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SEA Knowledge Sharing Forum

Economic valuation of ecosystem services

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UNCCD United Nations Convention to Combat Desertification

Offering Sustainable Land-use Options

Outline

- The case for valuing ecosystem services
- Methods for valuing ecosystem services
- Case study: the value of forest ecosystem services in Cambodia

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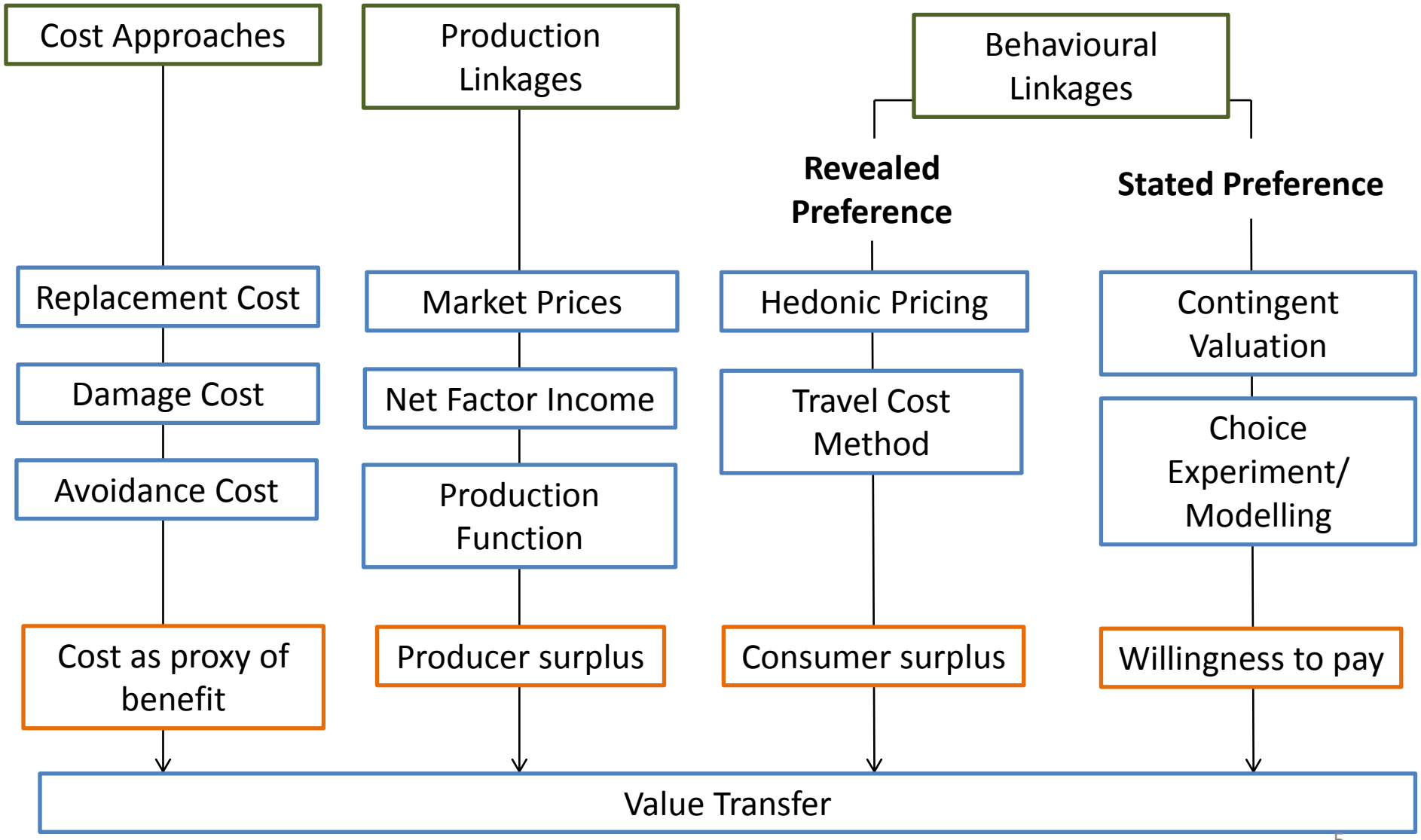
The case for valuing ecosystem services

- Ecosystem services are the benefits that ecosystems provide to people (e.g. food, timber, climate regulation, recreation and tourism)
- The contribution of ecosystem services to human wellbeing (economic value) is often unrecognised
- Need for information on the economic value of ecosystem services to improve decision making
- Valuation methods have been developed to help fill this information gap

Why conduct valuation?

