

**Environmental economics in the UK
water sector:
Development and prospects**

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MWH®

BUILDING A BETTER WORLD

What is environmental economics?

It's about

- *measuring the external environmental effects, or costs, of economic decisions*
- *proposing solutions to mitigate or eliminate those costs to better manage natural resources and promote social well-being*



Not just about money !

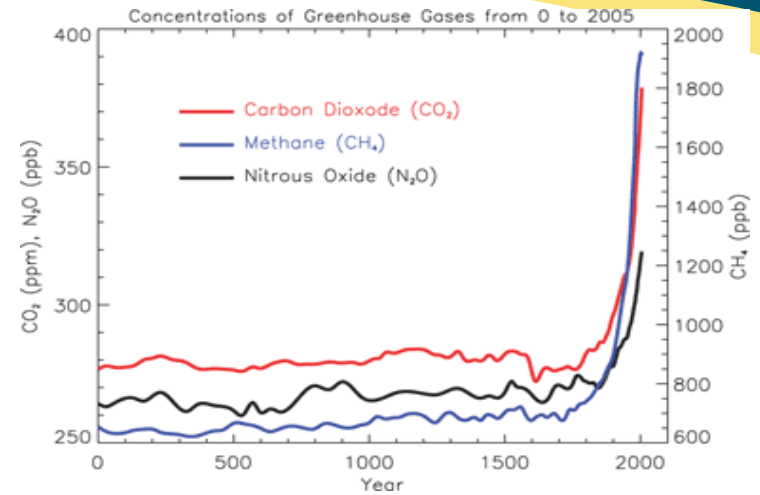
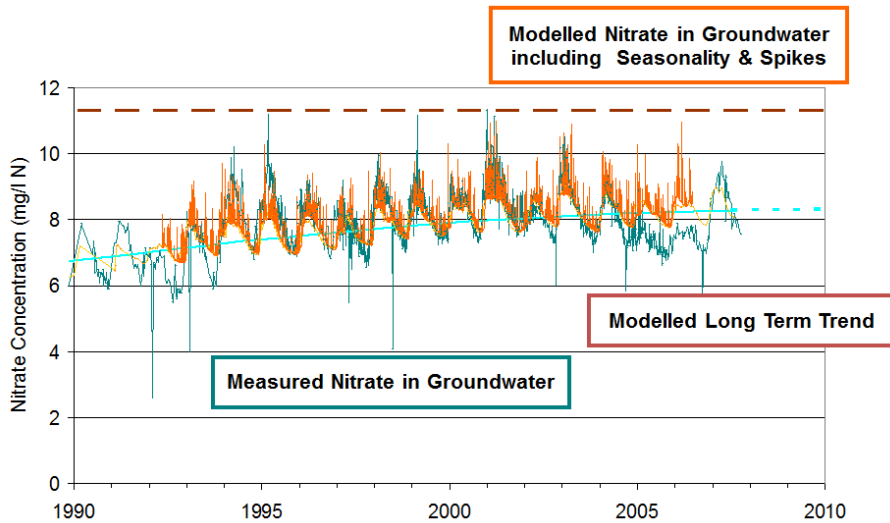
About choices (trade-offs)

Largely about microeconomics

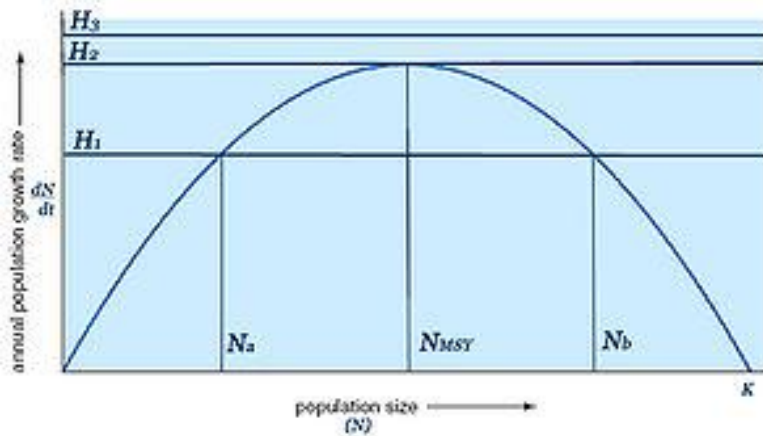
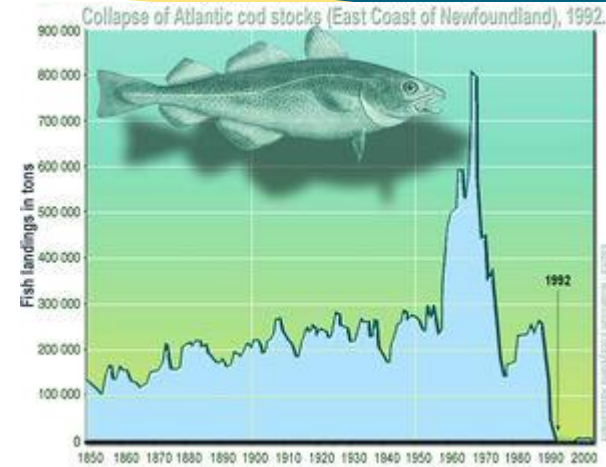


Why do we need environmental economics?

