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The value of land and economic valuation methods

Dr Nicola Favretto n.favretto@leeds.ac.uk

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Learning goal and outline

LEARNING GOAL

- To understand the welfare-economic basis of monetary valuation of the environment and the main approaches to monetary valuation

OUTLINE

- What is the "**value of land**"?
  - **Theoretical framing**:
    - Defining **ecosystem services** and different **types of value**
    - What is the **Total Economic Value (TEV) framework**?
  - **Valuation methods**: how do we measure the TEV?

What is the "value of land"?

- Grounded on the concept of **Ecosystem Services (ES)**
  - Benefits that humans obtain from nature - through interaction of **natural, social, physical** and **human** capital

ES categories:

Provisioning: fresh water, food, fuel

Supporting: nutrient cycling, soil formation

Regulating: regulation of climate/flood, water purification

Cultural: aesthetic, educational, spiritual, recreational

- What is **value**: "**welfare utility**" (satisfy human needs) vs "**price**" of a good or service
  - Valuation encompasses two main principles of welfare economics: **preferences** and **money**

Why consider valuation?

- Give a **market value for non market goods (un-priced)** such as ecosystem services
- Valuation **captures tradeoffs** in a world of scarce resources and conflicting desires/interests

–> better resource management decisions

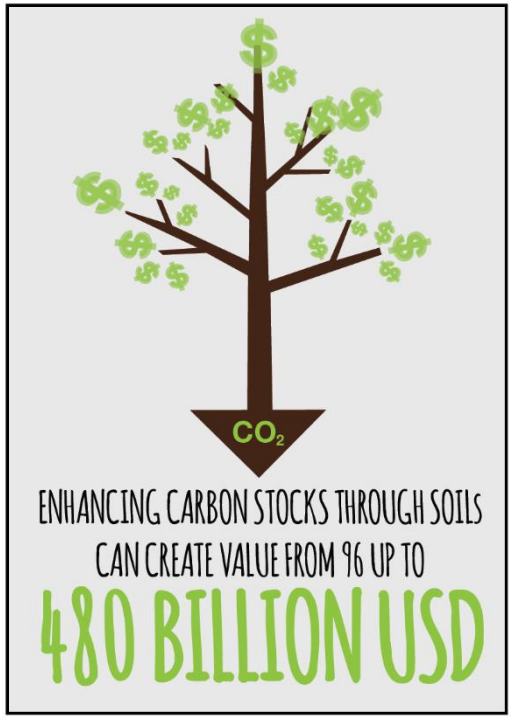
$ Fresh water

$ Recreation

$ Food

$ Carbon sequestration

$ Pollination



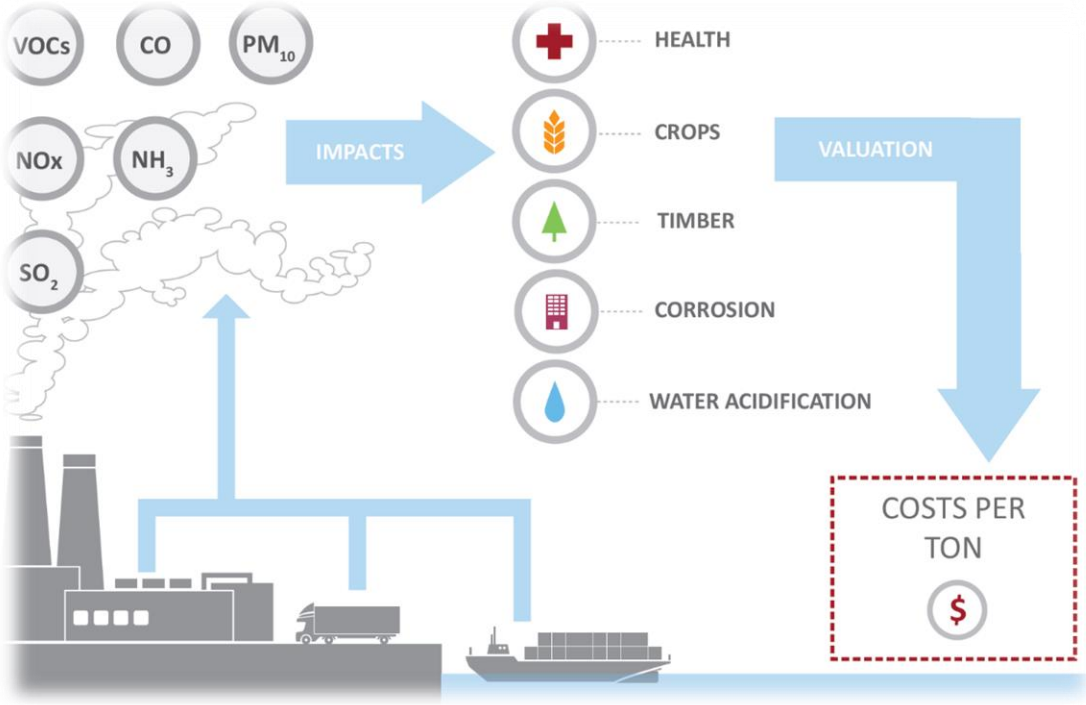
ES categories and examples of valuation

Provisioning services

- Estimation of soil erosion costs in relation to investment in erosion reduction

