

Valuation Discussion: Motivation, Concepts and Methods

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“Almost all economists are intellectually committed to the idea that things people want can be valued in dollars and cents...

Most environmentalists not only disagree with this idea, they find it morally deplorable...

Yet, the fact remains that difficult choices must be made.”

(Economist, 2002)

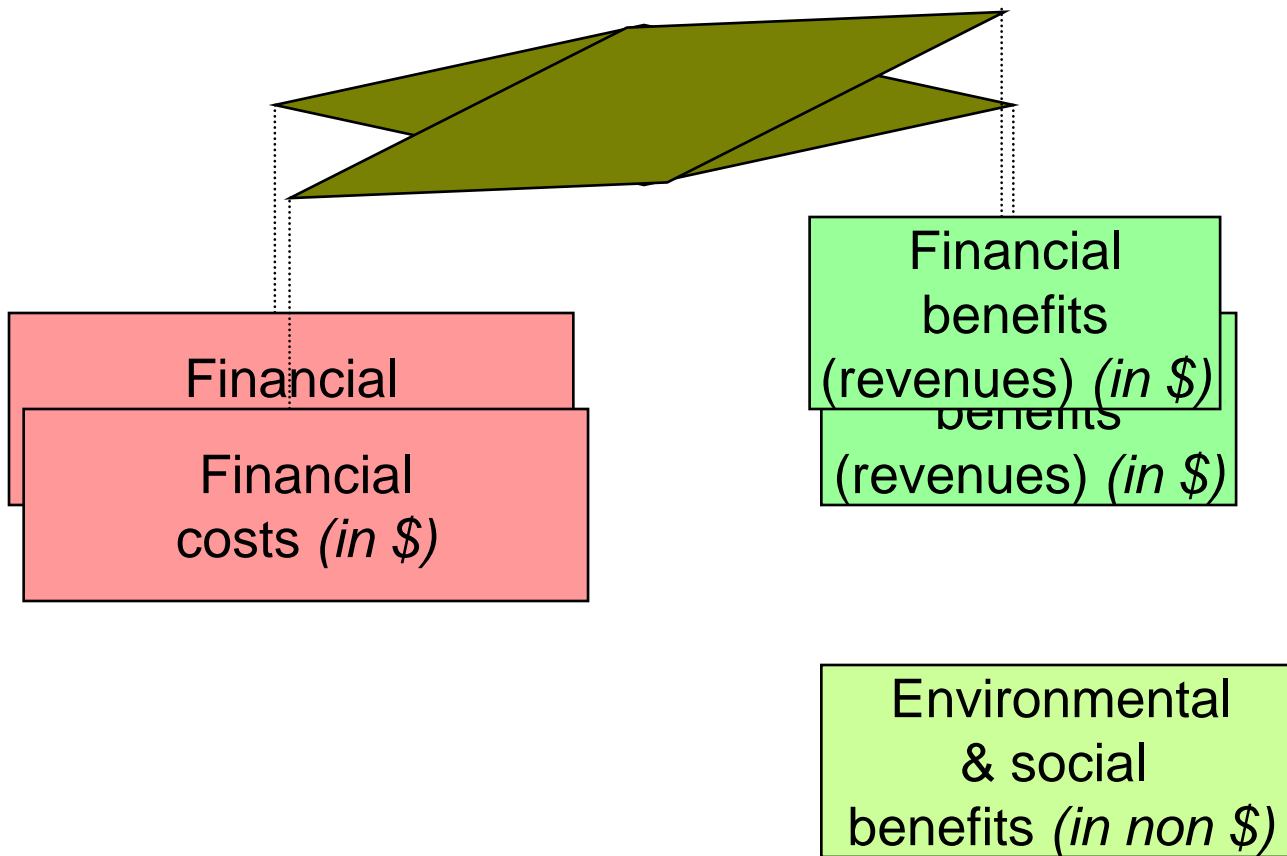


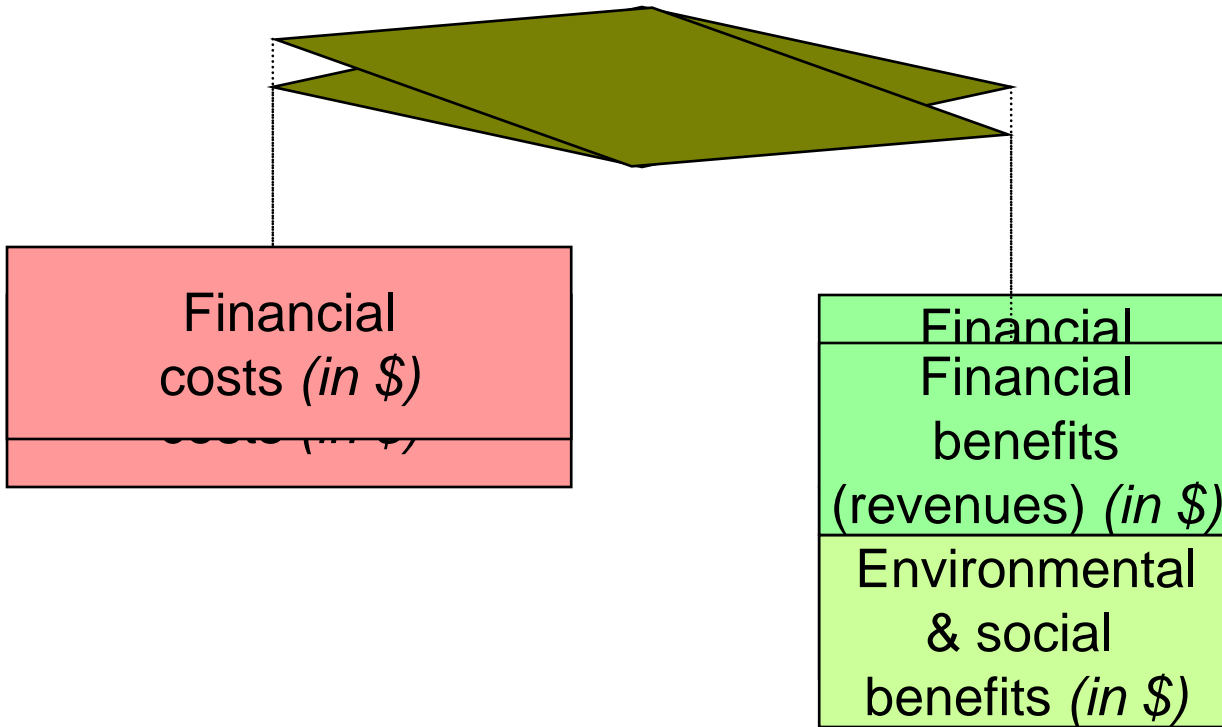
Moratorium on dredging in RMI



Source: McKenzie et al. 2006

Damage costs of near-shore dredging in terms of coastal protection losses were estimated at US\$52 per m³. This was much higher than the US\$36 per m³ off-shore.





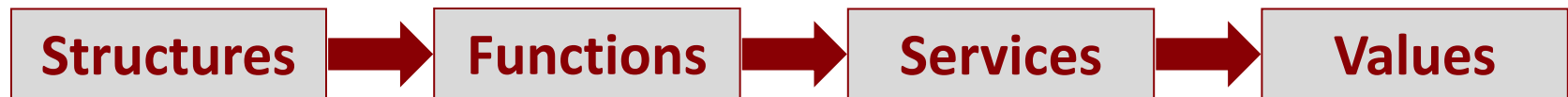
Limited Budgets; Unlimited Wants

- Demonstrate value of nature
- Increase transparency & accountability with understanding of tradeoffs
- Inform economic instruments that create incentives & sources of finance



Value of ecosystem services

- In economics, value is defined as welfare (wellbeing).
‡ price
- Value of ecosystem services depends on human welfare derived from nature.



