

Towards improving ecosystem service valuation: macroeconomic, microeconomic, and dynamic considerations

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Long-term objective,
make ecosystem service valuation more:

- accurate
- consistent
- tractable
- policy relevant

Macroeconomic consideration: income as an upper bound on ES value

If: economic value = willingness to pay
or opportunity cost = what one is willing to give up to get something

Then: total value \leq total income
total ecosystem service value $<$ total income

Macroeconomic consideration: income as an upper bound on ES value

$$\text{GDP} = \text{sum of market value added} = \text{sum of income}$$

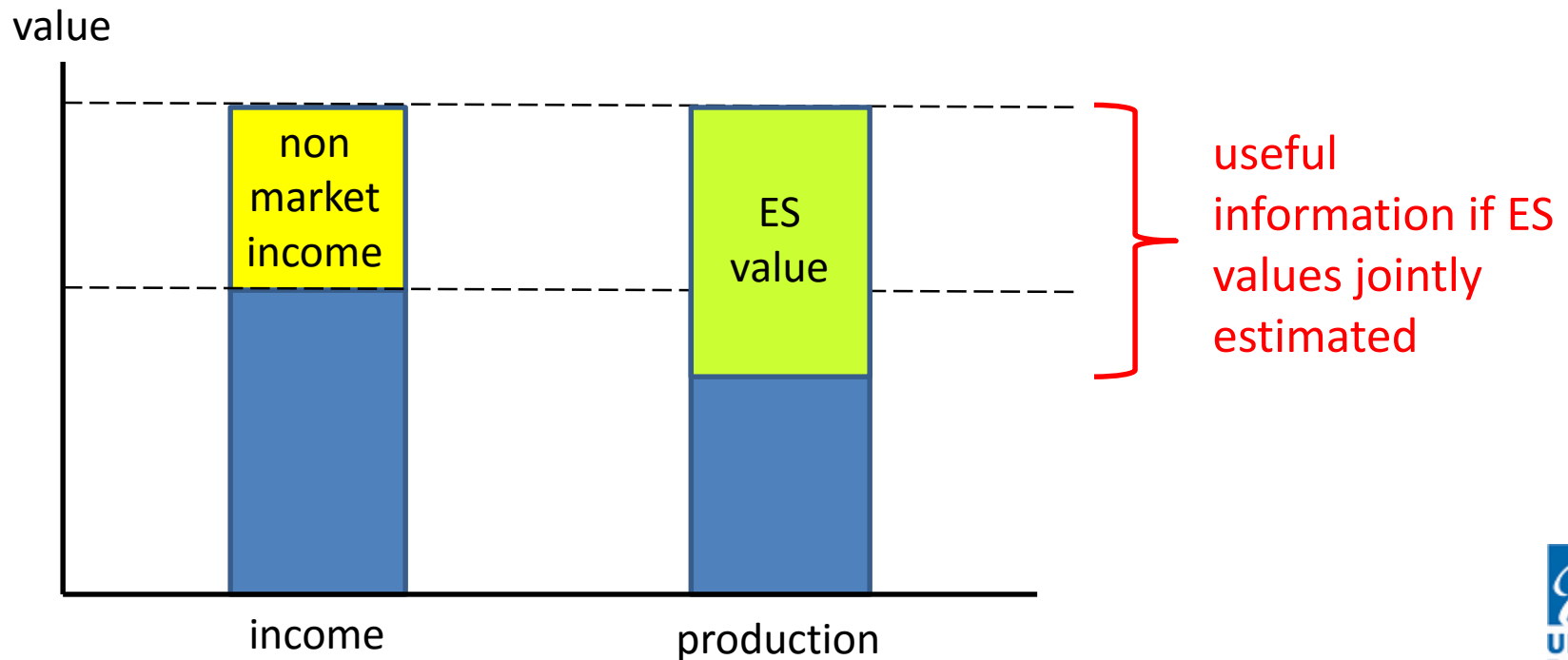
$$\begin{array}{l} \text{sum of market value added,} \\ \text{nonecosystem services} \end{array} + \begin{array}{l} \text{sum of market value added,} \\ \text{ecosystem services} \end{array} = \text{sum of income}$$

$$\begin{array}{l} \text{sum of market value added,} \\ \text{non-ecosystem services} \end{array} + \begin{array}{l} \text{sum of market value added,} \\ \text{ecosystem services} \end{array} + \begin{array}{l} \text{sum of nonmarket} \\ \text{value of goods and} \\ \text{services} \end{array} = \begin{array}{l} \text{sum of market} \\ \text{income} \end{array} + \begin{array}{l} \text{sum of nonmarket} \\ \text{income} \end{array}$$

Macroeconomic consideration: income as an upper bound on ES value

If: economic value = willingness to pay \leq ability to pay = income
or opportunity cost = what one is willing to give up to get something

Then: total value = total income
total ecosystem service value $<$ total income



Microeconomic consideration: marginal ES values may be low (should be low?)