Regulating services

- Estimation of costs of pollution to set up payments for maintenance



Source: TRUCOST, 2013, p. 25

ES categories and examples of valuation

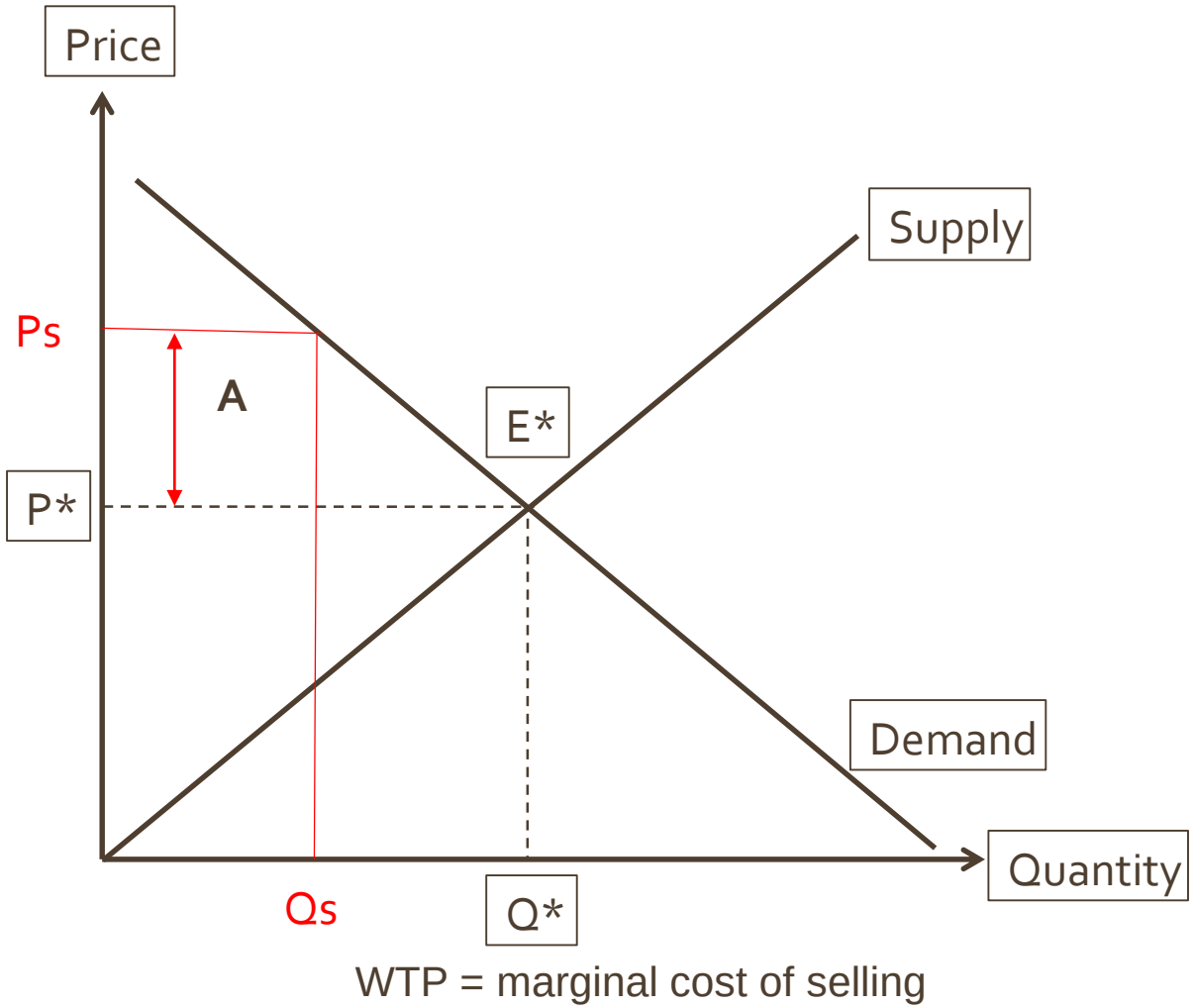
Cultural services

- Estimation of aesthetic and spiritual values to protect cultural/spiritual assets

Supporting services

- Difficult to value

Welfare economics & valuation



WTP = marginal cost of selling

- Society needs to choose the **mix of environmental service flows** that is consistent with the **highest possible** level of **human well-being**
- Monetary valuation derives demand curves for environmental services
- D depicts the sum of the individuals' willingness to pay for Qs of it
- Area A: **consumer surplus** (net benefit of a good to consumers)