- Information on the value of ecosystem services can be used in many decision making contexts:
  - Value of external costs to **set taxes** (e.g. carbon taxes)
  - Value of external benefits to **set subsidies** (e.g. for land set aside for biodiversity)
  - Value of damage costs to **set compensation payments** (e.g. for oil spills)
  - Value of public goods for **public provision** (e.g. Protected Areas)
  - **Land use planning** (allocation of land to different uses)
  - **Cost-Benefit Analysis** of policies and investments
  - **Green Accounting** (e.g. UN System of Environmental-Economic Accounts SEEA)
- Allows comparison of impacts in the same units (money)

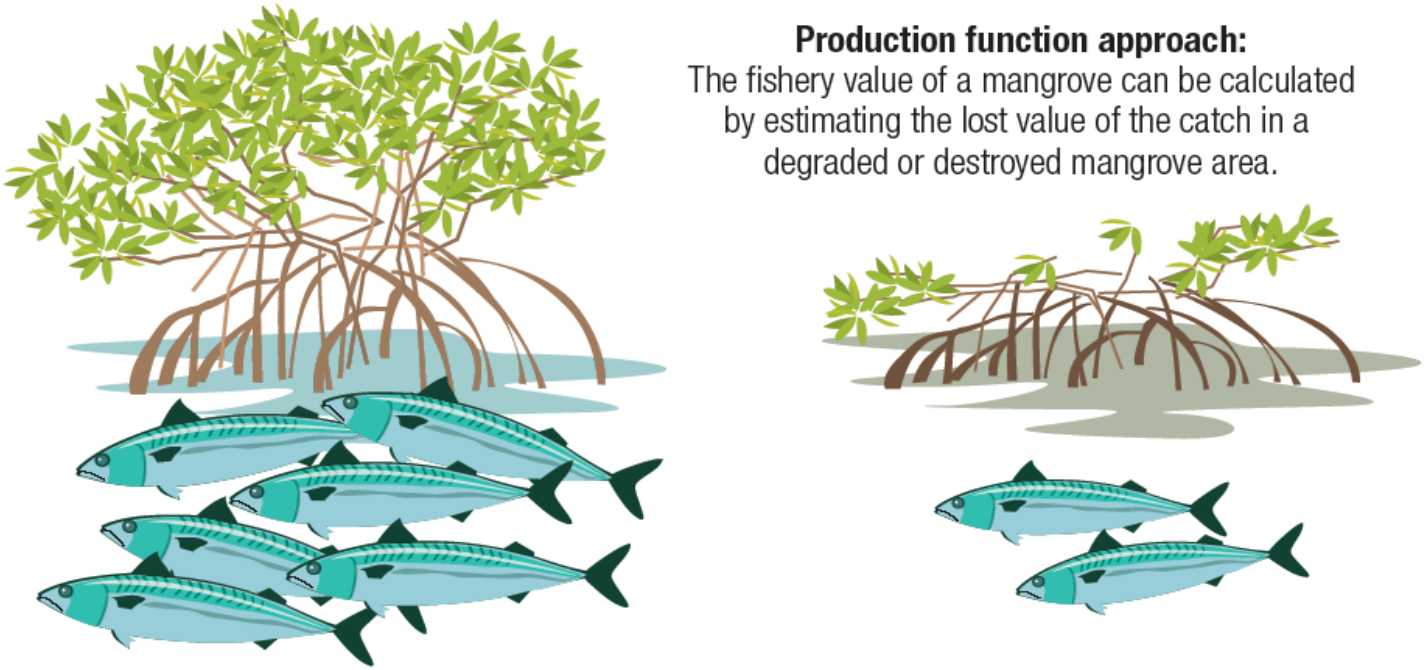
Valuation Methods



Market prices

- Used for valuing marketed goods (e.g. timber, fish, recreation, carbon)
- Straightforward and inexpensive data
- Weaknesses: ignores costs; market distortions; missing markets

Production function approach



- Values ecosystems as inputs in production of commercially marketed goods
- Estimate a production function that relates the value of output to the quantity and prices of inputs, e.g.

Fish catch = *f* (Trips, Boat, Gear, Mangrove)

