

Ecosystem Services

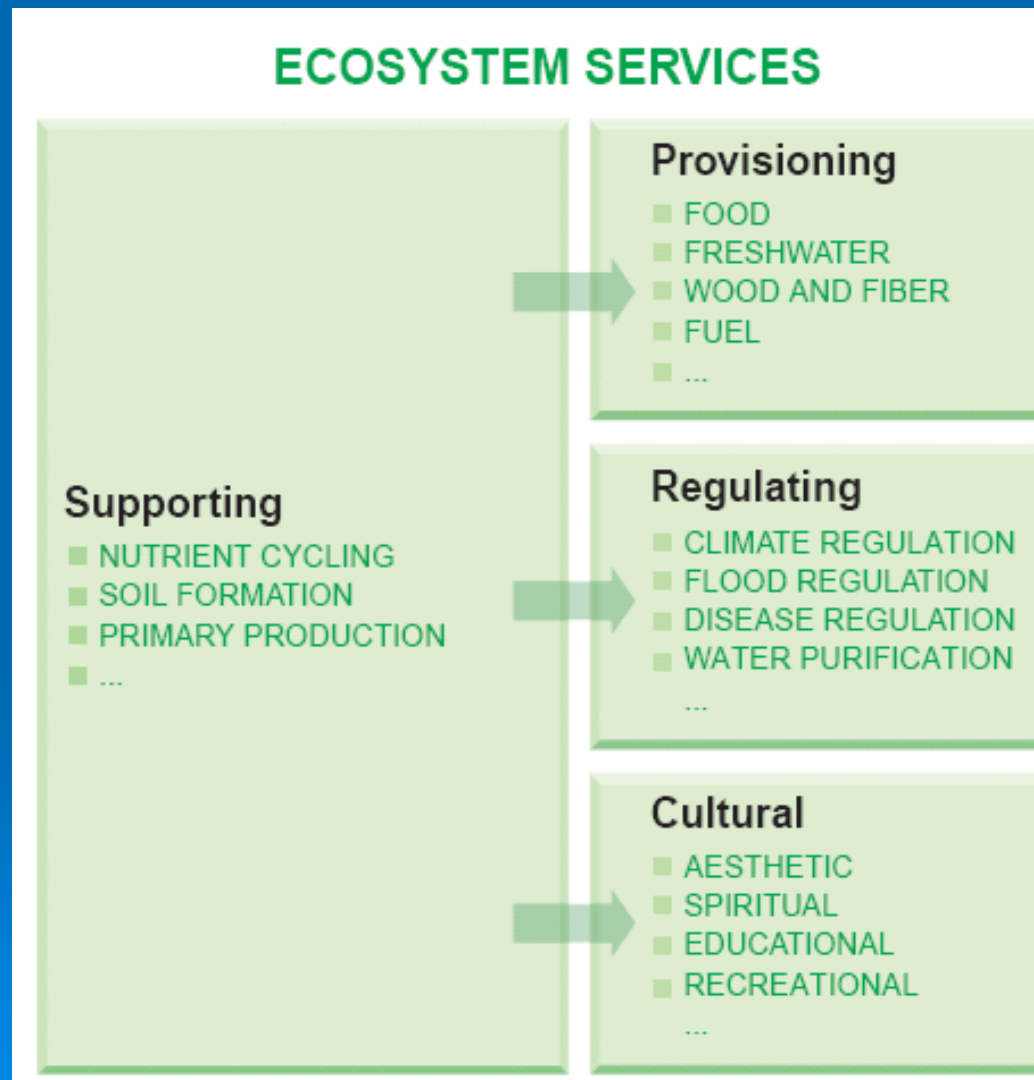
- Ecosystems have *functions*, and these functions provide many *services* that are valued by humans.
- 'Ecosystem Services' increasingly understood. Adopted by Millennium Ecosystem Assessment



ES useful because...

- ES - avoids false divisions into economic, social, environmental, cultural impacts of e.g. agriculture
- Agriculture can make use of, provide, degrade several of the ES
- *Avoiding damage to ES may be as valuable as producing ES*

Ecosystem Services: The benefits people obtain from ecosystems (Source, Millennium Ecosystem Assessment)



Value of ES

- We need to consider what the types of goods and services are
- How they benefit society
- And how they can be valued