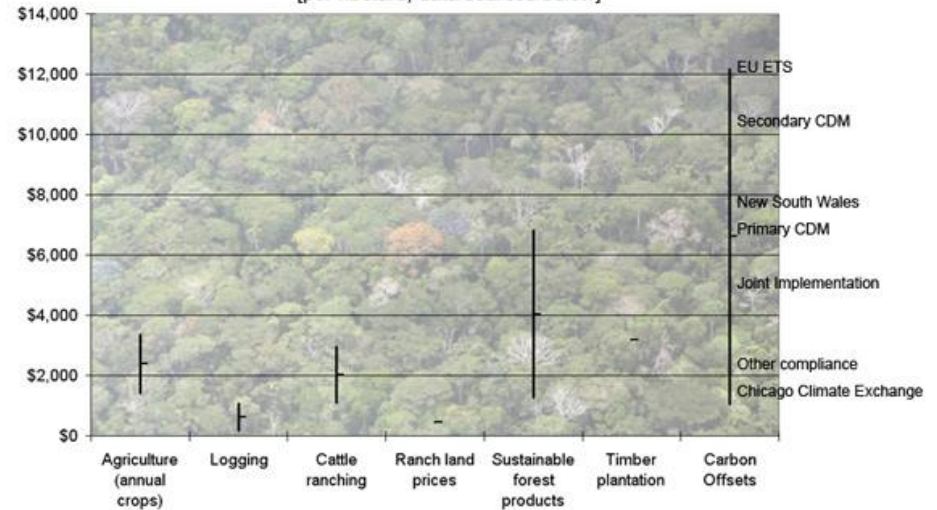
Externalities



Common property (tragedy of commons)



Net present value of various land use options in the Amazon
[per hectare, data sources below]



