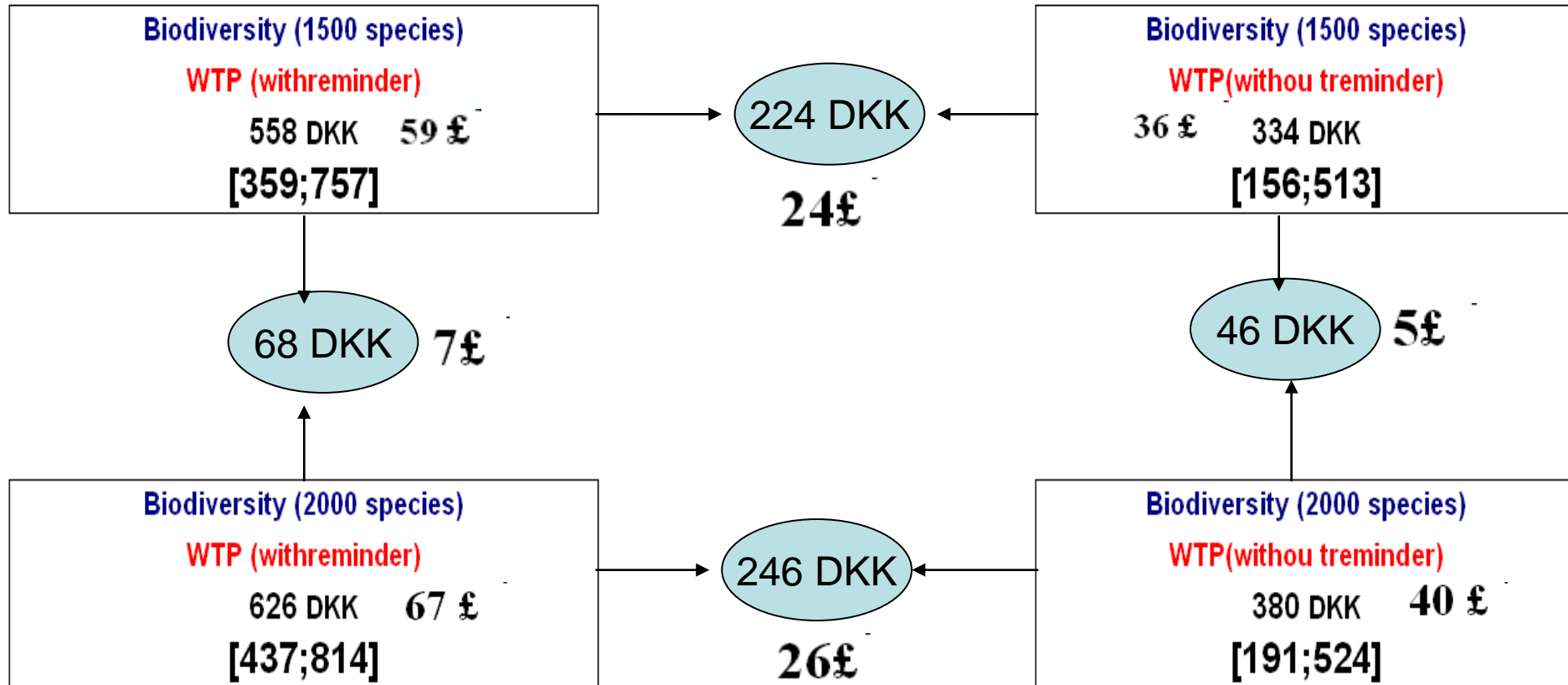
Estimation

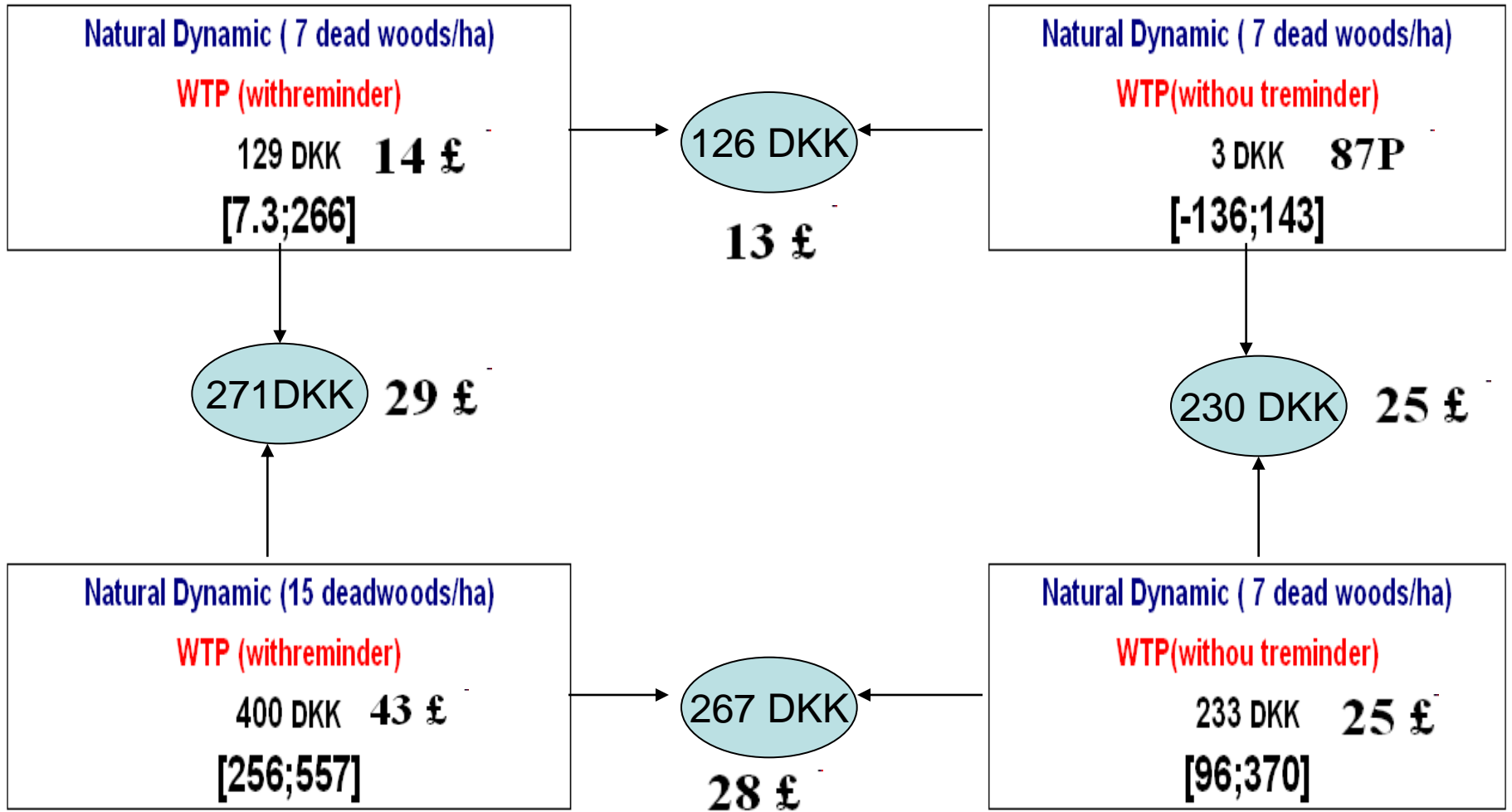
Econometrics methods such as Mixed logit model

$$P_{ni} = \int L_{ni}(\beta) f(\beta) d\beta,$$

$$L_{ni}(\beta) = \frac{e^{V_{ni}(\beta)}}{\sum_{j=1}^J e^{V_{nj}(\beta)}}$$

WTP comparison





If being a passive visitor has any effect in people preference for biodiversity

****How often do you visit forest?**

More than 3 times a week=1

1-3 times a week=2

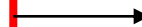
1-3 times a month=3

1-12 times a year=4

Once a year=5

Less than once a year=6

I never visit the forest in this region=7



passive
visitor

WTP of being a passive visitor

	With reminder	Without reminder
Biodiversity (1500 species)	205	16
Biodiversity (2000 species)	258	122

WTP of being a visitor

	With reminder	Without reminder
Biodiversity (1500 species)	312	280
Biodiversity (2000 species)	324	289

Who benefits:

- 1- Researchers carrying out future studies should consider not only in terms of species number but also as its functionality.
- 2- Nature managers and policy makers should better target policy actions related to biodiversity to have more public support.