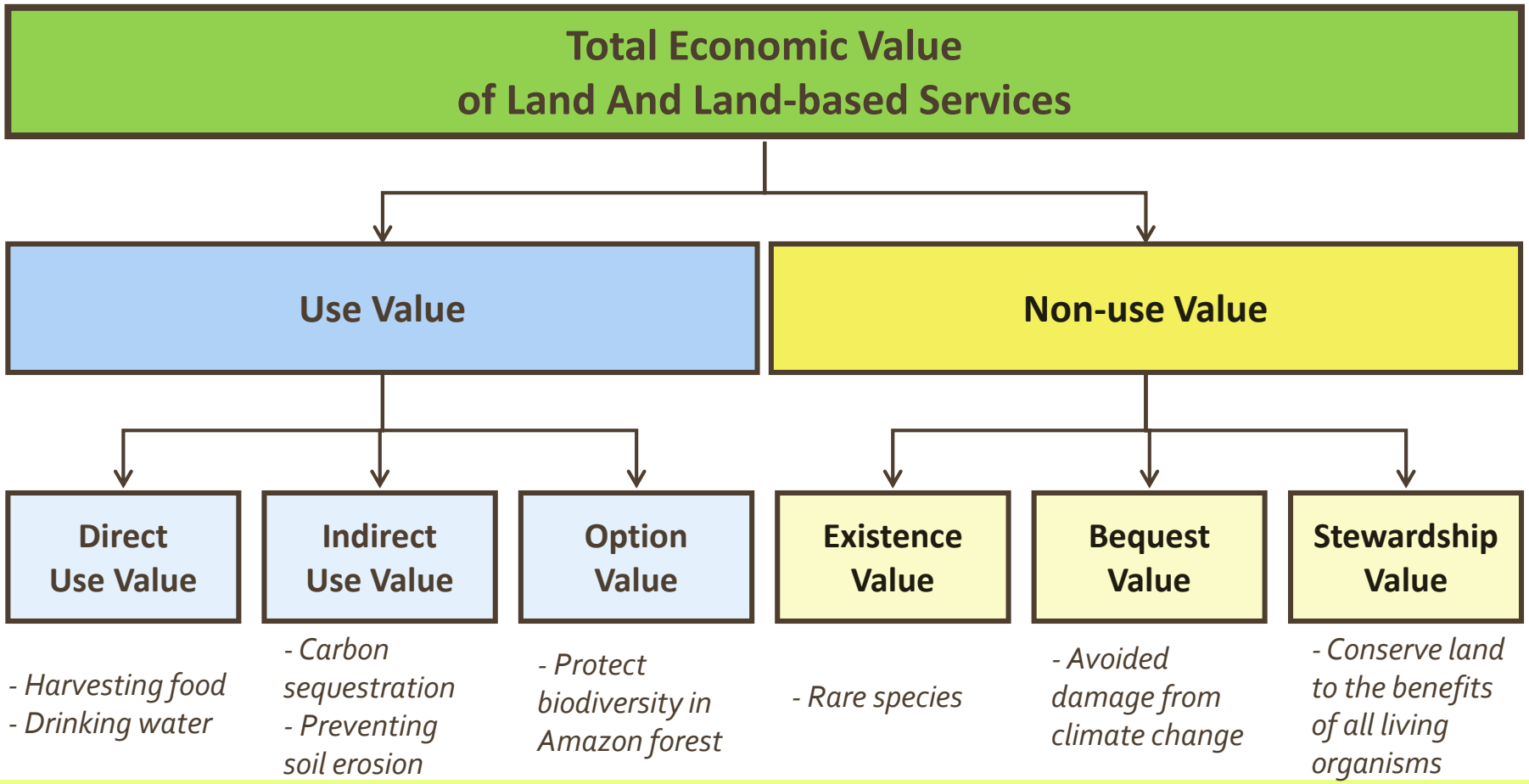
Some important terms

- **WTP = willingness to pay** for a change in environmental quality
  - E.g. preservation (instead of extinction) of a species
- **WTA = willingness to accept** compensation for a change in environmental quality
