Training Session on Economic Valuation – Session 3 Subsession 3 „Selecting the method to use: Overview of the most important valuation methodologies"

Training on the systematic integration of economic valuation of "wet" ecosystem services into the TDA/SAP process

Context

- In Section III.2.5 and Annex II of the Tier 2 Guidance Document, a set of nine valuation methodologies is presented.

- These represent the most important and most common valuation techniques.

Selection of valuation methods based on: selected ES & the TEV-category

Type of Ecosystem Service (TEEB)	Ecosystem Service	Category (TEV): (direct/indirect; use value/non-use value)	Methodology to be used for economic evaluation see fiches in Annex II)
Provisioning Services	Food	Direct Use	Market prices, production function approach, cost of alternatives/substitute goods
	-Fish/Seafood		
	-Cultured Products/Aquaculture		
	Other Food Products		
	Genetic Resources	Direct Use	
	Medicinal Resources	Direct Use	
	Fiber, timber, fuel	Direct Use	
	Water (drinking, irrigation, cooling)	Direct Use	
Regulating Services	Air quality regulation (e.g. capturing dust)	Indirect Use	Hedonic pricing, replacement cost
	Climate Regulation (Carbon Sequestration)	Indirect Use	Damage costs avoided, market prices, replacement cost method
	Moderation of extreme Events (e.g. floods, storms)	Indirect Use	Replacement cost method, damage cost avoided
	Water treatment	Indirect Use	Replacement cost method
	Erosion Prevention	Indirect Use	Replacement cost method, damage cost avoided
	Nutrient Cycling and maintenance of soil fertility	Indirect Use	Replacement cost method, damage cost avoided
Habitat Services	Maintenance of life cycles of migratory species (including nursery service for commercially valuable fish species)	Indirect Use	Production function approach, Contingent valuation
	Maintenance of genetic diversity (gene pool protection)	Indirect Use	
Cultural Services	Opportunities for Tourism/Recreation	Direct Use	Contingent valuation (CV), travel cost method, choice modelling/experiments
	Aesthetic Information, Inspiration, Spiritual Experience and Education	Non-use	

Context

Annex II – the "Toolbox" – provides for each methodology:

- Brief description

- ES that can be valued by the method.

- Elements of TEV captured.

- Main application/uses and advantages.

- **A step-by-step application/implementation.**

- Main challenges and limitations.

- Use in combination with other methods/possible conflicts-synergies.

Context

- Finally, since the tier 2 guidance needs to be "generally applicable" – i.e. it cannot answer all questions that will come up: a set of further sources/literature is provided as well.

EV methodologies

The methods are classified into:

a. Revealed Preference methods

→Market price assessment (1), production function approach (2), hedonic pricing (3) and the travel cost method (4).

b. Stated Preference methods

→Contingent valuation (6), choice modelling/choice experiments (7).

c. Cost-based approaches

→Replacement cost method (8), damage cost avoided (8).

d. Methods of eliciting non-economic values (9)

→Overview of Participatory Valuation methods.

• The benefit transfer method: not summarized in a fiche, since important part of the tier 1 guidance

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Economic valuation methods: Market prices[1]

Money paid for ecosystem services that are traded in commercial markets, e.g., timber, fish:

Market prices:
the money value of forest products such as timber can be observed directly in markets.

Source: Van Beukering, 2011[1]

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Economic valuation methods: Market prices

Market prices pros:

• Easy to grasp and communicate

• Mostly good data situation

• Quick and relatively easy to conduct

Market prices cons:

• Limited application (few ES)

• Market distortions (subsidies, different costs etc.)

Economic valuation methods: Production function

- Infers value by considering the changes in quality and/or quantity of a marketed good that result from an ecosystem change (e.g. changes in fishermen's income resulting from improvements in coral reefs' health).

- ES are seen as inputs into a production process.

- Estimate impact on productivity with a change in the service input.

- Any impact that affects produced goods (e.g. declines in soil quality affecting agricultural production).