Thanks for
your
attention



- Representantative in terms of
- gender,age,income

IF never choose sq

Education	male	female	Total
primary school	30	29	59
vocational secondary school	29	24	53
Higher education	140	128	268
Total	199	181	380

IF Always choose sq

Education	male	female	Total
primary school	3	9	12
vocational secondary school	8	12	20
Higher education	49	80	129
Total	60	101	161

WTPs

Without reminder

[Variable]	WTP	Standard error	b/St.Er.	P[Z >z]
bio1500	301	89.4547165	3.367	0.0008
bio2000	336	71.3215559	4.716	0
ND_D2	89.8	79.3044247	1.133	0.2573
ND_D3	281	71.1419849	3.954	0.0001
LOC_s	110	93.4957428	1.182	0.2373
LOC_f	-178	101.106636	-1.759	0.0785
LOC_Z	281	86.7392784	3.235	0.0012

With reminder

[Variable]	Coeffici	Standard	b/St.Er.	P[Z >z]
bio1500	535.78	76.8680855	6.97	0
bio2000	599.41	59.4695438	10.079	0
ND_D2	127.46	67.2180107	1.896	0.0579
ND_D3	274.29	53.7080417	5.107	0
LOC_s	191.3	80.2161706	2.385	0.0171
LOC_f	309.82	78.7407016	3.935	0.0001
LOC_Z	299	74.5913018	4.009	0.0001

Bio1500

withreminder

	535.780	
Lower bound		Upper bound
385.12		686.44

Bio1500

without reminder

	301.17	
Lower bound		Upper bound
125.84		476.499

63.627

WTP1 (without) \neq WTP2 (with)

35.211

Bio2000

withreminder

	482.85	715.97
	599.408	

Bio2000

without reminder

	196.59	476.169
	336.38	

WTP1 (without) \neq WTP2 (with)

ND_d2

withreminder		
	-4.285	259.21
	127.462	

ND_d3

withou treminder		
	-65.6	245.276
	89.84	

WTPwith≠WTPwithout

ND_d3

withreminder		
	169.02	4095.2
	274.290	

ND_d3

without reminder		
	141.85	420.726
	281.29	

WTPwith≠WTPwithout

Scenarios For recreational aspect:

Your preferable forest to visit!

Assume you have the option to visit either forest A or forest B. They are identical but different in terms of :

1-Numbers of visiting people

2-The distance from your home

Now, please look at the following choices (choice A and choice B.

Which would you choose to visit?

	Forest A	Forest B	Non of these
Amount of Visitors	Few visitors	Many visitors	
Distance from your home (Km)	15	10	
Your choice (select only one option)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Biodiversity acting as:	
A regulator of ecosystem processes (<i>indirect value</i>)	Biodiversity as a good (<i>direct value</i>)
What kind of organism?	
<p>Microorganisms: decomposition and nutrient cycling.</p> <p>Primary producers (plants on land and in water): biomass production and carbon capture</p> <p>Top predators, parasites: population regulation</p> <p>Pollinators: stability of nonagricultural ecosystems</p>	<p>Large vertebrates, especially birds, mammals and conspicuous flowering plants: recognised for their charisma and aesthetic appeal</p> <p>Flagship or umbrella species: providing protection for wider communities and habitats</p> <p>Phylogenetically distinct species: maintaining evolutionary diversity</p> <p>Endangered species: maintaining taxonomic diversity</p>
What kind of ecosystem management?	
<p>inputs need to be managed to achieve productivity and maintain nutrient cycles and decomposition but with the risk of reducing the ability of the system to deliver other services.</p> <p>Importance of <u>maintaining diversity for resilience, and resistance</u> to predictable and unpredictable future environmental change</p>	<p>Directed and often very focused management for enhancing viability of <u>individual target species or species groups</u></p>
How do humans benefit?	
<p>Healthy fertile soils, clean air, clean water, disease and pest regulation, climate regulation, and food and fibre production</p>	<p>Cultural services, recreation, tourism, aesthetic enjoyment, inspiration and education</p>
How important is 'diversity' compared with biomass or composition?	
<p>For some services and over the short term, composition and biomass might be more important attributes but little is known of the functional roles of most soil organisms and there is no reason to assume a lesser role for biodiversity here than elsewhere</p> <p>Biodiversity provides resilience (an 'insurance' role)</p>	<p>Preserving species richness is primarily about diversity</p>