Public goods

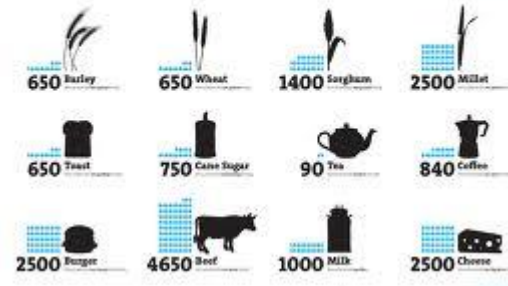
- Non-excludable
- Non-rival



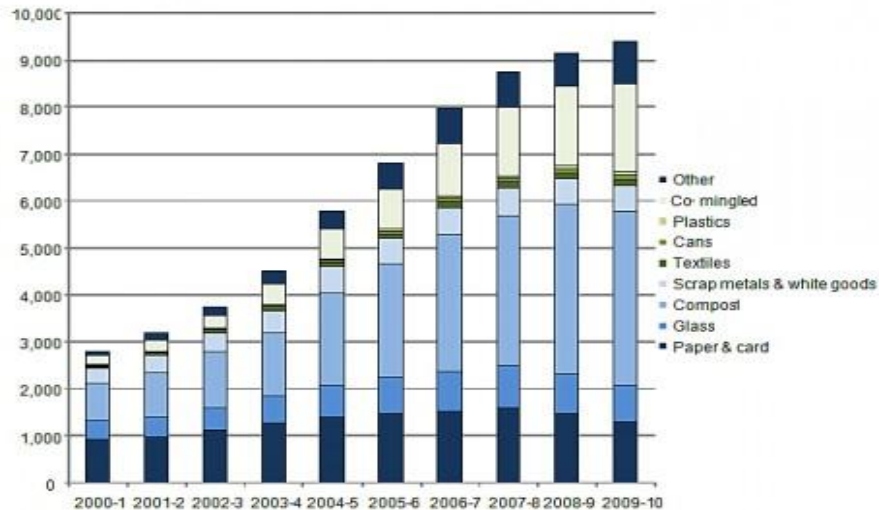
Poor information



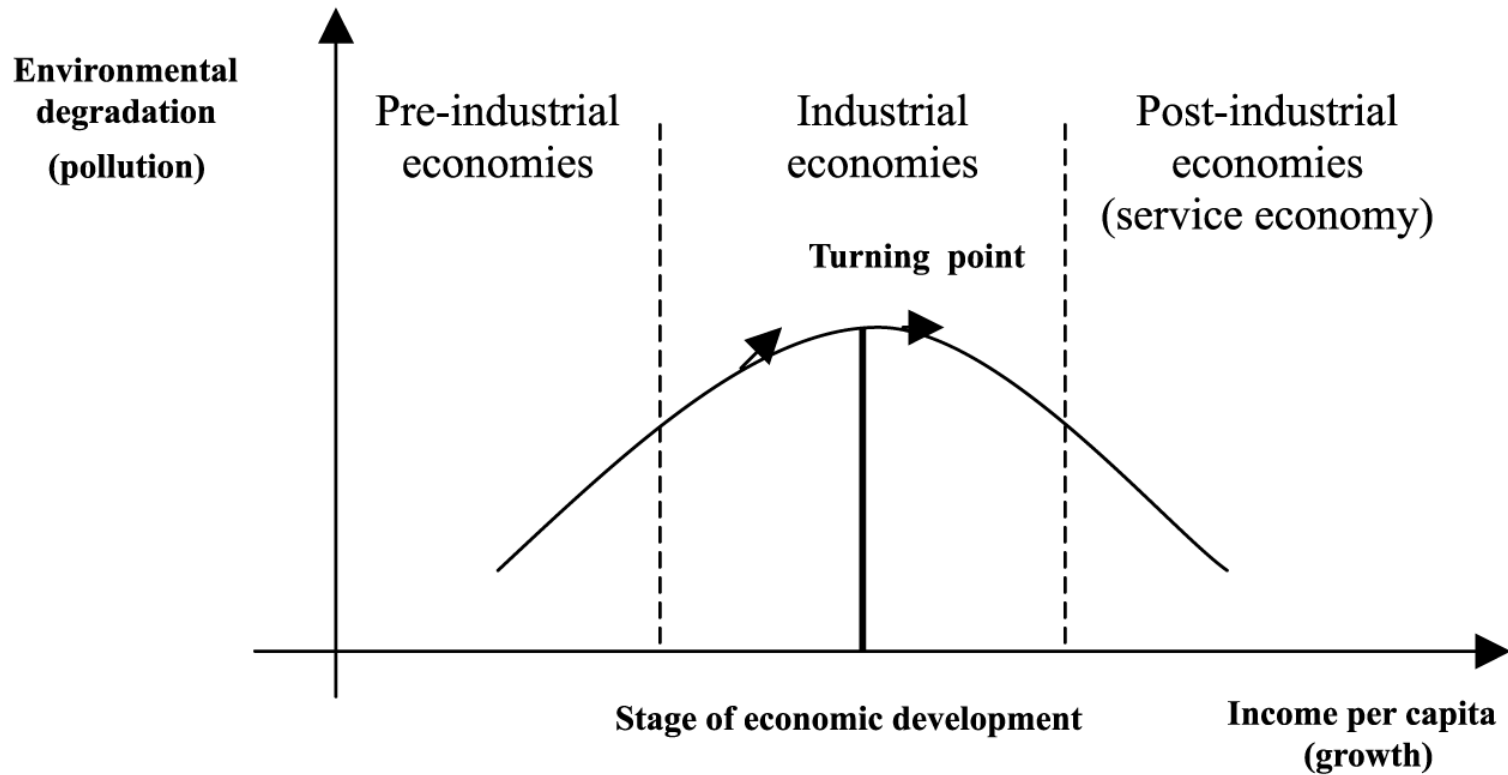
WATER FOOTPRINT



Household waste recycled by material: England, 2000-01 to 2009-10



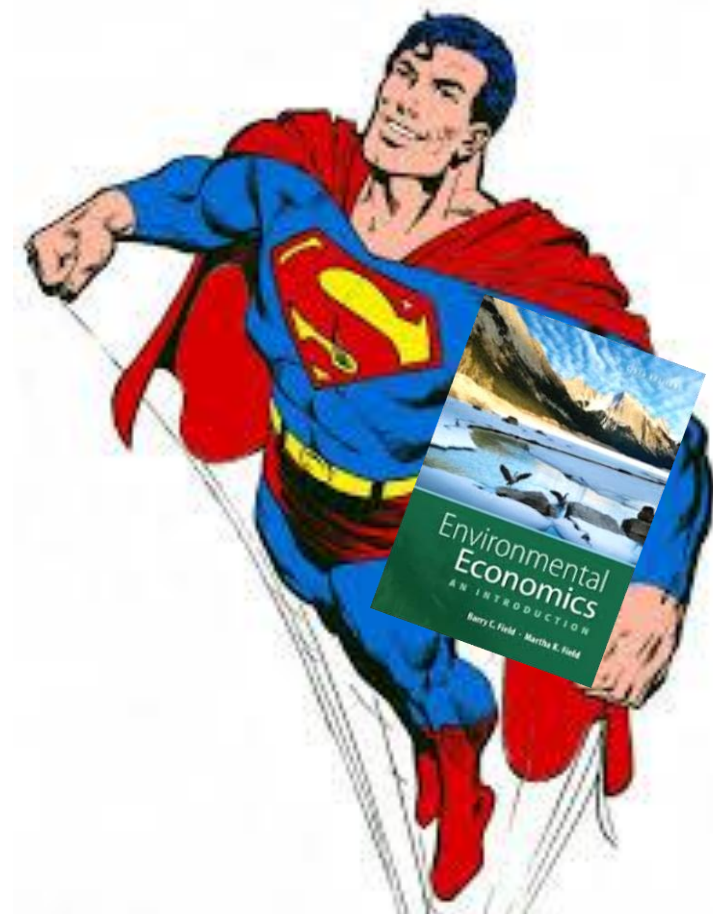
The end result of market failures.....



Source: Panayotou (1993)

Environmental challenges facing the water sector

- Pollution of water environment
 - WFD requirements
- Over abstraction
 - Competing uses
- Resource efficiency
- Climate change
 - Resilience to flooding/drought
 - Increased water scarcity
- Reducing carbon



Economic appraisal: Social cost-benefit analysis



$B > C$

$B < C$

CBA brings 3 pillars of sustainability together



How much does it cost?

What are environmental impacts?