- Welfare is traditionally measured in terms of currency
- The substitution between money and the quantity/quality of ecosystem services can be expressed as **willingness to pay (WTP)** or **willingness to accept (WTA)** compensation

Categories of Ecosystem Services

(Millennium Ecosystem Assessment)

Provisioning Services

- Food
- Fresh water
- Wood and fiber
- Fuel
- ...

Regulating Services

- Climate regulation
- Flood regulation
- Disease regulation
- Water regulation
- ...

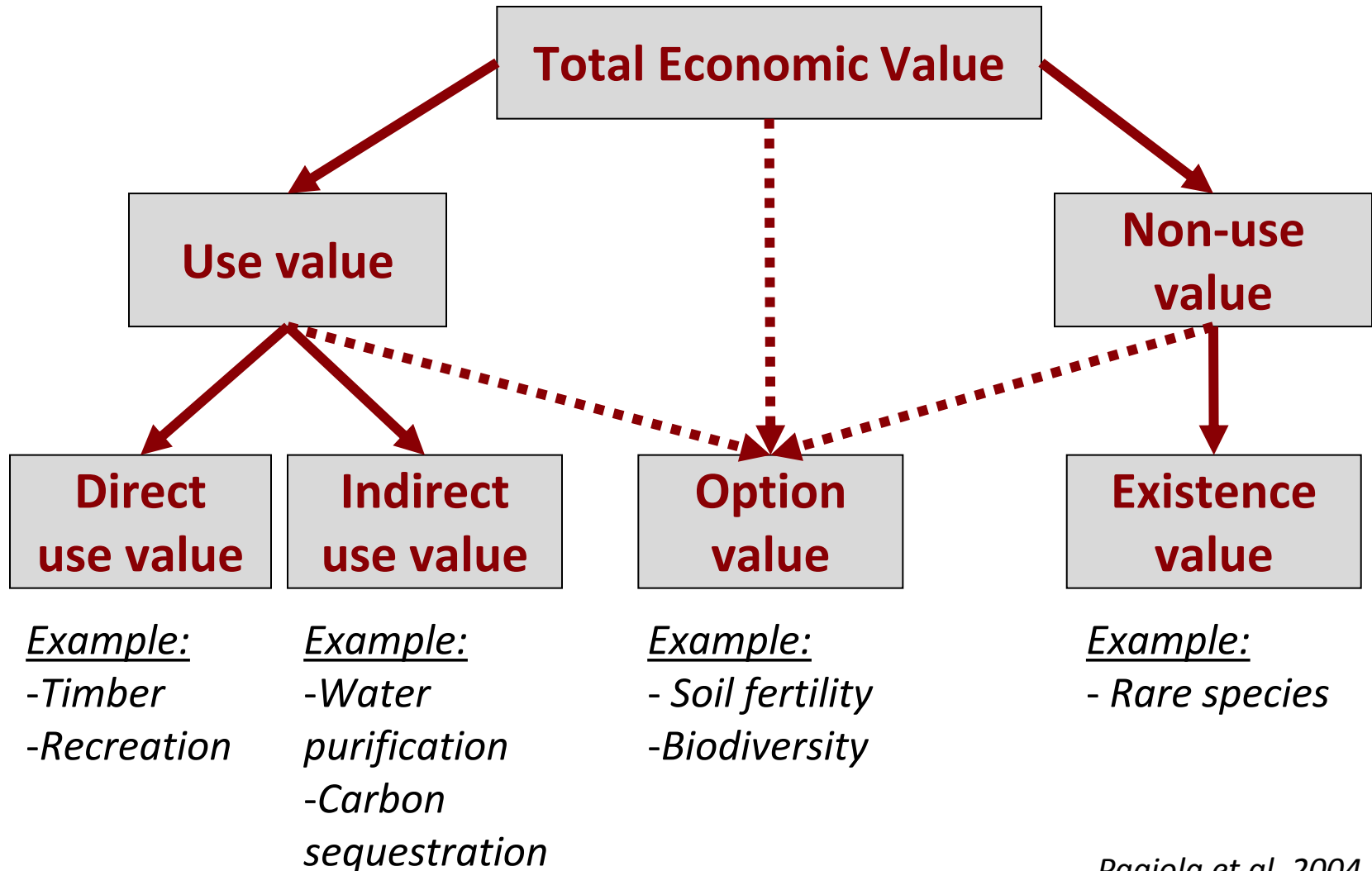
Cultural Services

- Aesthetic
- Spiritual
- Educational
- Recreational
- ...