Economic valuation methods: Production function

Production function pros:

- Market data readily available and robust.

Production function cons:

- Data-intensive.

- Technically difficult.

- High scientific uncertainty regarding knowledge about ecosystems' functioning and biophysical relationships.
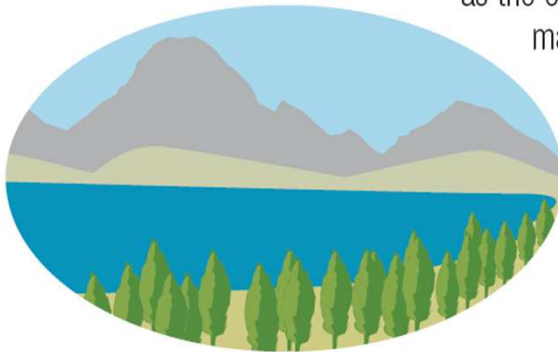

Source: CIAT, 2016[2]

Economic valuation methods: Replacement costs

- Estimate cost of replacing ecosystem service with manmade equivalent.

Replacement cost:
the value of a natural reservoir can be estimated as the cost of replacing it with a man-made reservoir.

Natural

Man-made

Source: Van Beukering, 2011[3]

Economic valuation methods: Replacement costs

Replacement cost pros:

• Simple statistical analysis.

Replacement cost cons:

• Often under-estimates value, as man-made equivalents generally don't provide same benefits as ecosystems.

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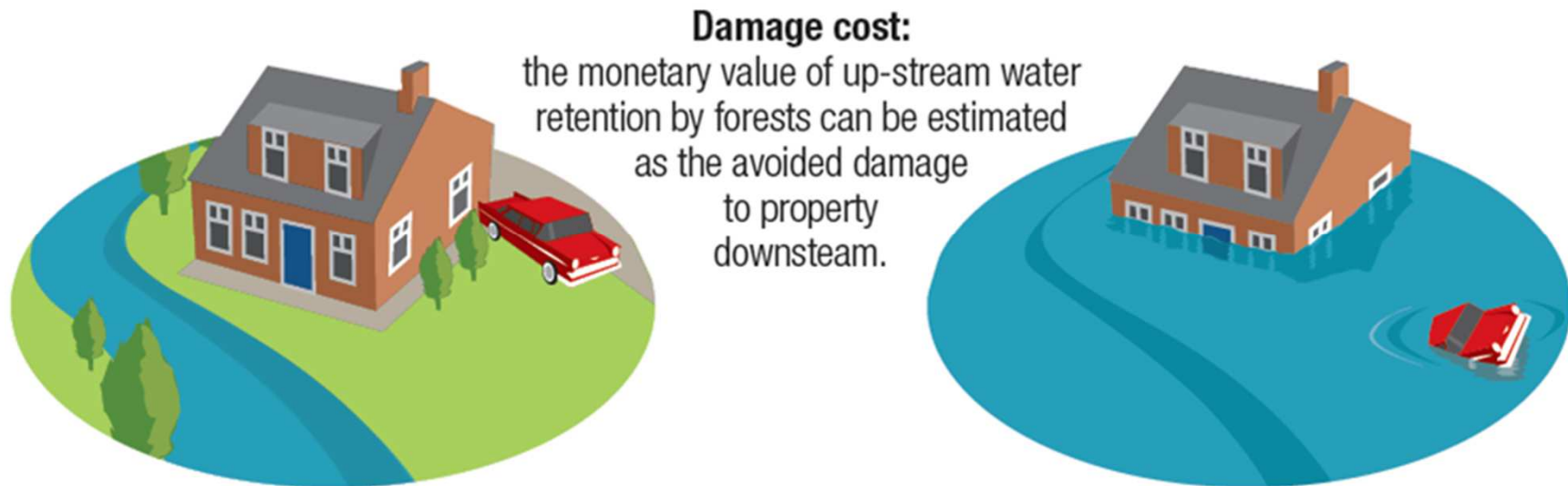INDUSTRY, INNOVATION AND INFRASTRUCTURE

Economic valuation methods: Damage costs avoided

- Estimates damage avoided due to an ES.