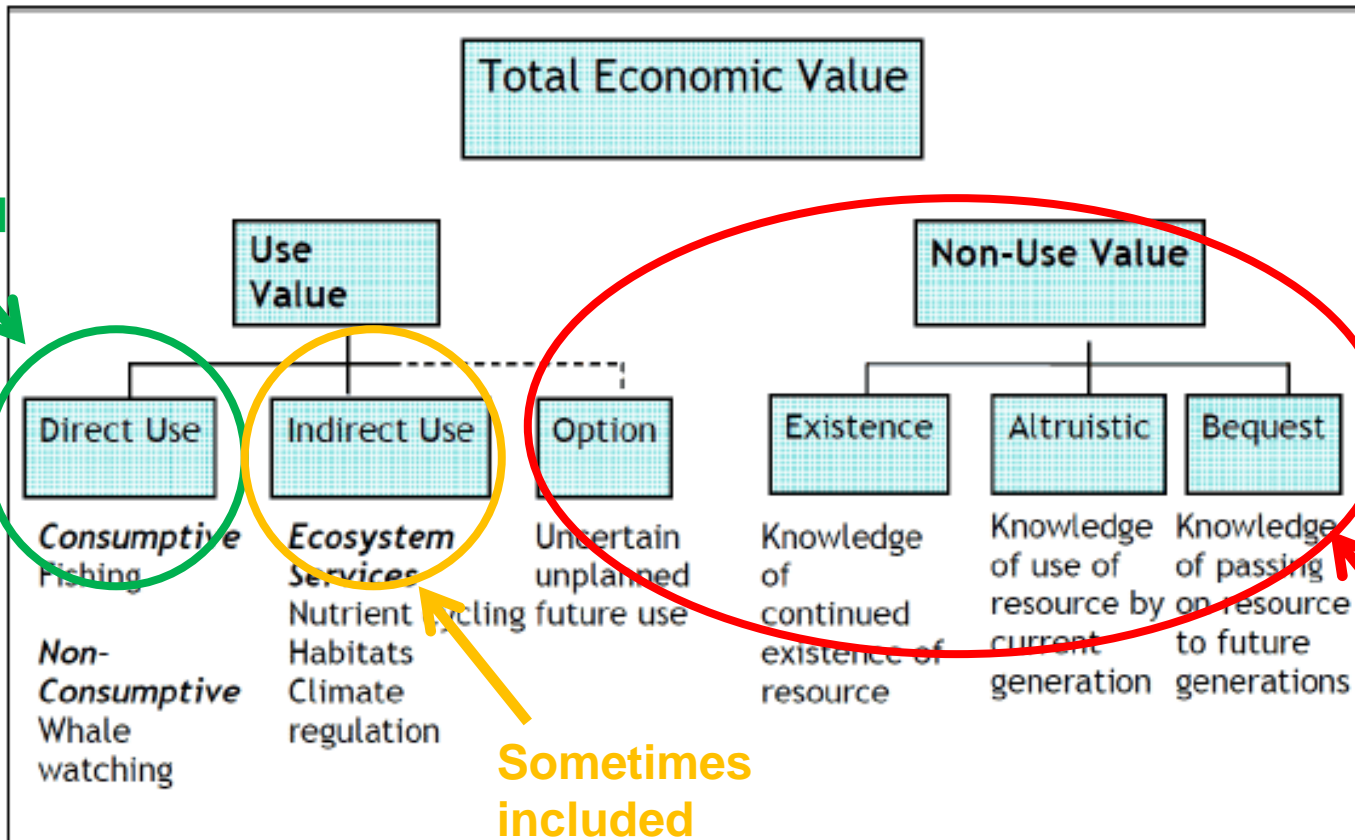


What are impacts on people?



Valuation

Usually included



CBA in the water sector - example

Should a water company upgrade a WWTW or construct a new wetland?

WWTW

- Enhanced service
- Resilience
- Water quality

Wetland

- Enhanced service
- Resilience
- Water quality
- Recreation
- Biodiversity
- Flood risk reduction



WWTW

- Capex
- Opex
- Carbon (capex and opex)
- Disruption
- Impact on bills

Wetland

- Capex
- Opex
- Impact on bills
- Compliance risk

$$NPV = \sum_{t=0}^n \frac{(\text{Benefits} - \text{Costs})_t}{(1 + r)^t}$$

where:

r = discount rate

t = year

n = analytic horizon (in years)

What are ecosystem services (ES)?

The goods and services provided by the natural environment that benefit people



4 Categories
(Millennium
Ecosystem
Assessment
2005)



UK NEA (2011) – some benefits

- Inland wetlands for water quality: £1.5 bn pa
- Pollinators for agriculture: £430 mn pa
- Amenity from living close to rivers, coasts, wetlands: £1.3 bn pa
- Health impact from living with a view of green space: £300 per person pa