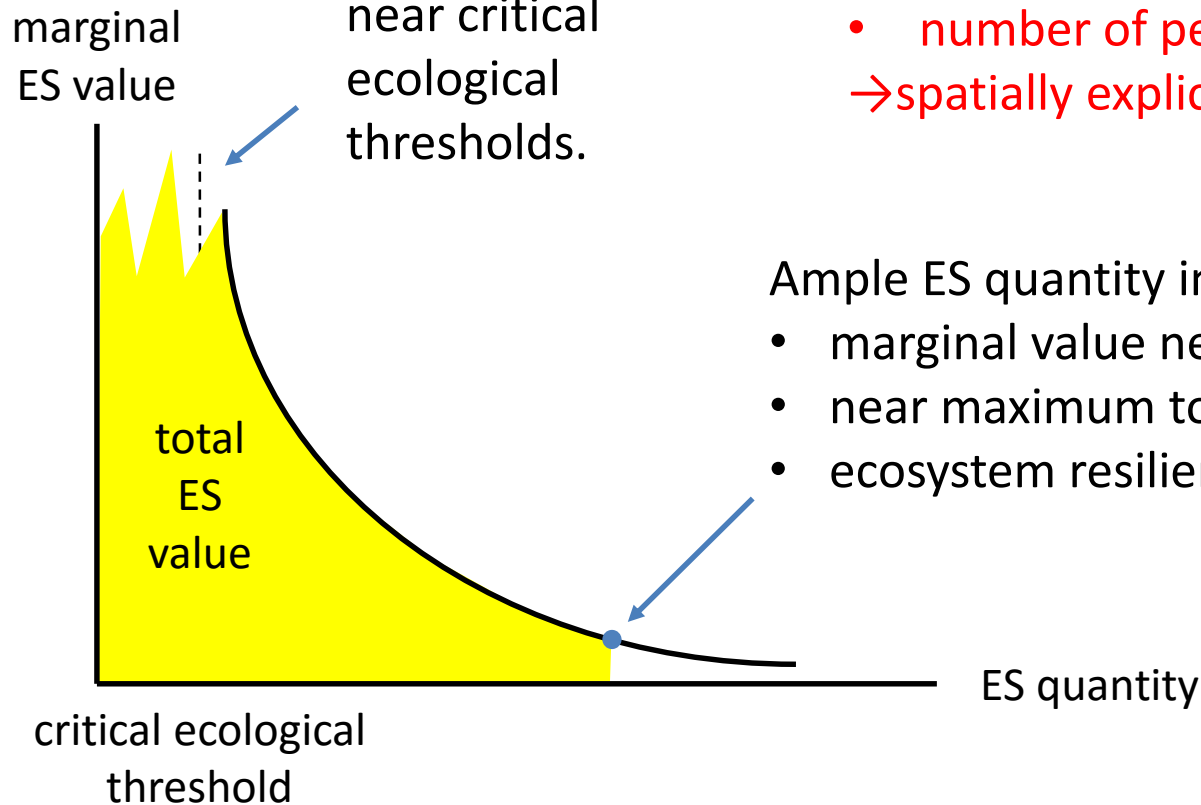
Marginal values depend on:

- amount of ES already provided
 - proximity to substitute ES
 - number of people using ES
- spatially explicit model needed