- E.g. estimation of the flooding damage cost as the value of a wetland´s or mangroves´ "extreme events regulation" service.

- Can be applied where ES can be replaced or restored by market goods or damage loss can be estimated with market information.

Economic valuation methods: Damage costs avoided

Damage cost:
the monetary value of up-stream water retention by forests can be estimated as the avoided damage to property downsteam.

Source: Van Beukering, 2011[4]

Economic valuation methods: Damage costs avoided

Damage costs avoided pros:

• Simple statistical analysis.

• Market data readily available and robust.

Damage costs avoided cons:

• Difficult to relate damage levels to ecosystem quality.

Economic valuation methods: Hedonic pricing

- Value of environmental amenities (air quality, scenic beauty, cultural benefits, etc.) that affect prices of marketed goods, mostly housing.

- Price of a good reflects a combination of all its attributes, including ES.

Economic valuation methods: Hedonic pricing

Source: Van Beukering, 2011[5]

Economic valuation methods: Hedonic pricing

Hedonic pricing pros:

• Based on market data, so relatively robust figures.

Hedonic pricing cons:

• Very data-intensive and limited mainly to property-related services.

• Complex statistical analysis.

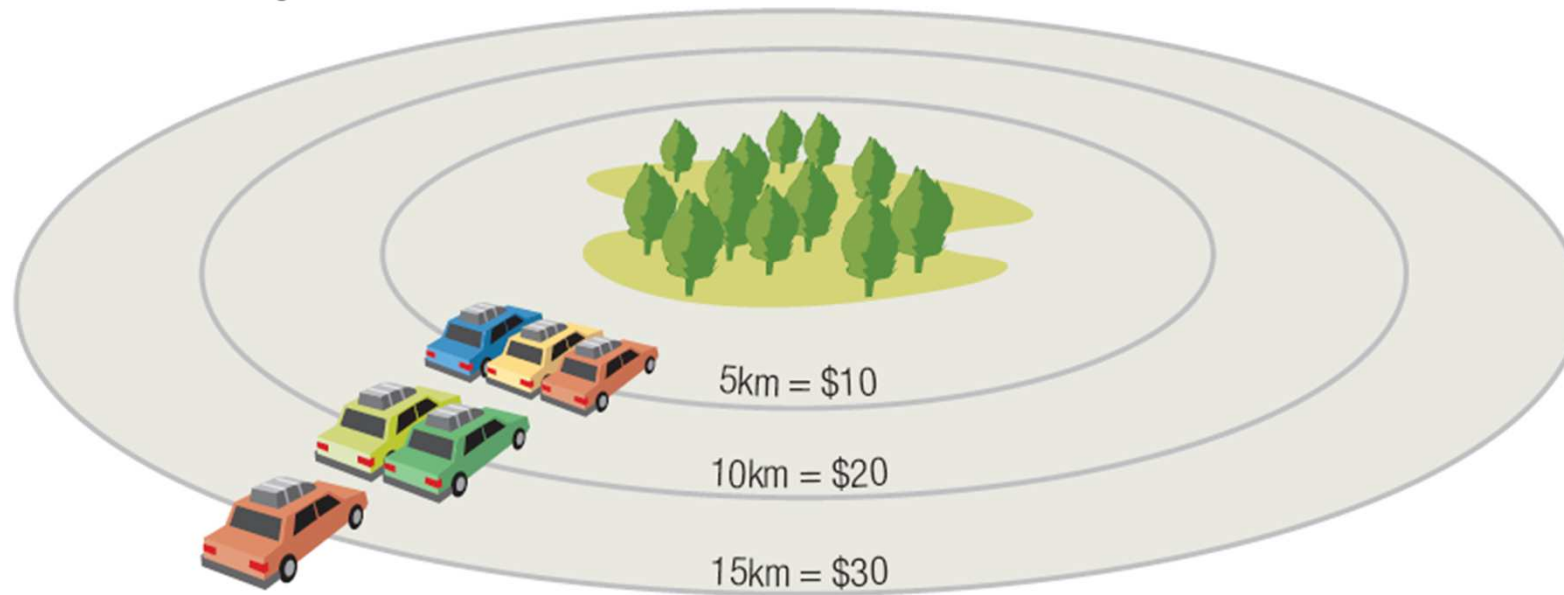# Economic valuation methods: Travel costs

- It assumes that the value of a site is reflected in how much people are willing to pay to travel to visit the site.