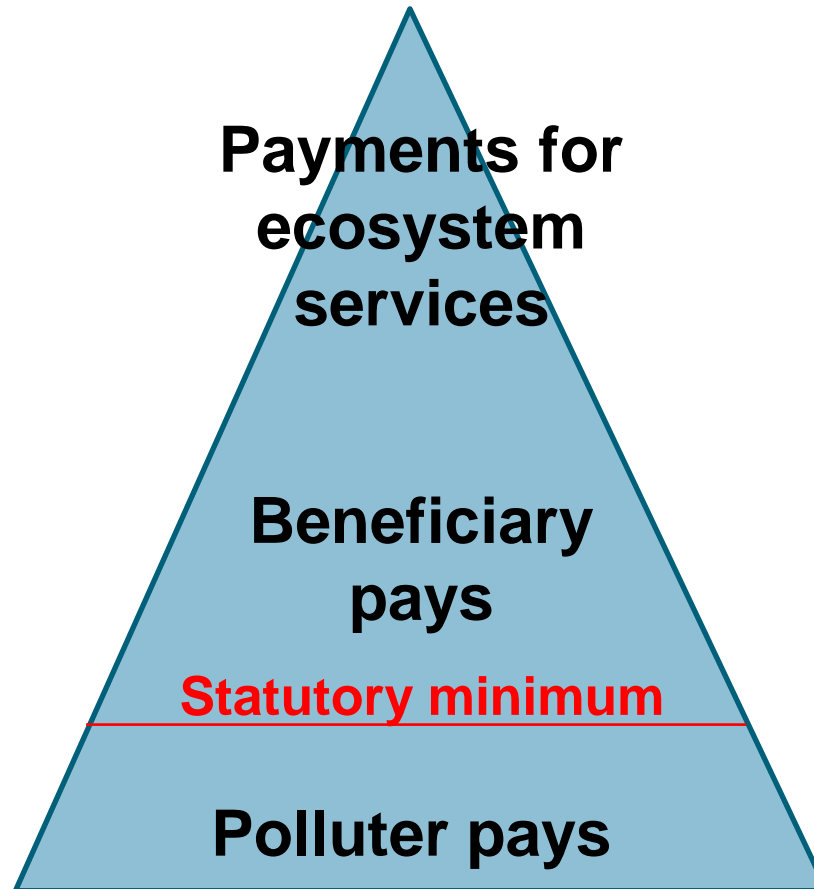
Who should pay?

Examples

WFD
Periodic Review
Upstream thinking
SCaMP

Flood risk protection
Agri-env schemes
Cross compliance

Abstraction licences
Discharge consents



What is needed?

Funders
Low transaction costs
Ecosystem values

Payment mechanism

Beneficiaries

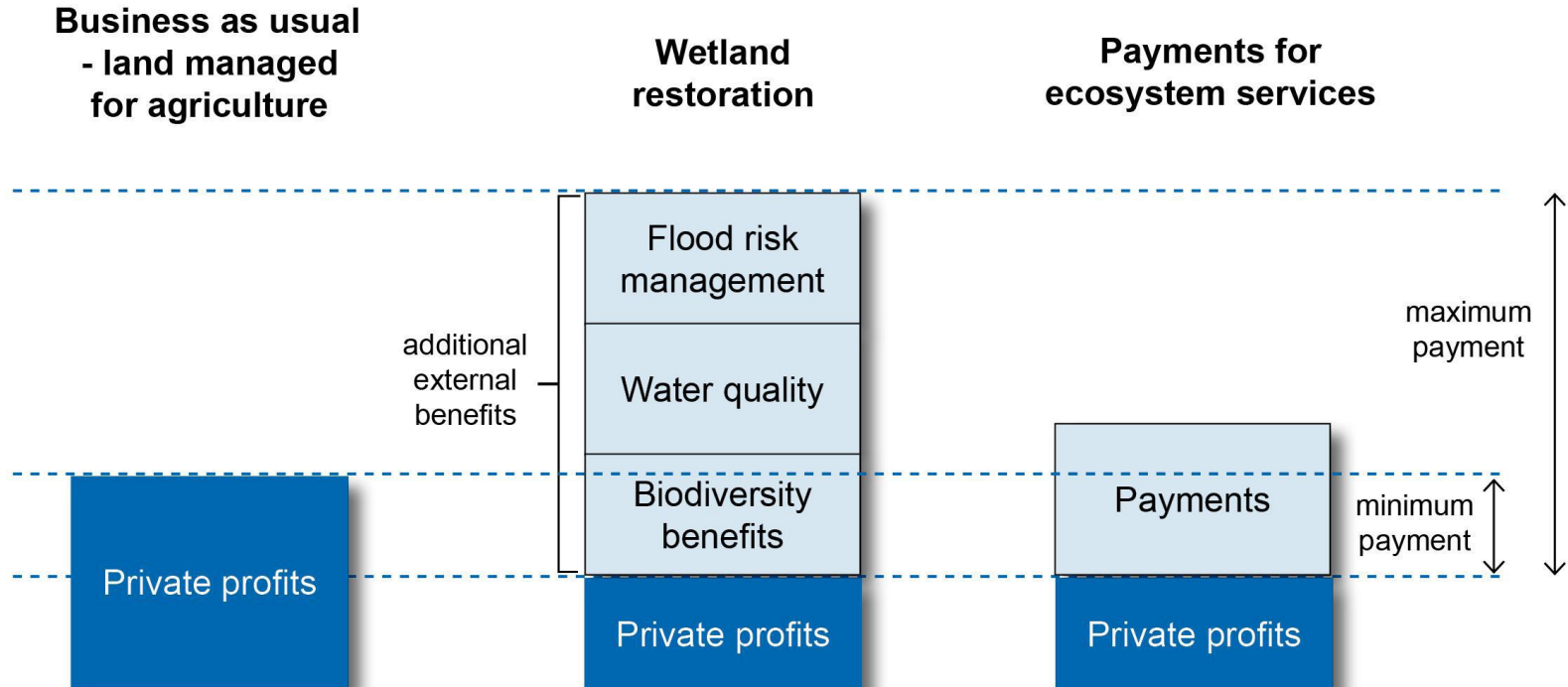
Information

Clear property rights

Identify polluters

What does PES look like?