Supporting Services

- Nutrient cycling
- Water cycling
- Soil formation
- Provision of habitat
- Primary production
- ...

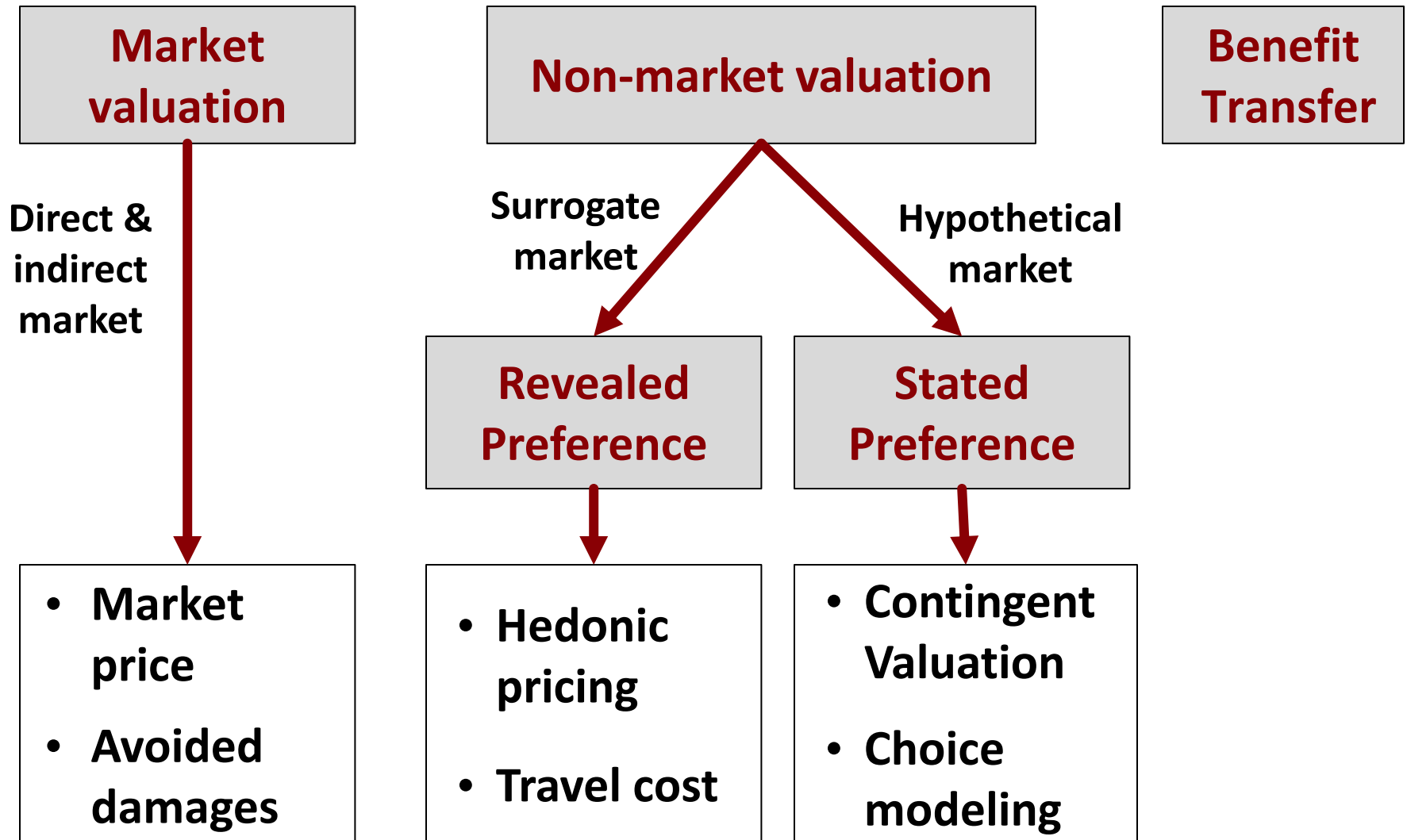
Total economic value



Value → Valuation

Service Type	Value Type	Valuation Method
Provisioning	Direct use	Market valuation
Regulating	Indirect use	Market and non-market valuation
Cultural	Direct use, Existence	Non-market valuation
Supporting	Option value, Existence	Non-Market valuation

Valuation methods



Market valuation

- Valuation using conventional good/service prices
- In a competitive market, the market price depicts the marginal benefit of a good/service
- Net benefit can be calculated by combining price with quantity and cost estimates
- **Market price method**
 - Actual prices of goods/services
- **Avoided damages method**