- Costs considered are travel expenditures, entrance fees, and the value of time.

Economic valuation methods: Travel costs

Travel cost: the value of a recreational site can be estimated from the number of visitors and the cost of travelling there

5km = $10

10km = $20

15km = $30

Source: Van Beukering, 2011[6]

Economic valuation methods: Travel costs

Travel costs pros:

• Based on actual/observed behavior.

• Relatively inexpensive.

Travel costs cons:

• Generally limited to recreational benefits

• Technically rather difficult, complex statistical analysis required

• High data requirements

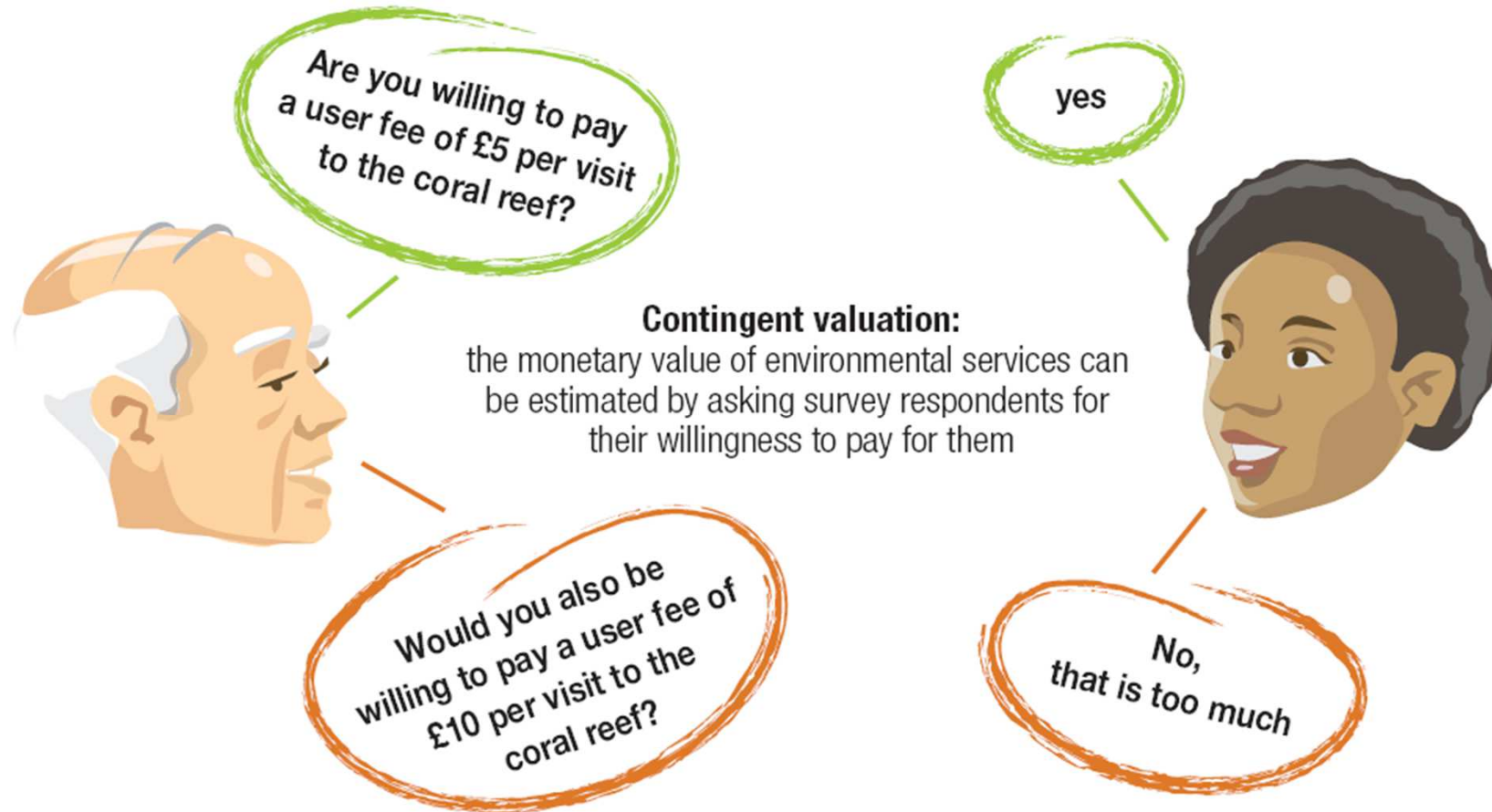• Difficulties arise when trips are made to multiple destinations