  - E.g. for an increase of X in noise level in the neighbourhood due to increase in air traffic
- WTPs and WTAs for the same environmental change often differ: **WTP<WTA**

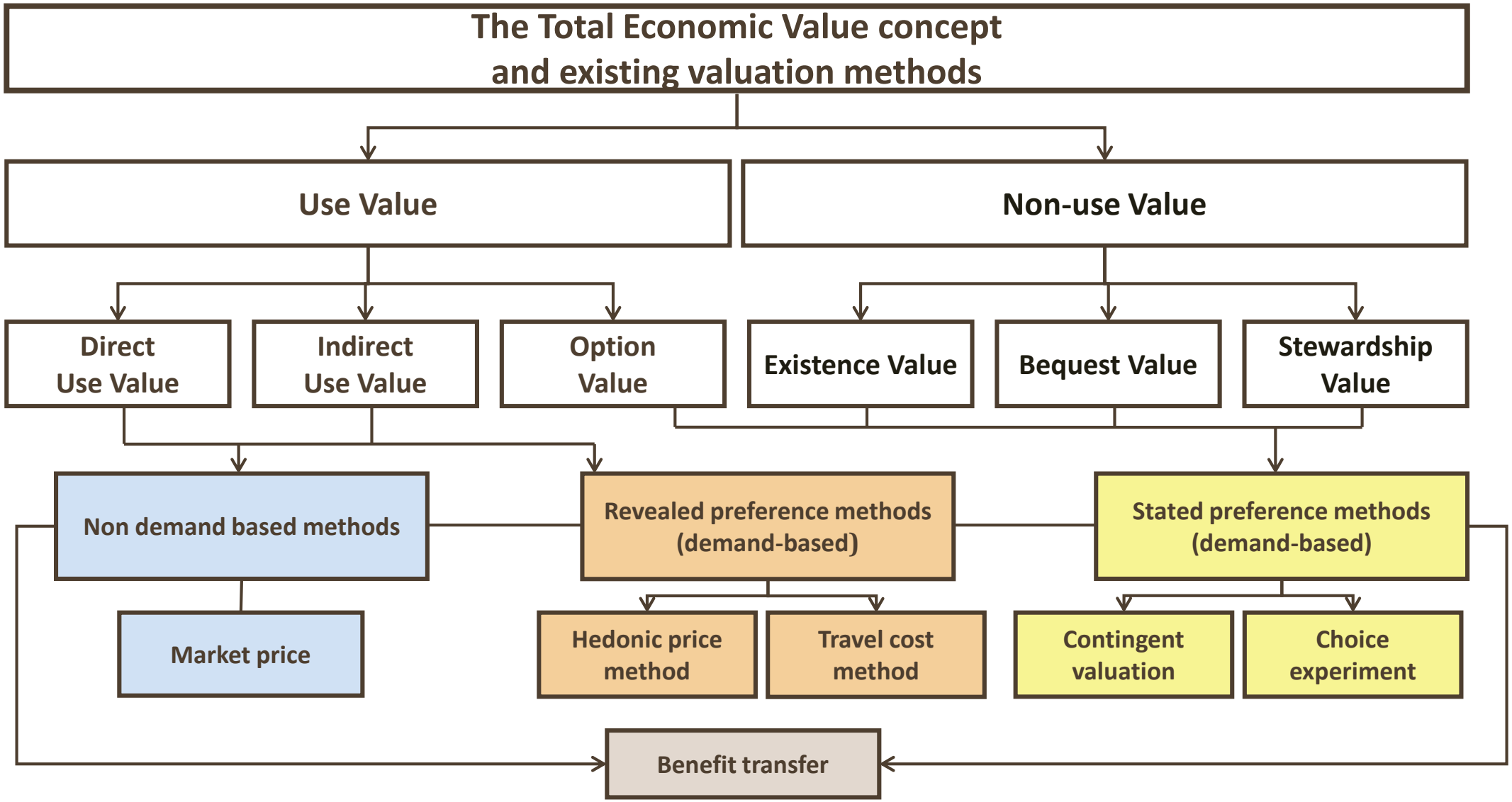
… It all relates to "well-being": individual's preferences and their **willingness to pay for gains** or to **accept compensation for losses**

