

LaSys Workshop 2005

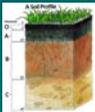
Multi-functionality, Ecosystem Services and Agriculture Work in progress

John R Porter
The Royal Veterinary and Agricultural University
Denmark

Ecosystem services

- Ecosystem services are the benefits that **humans** derive from the **functioning** of local and global ecosystems
- Market economies could not exist without the services derived from ecological life-support systems

Ecosystem services

Provisioning Goods produced 	Regulating Ecosystem processes 	Cultural Non-material Recreation Education Aesthetic
Supporting Soil formation 		

UN Millennium Assessment 2000

Multi-functionality in farming systems

A multi-functional agroecosystem produces multiple services

- Variety of harvested components
- Biogeochemical cycles within the farming system
- Pollination
- Temporal and spatial biodiversity

Multi-service agroecosystems



Mono-service ecosystem



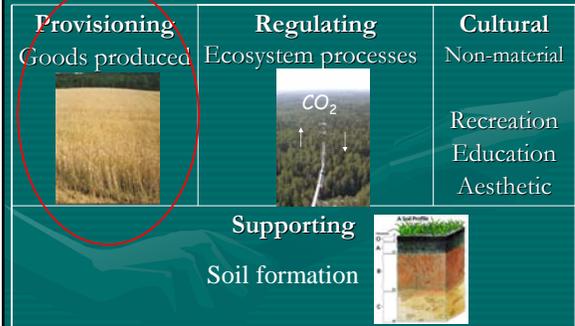
Change in services?



Question

How do we link the **economic value** of agricultural production to the **ecosystem value** of agroecosystem services?