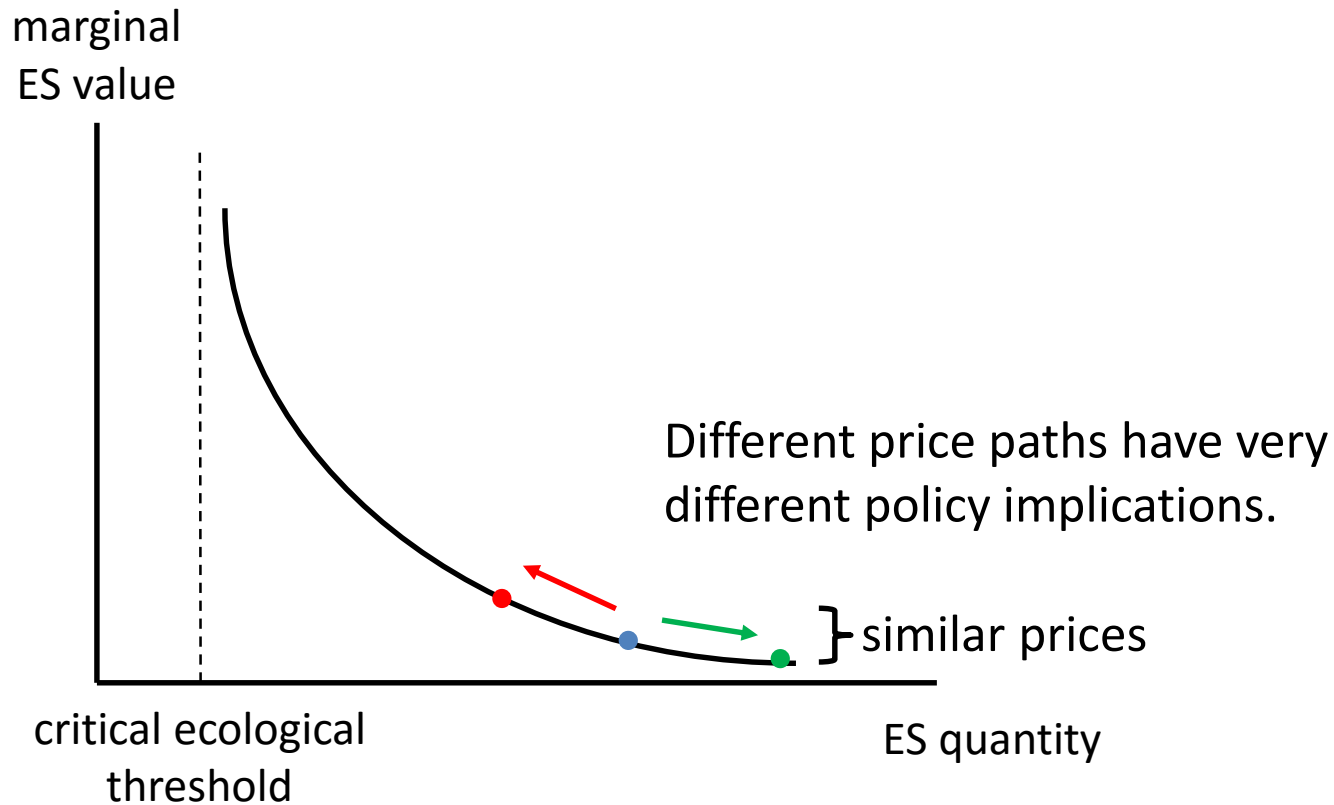
Marginal values approach infinity near critical ecological thresholds.

Ample ES quantity implies:

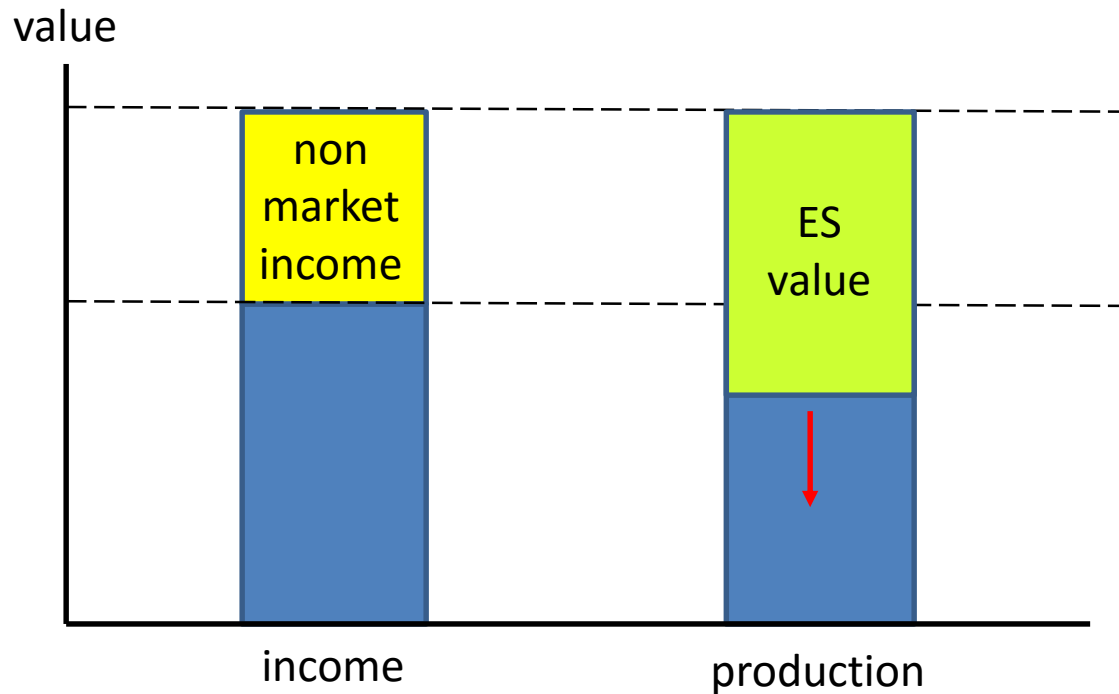
- marginal value near zero
- near maximum total value
- ecosystem resilience



Dynamic consideration: ES price paths over time are critical



Dynamic consideration:
ES price paths over time are critical

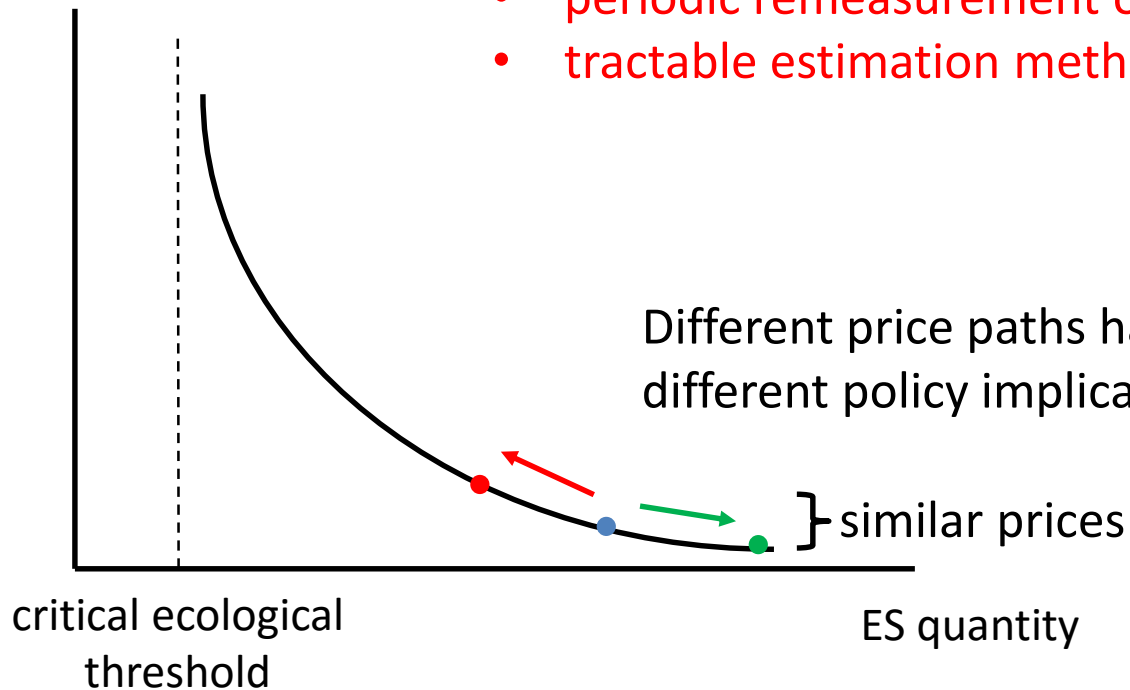


Dynamic consideration: ES price paths over time are critical

marginal
ES value

Price path estimate requires:

- periodic remeasurement of ES values
- tractable estimation method



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Some Possible Criteria for ES Valuation Studies:

- estimate ceiling on total ES value
- jointly estimate all ES values
- expect (and embrace) near-zero marginal ES values
- track ES values over time

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