Total Economic Value

= sum of WTP/WTAs for change in policy/project



The Total Economic Value concept and existing valuation methods



Non demand based methods – Market price

- **Market price**: Observe prices directly in markets
  - E.g. Timber and fuel wood from forests
  - Advantage: easy to apply
  - Disadvantage: market prices can be distorted by subsidies

Revealed preference methods – Hedonic price

- Preferences and values are 'revealed' in complementary or **surrogate** markets
- **Hedonic price**: estimates economic values of ecosystem services that directly affect the price of marketed goods, E.g.:
  - Explores **WTP for environmental quality** in property sales - e.g. proximity of park to house
  - **Property prices** are explained by a **function of environmental attributes**
  - **Regression analysis** used to estimate increments in property values with different environmental and structural attributes

Source: Van Beukering et. al 2007 Valuing the Environment in Small Islands - An Environmental Economics Toolkit

Hedonic price case study (Van Beukering et al. 2007)

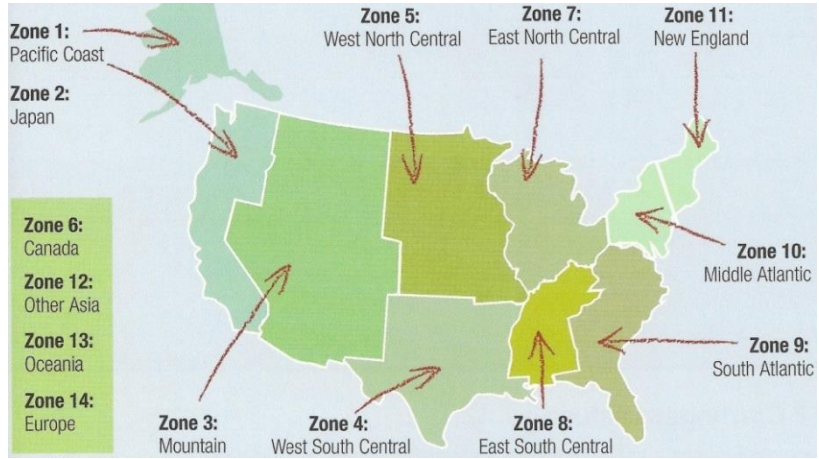
- **Amenity value of coastline** in Guam using actual behaviour
- **Environmental goods** – presence of a clean beach and healthy coral reef
- 2000-2004 **Statistical analysis of** database of 800 **house sales** showed that every additional km from the coast the value of a house declined by US$ 17,000
- Extrapolation results yielded **total annual amenity value of coastal attributes** as US$9.6 million