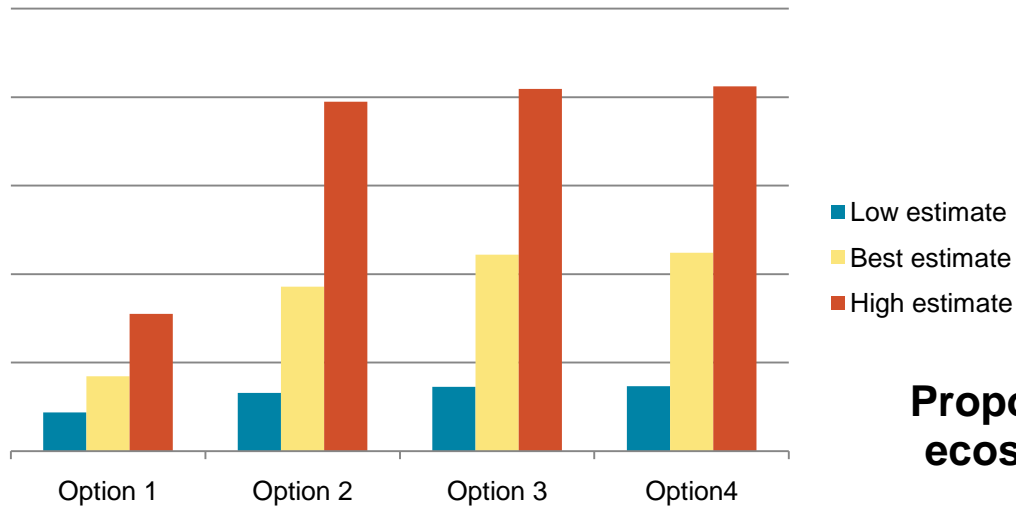
“There is an urgent need to develop market mechanisms through which landowners can realise the value of the ecosystem services that their land provides to society” (Lawton Report)



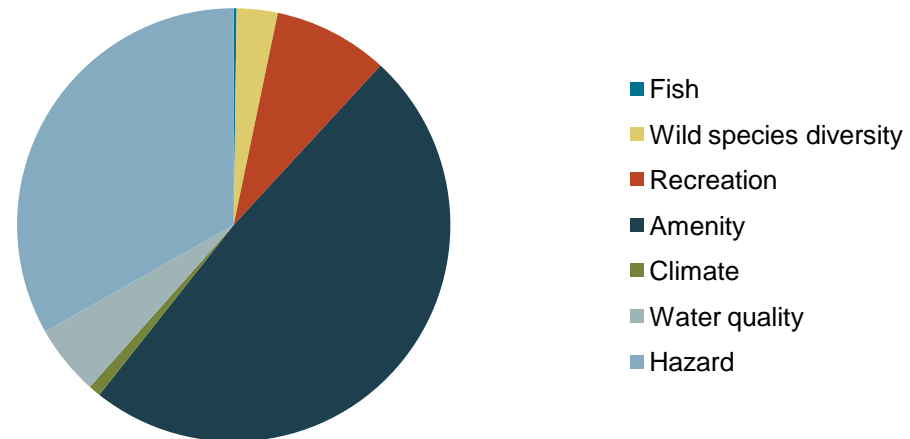
Adapted from Defra (2010). *Payments for Ecosystem Services: a short introduction*