 - Costs incurred in the absence of the service
 - Market prices of equivalent non-ecosystem services

Non-market valuation

- **Revealed-preference methods:** use observed behavior to identify value in a surrogate market
 - **Hedonic pricing method (Land market)**
Influence of environmental/ecosystem attributes on property value
 - **Travel cost method (Tourism market)**
Costs of recreational visits as proxy of economic use values associated with ecosystems or sites

Non-market valuation

- **Stated-preference methods:** use reported choices to estimate value in a hypothetical market
 - **Contingent valuation**

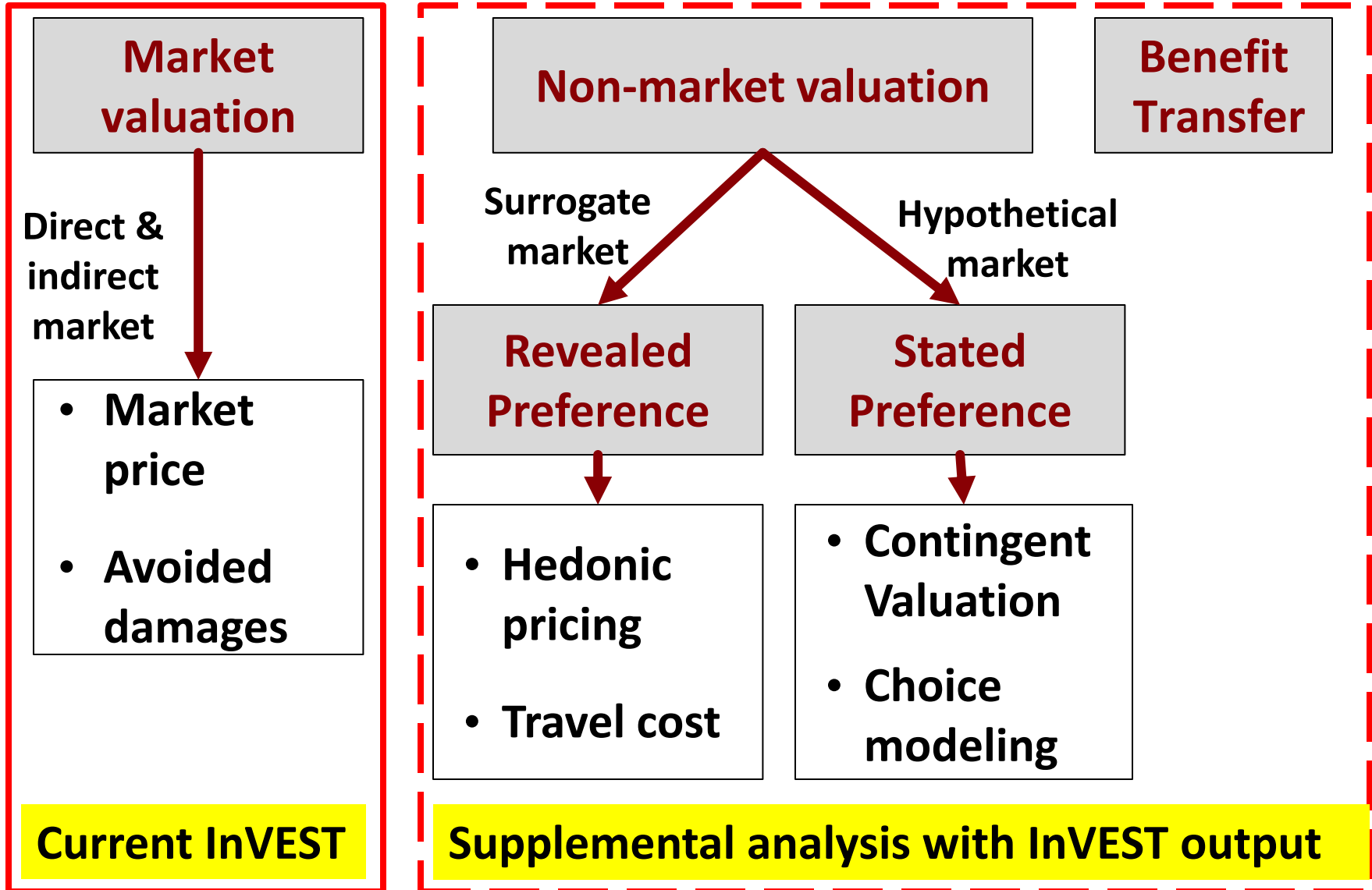
Ask respondents to express their willingness to pay (WTP) or willingness to accept (WTA) compensation for changes in ecosystem services
 - **Choice modeling**