Revealed preference methods – Travel cost

- Method used to value sites that are used for recreation
- **Travel expenses** (number of visits), local **expenditure** and **time costs**
- Visitors *total expenditure* is used to estimate *demand* for services on site; then it's aggregated to derive *total benefit*
- Travel cost method involves tricky questions: what costs to include and how to distinguish costs that are incurred for other reasons

Travel cost case study (Pieter van Beukering et al. 2010)

- **Recreational value** of Hawaiian coral reefs
- Define zonal distribution of coral reef visitors to Hawaii
- **Travel costs**: actual costs of transportation, cost of travel time and local expenditures
- Most visitors come by plane: airfares used
- **Time cost** was calculated using **wage rates** (i.e. opportunity costs)
- Travel costs and visitation rates yielded a **demand curve** for Hawaiian tourism
- Marine active tourists spent **18% of expenditures on coral reefs**
- Total reef associated **consumer surplus** was US$97 million



Stated preference methods – Contingent valuation

- Asking people their WTP/WTA for an environmental service

  CASE STUDY (Arin and Kramer 2002)

- Environmental policy – Demand for dive trips to 3 protected coral reef areas in the Philippines
- **Survey** – Tourists were surveyed in 1997 using face to face interviews
- *How much would you be willing to pay as a daily, per person entrance fee to a marine sanctuary where fishing is prohibited in addition to the costs of the trip?*

  US$0, US$1, US$3, US$5, US$10 and other (please specify)

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Contingent valuation – case study

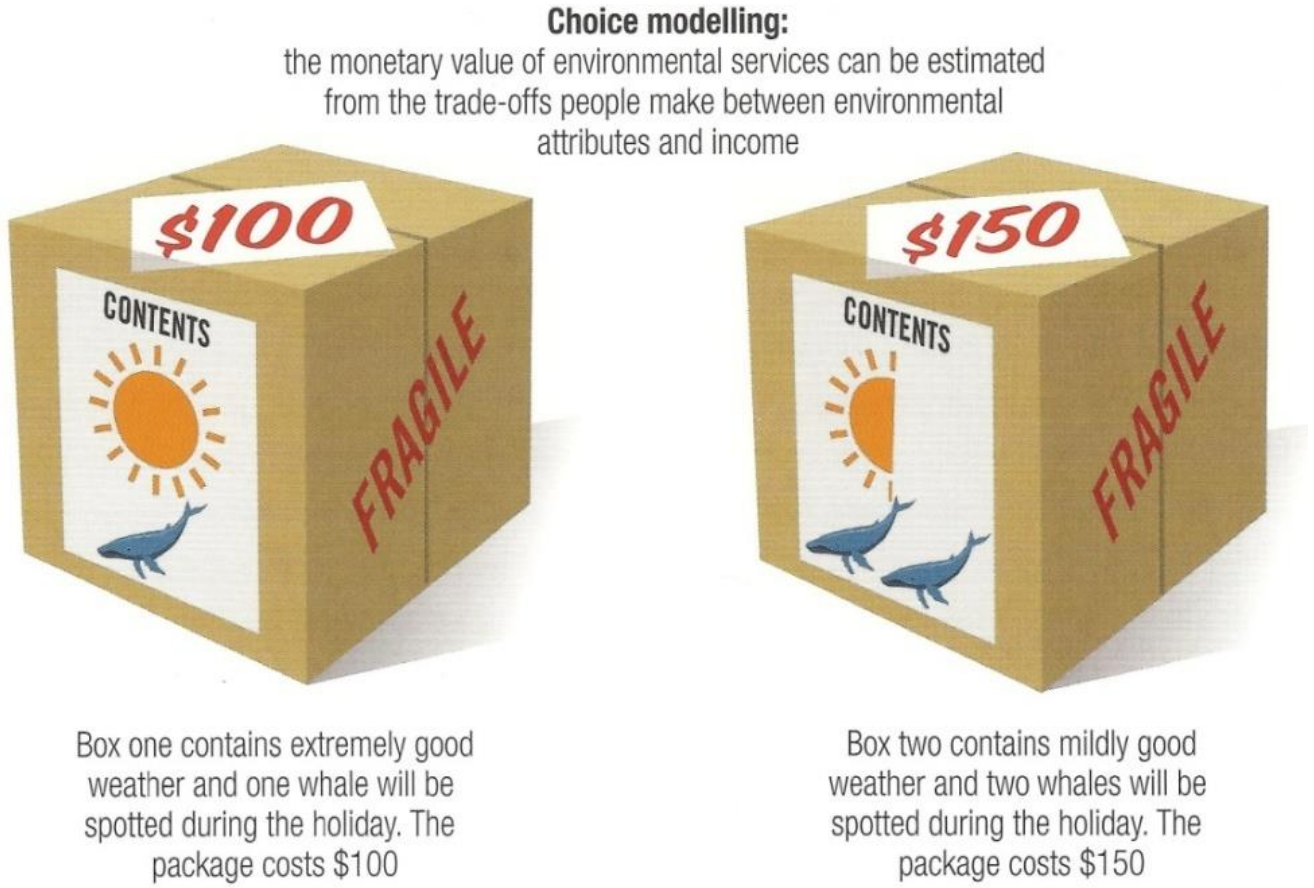
- Results showed positive WTP to enter sanctuaries
- Revenues could support:
  - Coral reef conservation
  - Employment for fishermen banned from fishing (**compensation**)