Economic valuation methods: Contingent valuation

- Involves directly asking people how much they would be willing to pay to prevent loss of, or enhance an ES (e.g. willingness to pay to keep a local mangrove forest intact).

- Willingness-to-pay (WTP) or willingness-to-accept (WTA).

Source: Van Beukering, 2011[7]

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Economic valuation methods: Contingent valuation

Contingent valuation pros:

• Able to capture use and non-use values

• Flexible

Contingent valuation cons:

• Complex statistical analysis.

• Bias in responses, resource-intensive method.

• Hypothetical nature of the market.

• Can be very expensive and time-consuming, because of the extensive pre-testing and survey work.

Question X: Options A, B and C.
Please choose the option you prefer most by ticking ONE box.

Fifteen-year effects

How much I pay each year	Healthy vegetation left in floodplains	Kilometres of waterways in good health	Protection of Aboriginal Cultural sites	Unallocated water	I would choose
Option A					
$0	20%	1500	25%	0%	☐
Option B					
$20	30%	1800	35%	5%	☐
Option C					
$50	40%	2100	45%	10%	☐

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Economic valuation methods: Choice modelling/choice experiments

Choice modelling/choice experiments pros:

- Able to capture use and non-use values

Choice modelling/choice experiments cons:

- Complex statistical analysis.

- Bias in responses, resource-intensive method.

- Hypothetical nature of the market.

- Analysis of the data generated is complex.

Economic valuation methods: Benefit Transfer

- Transferring a value from studies already completed in another location and/or context
- Identify ecosystem services to be valued
- Identify existing "original valuation studies" of the ES
- Assess transferability (socio-economics, demographics)
- Adjust values of existing original valuations based on:
    - Differences in population
    - Differences in site characteristics
    - Inflation, exchange rates etc.

Economic valuation methods: Benefit Transfer

Benefit transfer pros:

- Less costly, less time consuming => can be done as part of IW project
- Easily applicable to obtain gross estimates

Benefit transfer cons:

- Less accurate, many assumptions and uncertainties
- Time consuming to find good original valuation studies
- Expertise/guidance necessary

Ideal for tier 1 projects, to obtain an approximation of the economic value of ecosystem services, or identify areas for in depth evaluation (tier 2)!

Questions ?

Discussion

- Do you have experience in applying such methods, what are your experiences?

- Which do you consider as main advantages and disadvantages of the presented methods?

Thank you!

For more information, please contact:

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Image/photo credits:

1. Source: Van Beukering, 2011

2. Climate-smart soils: testing soil health in Western Kenya; photo credit by CIAT, 2016 / Creative Commons Attribution 2.0 Generic | Flickr

3. Source: Van Beukering, 2011

4. Source: Van Beukering, 2011

5. Source: Van Beukering, 2011

6. Source: Van Beukering, 2011

7. Source: Van Beukering, 2011

8. CAP Net Training Materials