Applying ecosystem services to surface water management

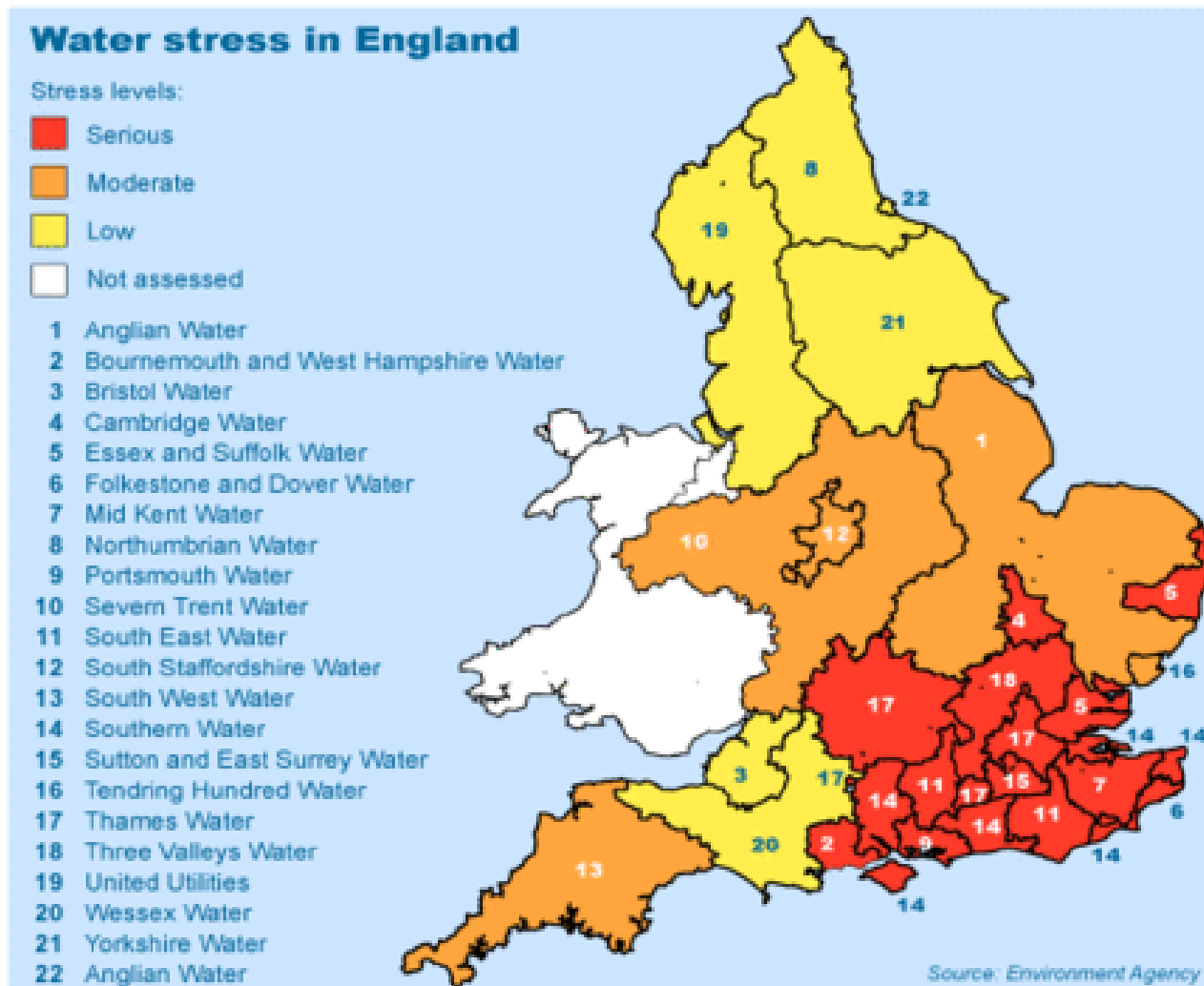
Benefits of solutions (NPV)



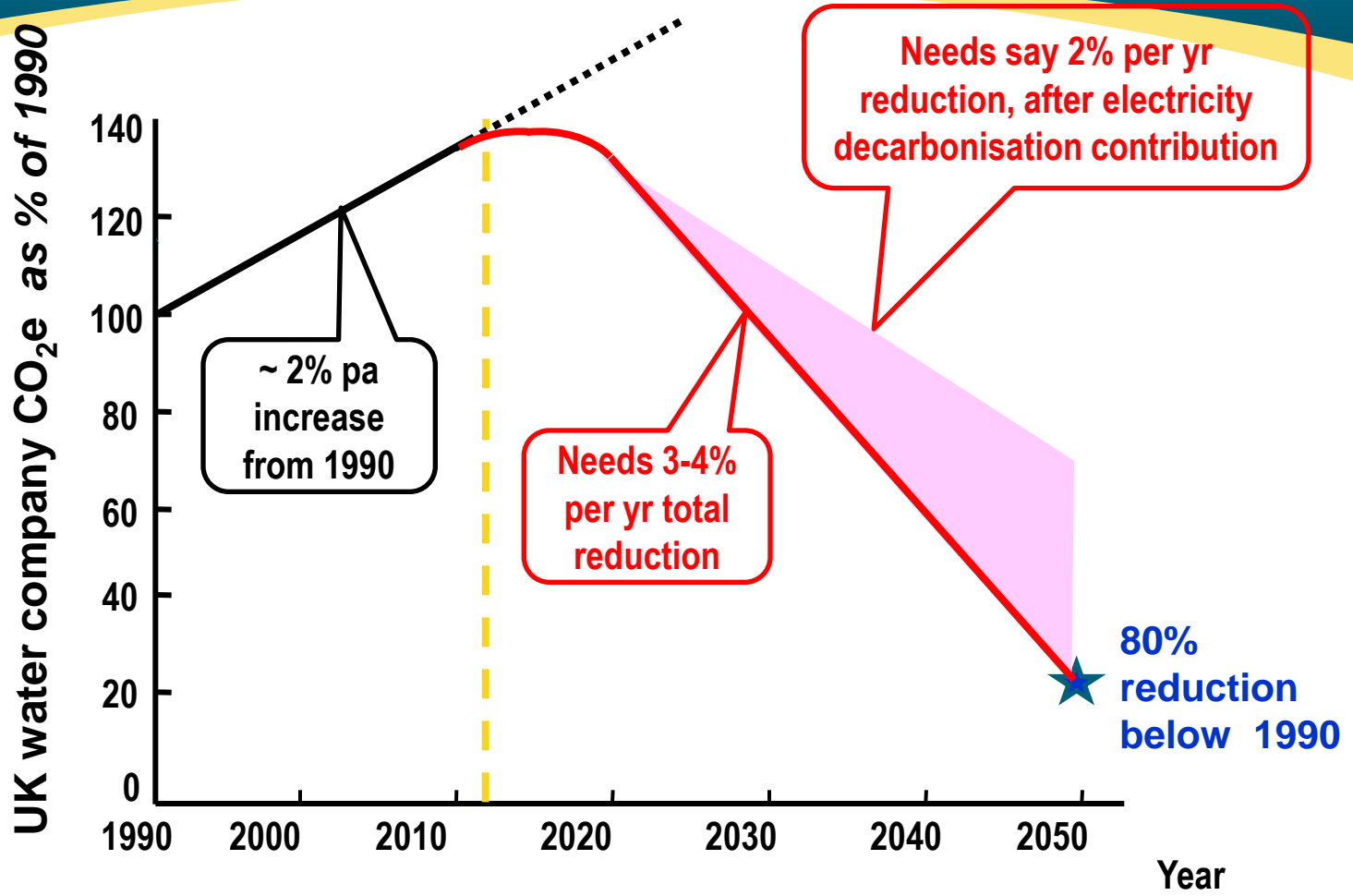
Proportion of benefits from key ecosystem service categories