US$95-116k on Anilao

US£0.85-1M on Mactan

Stated preference methods – Choice experiments

- CEs depicts economic values as **collections of attributes**
- CE's addresses some difficulties of CV by **asking people to value attributes** of an environmental good
- Advantages:
  - Efficiency: respondents **evaluate multi-attributes** simultaneously
  - **Intuitive** and more meaningful elicitation of value



Van Beukering et. al 2007

Choice experiments case study

- Local WTP for coral reef conservation focusing on **local recreational use**, abundance of **culturally significant fish** and **non-commercial fishery** values

Findings:

- Recreational benefits/supply of culturally significant fish most important
- **Sharing** of fish with family and friends **more important than re-sale**
- Attitudes: more concerned with pollution than ban on harmful fishing practices

Attributes	Option 1	Option 2	Current situation
REEF RECREATION *Number of recreation areas provided by coral reefs*	20% less	20% more	No change
FISH CATCH *Reef fish & seafood caught on the average fishing trip is enough for:*	One meal	meal + sharing + selling	One meal
CULTURAL FISH *Amount of cultural fish (e.g. baby Rabbitfish & baby Goatfish)*	20% less	20% more	No change
REEF MANAGEMENT PRACTICES	None (outside the MPAs)	Measures taken	None (outside the MPAs)
POLUTION FROM LAND *Change in the amount of pollution entering reef (e.g. sediment, sewage)*	20% more	20% less	No change
INCOME TAX *Change in the amount of income tax that you pay on a yearly basis*	$40/year less	$40/year more	No change
Which of the options do you prefer?	☐ Option 1	☐ Option 2	☐ Current situation

Van Beukering et. al 2007

Benefit transfer method

- Borrowing WTP for one site and applying to another
- Why use this method? Limited resources
- Pre-conditions:
  - Original study should be valid and rigorous
  - Populations and study sites (i.e. environmental characteristics) must be similar

Conclusion

- **Value** and **price** are **different** concepts
- There are multiple types of values – you should be familiar with them by now
- The **Total Economic Value** provides a useful framework for comprehensive valuation of ecosystem services under their multiple categories
- **There is no "one best" method**: Ecosystem services can be valued using a variety of methods – each one serves different purposes and has got its own pros and cons
- Ecosystem valuation is **not "precise"**, but it provides useful information that **can support policy and decision making** in a world or finite resources