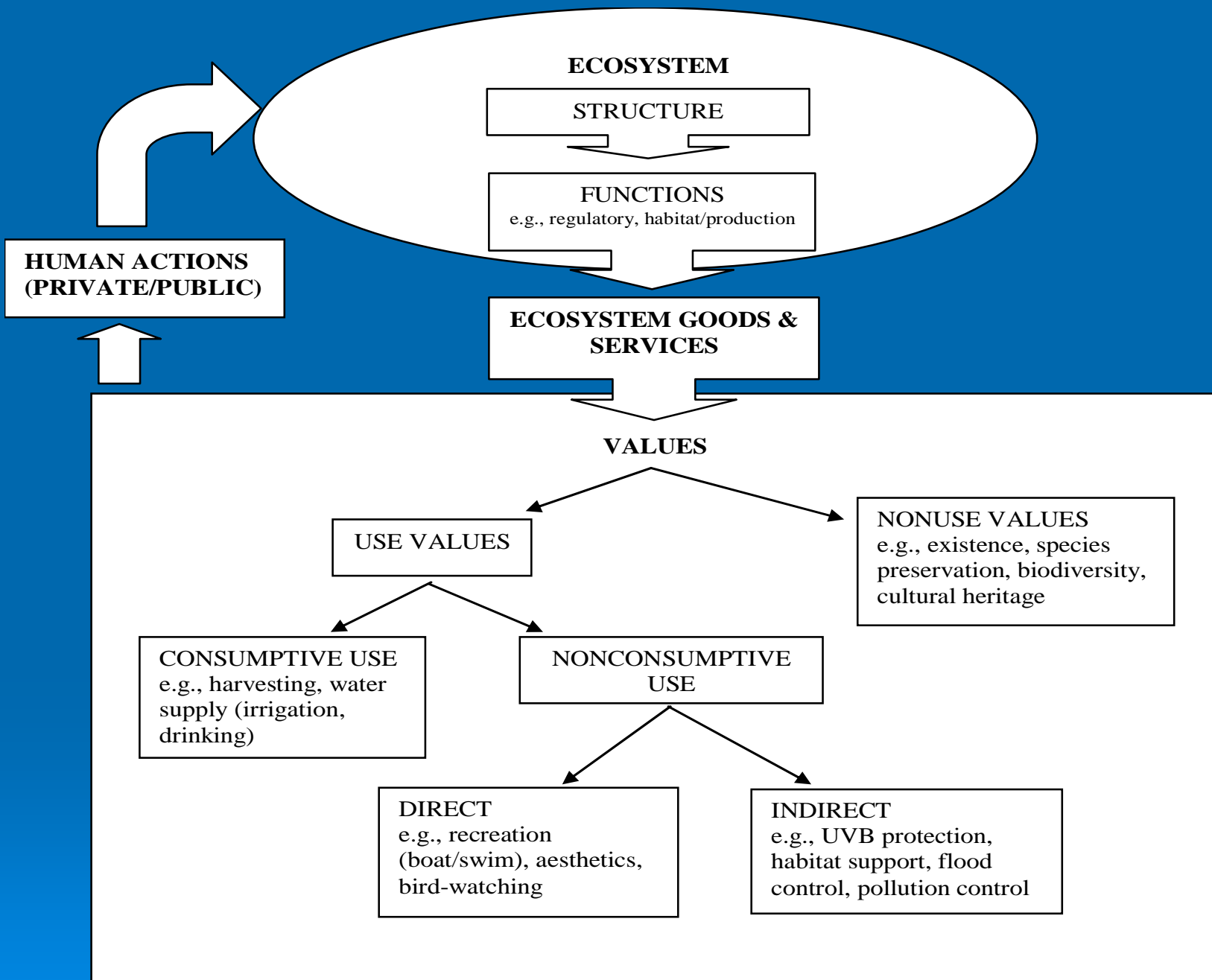



Figure 1: Connections between ecosystem structure and function, services, policies, and values.

Example of ecological functions of wetlands, economic goods and services, types of value, and applicable valuation methods

Ecological function	Economic goods & services	Value type	Commonly used valuation methods
Groundwater discharge	Water supply	Indirect use	Production fn, Replacement cost
Water quality maintenance	Improved water quality	Indirect use	CVM, CM
Biological diversity	Appreciation of species existence	Non-use	CVM, CM
Carbon sequestration	Reduced global warming	Indirect use	Replacement cost
Habitat and nursery for plant and animal species	Recreational fishing, harvesting	Direct use	TCM, CVM, CM, Market prices

Tradeoffs and Decisions

- Nearly all public policy and resource management decisions imply *trade-offs* (i.e., more of one good/service but less of another)
 - Information is needed on *trade-offs* – value of what has been increased as well as value of what has been decreased
 - Decisions involve choices – these choices reflect how “valuable” the alternatives are
 - Important input into policy making
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Valuing Ecosystem Services

- Many ES are unpriced in markets.
- Markets are good at providing priced ES, weak at providing unpriced ES.
- If value of ES known, individuals, business, government, NFP are more likely to increase supply of ES via tax, regulation, voluntary effort.
- Quantifying and valuing tradeoffs between ES requires non-market valuation research.
- LINX0303 has completed NMV studies of ES in NZ arable, pastoral, horticulture

Attributes used in Dairying Choice Models

1. Methane emissions
 - Current, 10% and 30% reduction in level
2. Nitrate leaching to waterways
 - Current, 10% and 30% reduction in level
3. Water usage for irrigation
 - Current, 10% and 30% reduction in level
4. Scenic Views
 - Current and 30% increase in trees, hedges
5. Cost to household per year for next 5 years
 - NZ\$0, \$30, \$60, \$100

Annual mean WTP (NZ\$) per household for the attributes

Attribute	MLEC	Income < \$40,000	Income \$40 – 70,000	Income >\$70,000	Weighted WTP
ME10	8.72 (-3 – 19)	5.29	4.69	7.73	4.70
ME30	15.85 (-6 – 34)	9.62	16.69	26.09	10.66
NL10	22.67 (3 – 39)	14.15	14.66	22.15	13.02
NL30	31.82 (4 – 54)	19.87	19.14	28.92	17.90
WU10	20.54 (-3 – 40)	12.64	10.86	16.67	11.06
WU30	26.93 (-8 – 56)	16.44	15.73	24.29	14.82
SV	16.34 (-6 – 35)	9.92	8.85	13.72	8.78