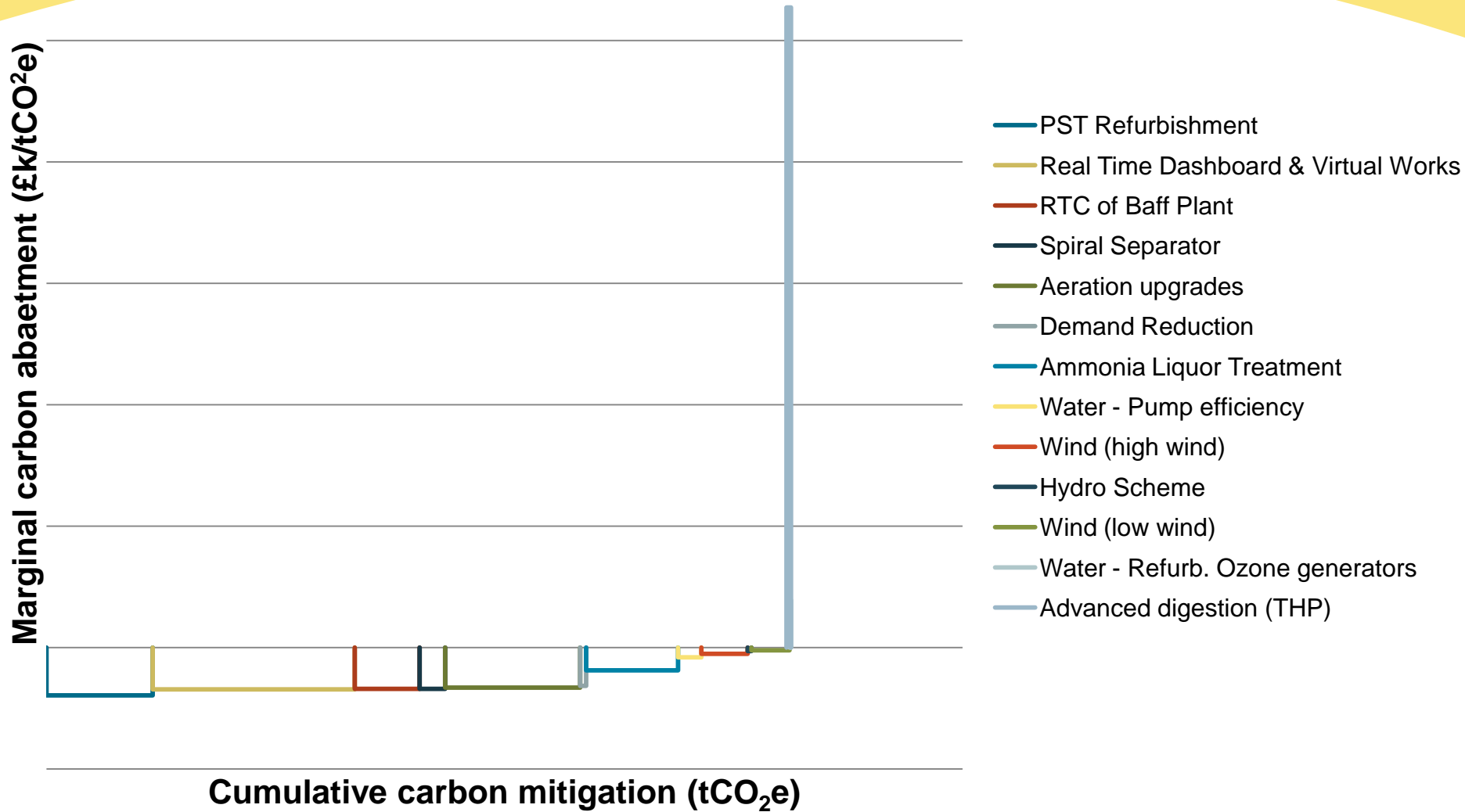
Economics and declining availability of water



Carbon mitigation



Marginal abatement curves



Conclusions

- Embed environmental economics into all projects!
- Benefits
 - to the environment
 - to organisations
 - to customers
 - to investors
 - to society
- Environmental economics can save the world!