Ask respondents to rank/rate/choose alternative choice sets which have different combination of price attribute and ecosystem attributes

Benefit Transfer

- With resource or time constraints, novel analysis may be impossible
- Benefits transfer uses existing studies to inform valuation efforts
- Spatial variability demands careful application of this approach
 - biophysical attributes (climate, quality, size...)
 - socio-economic attributes (management, disturbance...)

Valuation methods in InVEST



Market valuation

Direct & indirect market

- Market price
- Avoided damages

Current InVEST

Non-market valuation

Benefit Transfer

Surrogate market

Hypothetical market

Revealed Preference

Stated Preference

- Hedonic pricing
- Travel cost

- Contingent Valuation
- Choice modeling

Supplemental analysis with InVEST output

Valuation methods in InVEST

Method	ES classification	InVEST model
Market Price	Provisioning	Fish Aquaculture Managed Timber Production Wave Energy Reservoir Hydropower Production Agricultural Production Non-timber Forest Product Production
	Regulating	Carbon Sequestration Crop Pollination Water for Irrigation
Avoided Damages	Regulating	Water Purification: Nutrient Retention Sediment Retention Carbon Sequestration Storm Peak Mitigation
Travel Cost	Cultural/Aesthetic	Recreation/Aesthetic

Net Present Value (NPV)

- The Net Present Value (*NPV*) of an ecosystem service is the present value of the expected net benefit flows over time.

$$NPV = \sum_{i=0}^{T-1} \frac{Benefit_i - cost_i}{(1+r)^i}$$

Number of years present landscape conditions are expected to persist, or total years the service is valued for.

Discount rate (0%~100%):
Weight of present benefits versus future benefits
Larger **r** → more weight on present

Limitations

- Limitations of economic valuation
 - Revealing preferences (partial, indirect, subjective)
 - Aggregating individual preferences (conflicts, relative weight)
 - Addressing uncertainty (in science, in methods)
 - Setting the discount rate (present vs. future)
 - Capturing full value (TEV not often achieved)
- InVEST tends to provide rapid and conservative economic valuation, which is better used for comparison among scenarios to assist decision-making
- Validated value estimates are more reliable in terms of magnitude

Discussion Questions

1. Technical questions about valuation?
2. What are you hoping to achieve / have you achieved using valuation?
3. When do you think monetary values help?
4. What is your biggest concern about valuation?
5. What improvement would you like to see in the valuation models of InVEST?