Ecosystem services



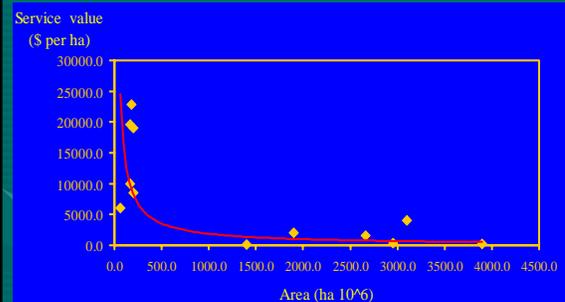
UN Millennium Assessment 2000

Ecosystem services

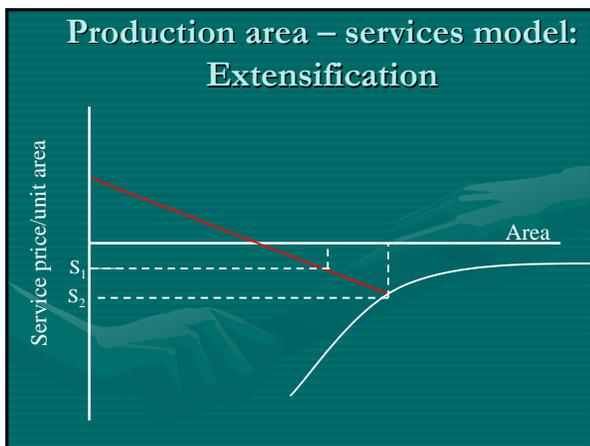
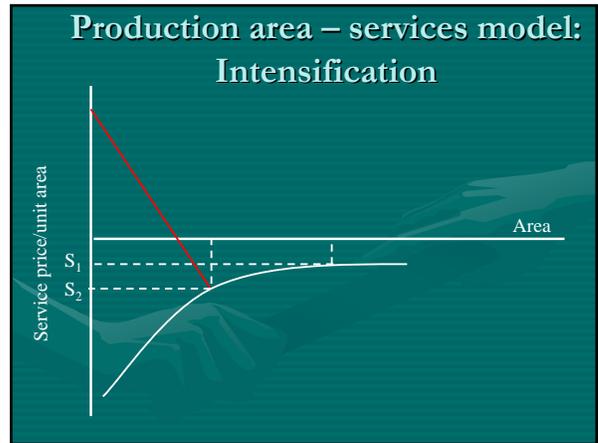
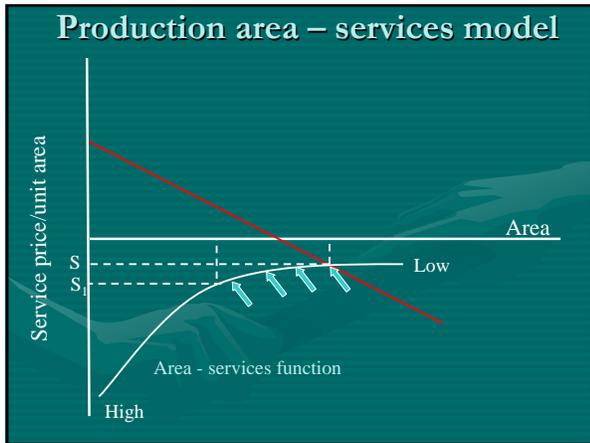
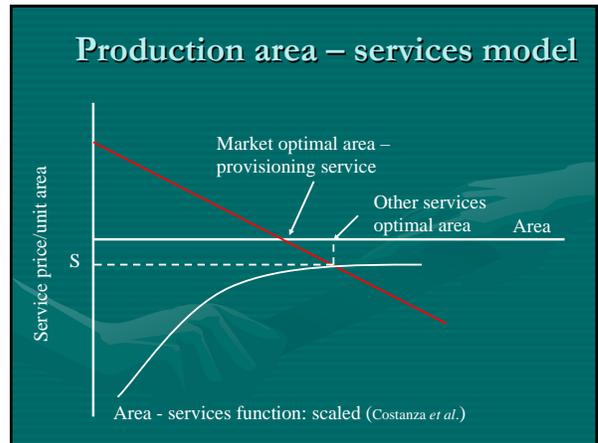
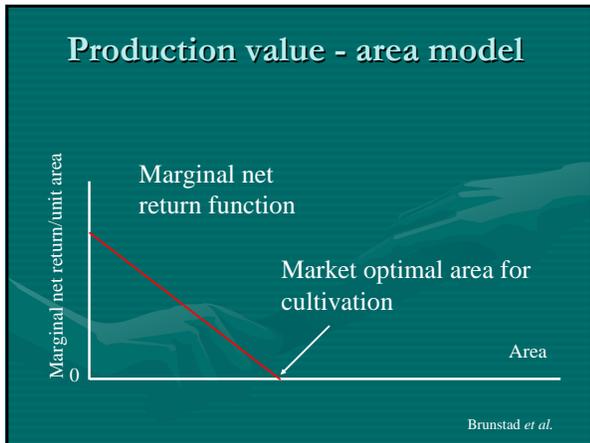
The value of the world's ecosystem services and natural capital

Costanza R. *et al.*, 1997. *Nature*, 387, 253-60.

Service value - area curve



calculated from Costanza *et al.*



EU agroecosystem services and CAP support

How far do current support EU payments to agriculture reflect identified agroecosystem services?

Agroecosystem service values – EU15+EU10

	permanent crops	permanent pasture	arable land	Total
EU15	1.8	11.3	5.9	19.0
EU10	0.3	2.1	2.5	4.9
Total	2.1	13.4	8.4	23.9

FAO Production Yearbook 2000
after Costanza *et al.*
billion Euros

Subsidies and agroecosystem services

- Societal transfers to the agricultural sector EU (2000): *ca.* 85 billion Euros
- EU 25 agro-ecosystem services: *ca.* 23 billion Euros
- Subsidies greatly overestimate the ecosystem service value of current EU agriculture

The Economist.

Questions

- How can we co-value the economic and ecological value of land systems?
- Should we internalise the external environmental costs and benefits (**economic approach**) or should we externalise the common internal processes (**ecological approach**)?

The energy based economy of ecosystem and economic services

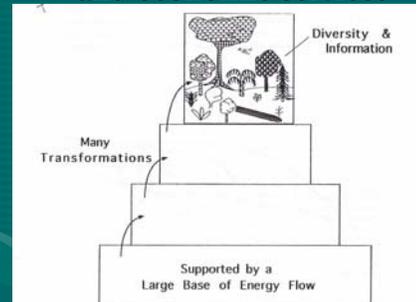


Fig. 2. Systems showing pyramid of energy transformations necessary to support information and biodiversity.

Conclusions

- EU subsidies greatly overvalue the ecosystem services from farming
- Raising ecosystem services seems possible by both intensification and extensification – land and region specific
- Need new approaches to unify the economics and ecology of ecosystem services – the ‘work done’ as a basis of value.

Acknowledgements

The Bertebos Foundation and the Royal Swedish Academy for Forestry and Agriculture

Bernd Kuemmel
Steve Wratten
Helen RB Porter