Replacement cost

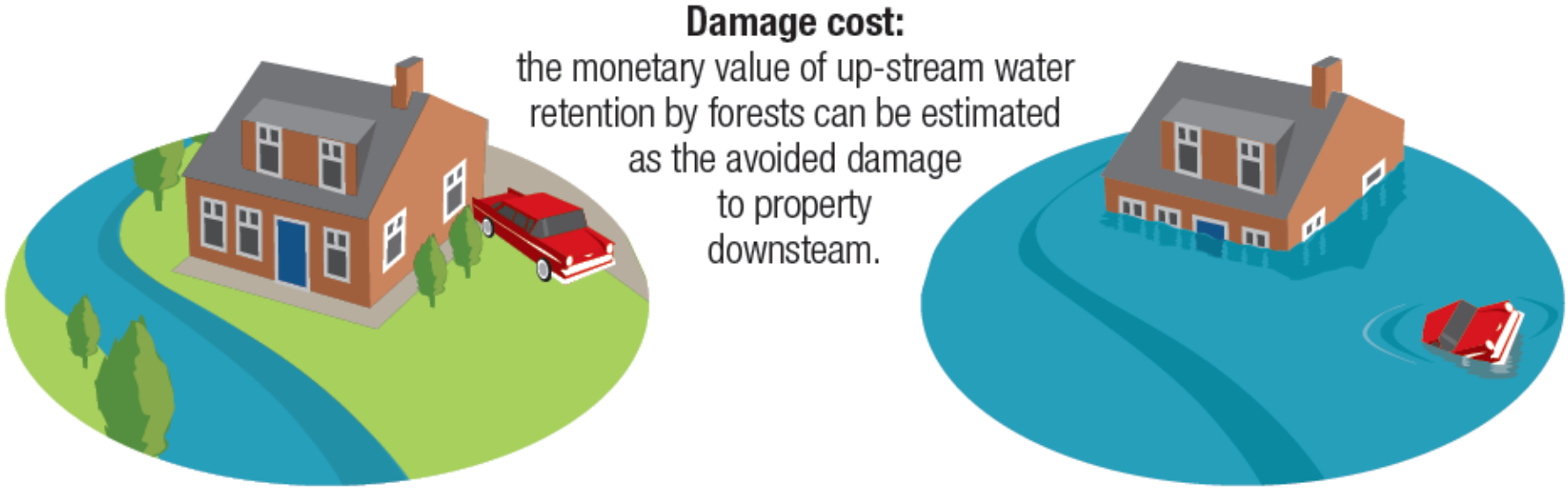
Replacement cost:
the value of a natural reservoir can be estimated as the cost of replacing it with a man-made reservoir.

Natural

Man-made

- Cost is not necessarily a good measure of benefit
- Only valid if there is a proven willingness to pay for the replacement
- Difficult to find “exact” equivalent replacements

Damage cost avoided



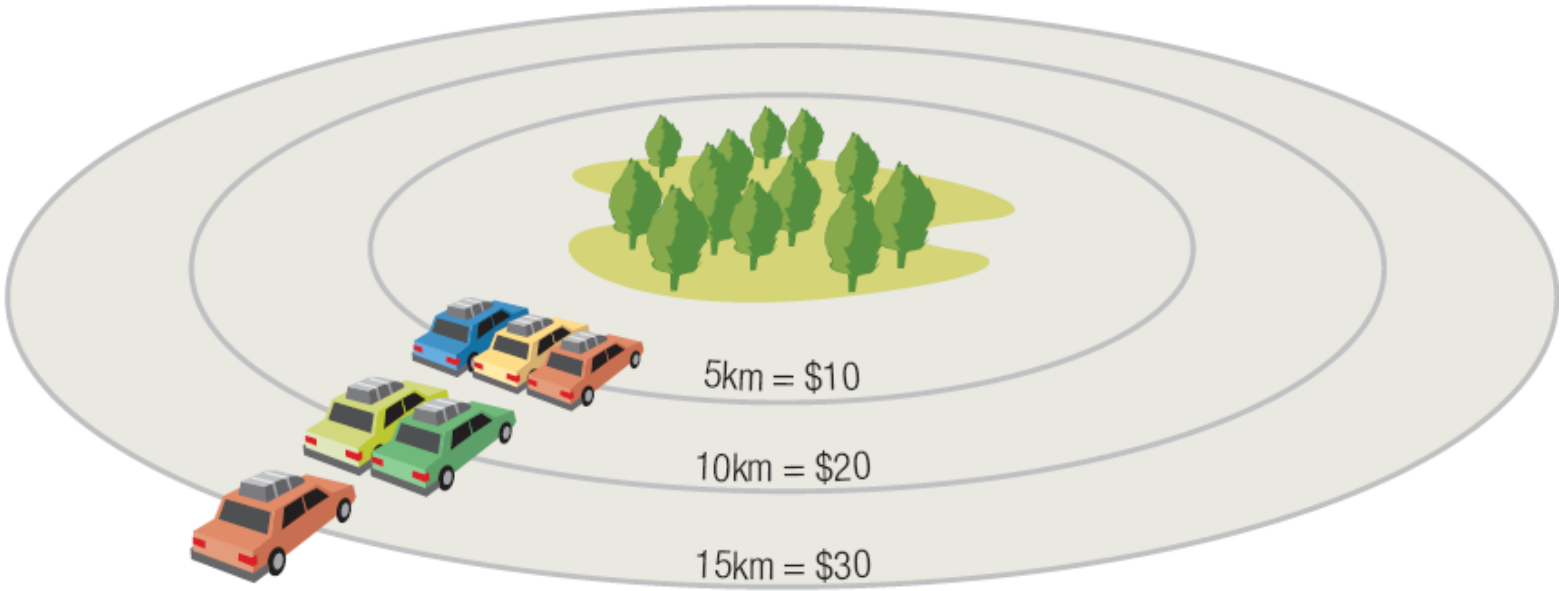
- Used for valuing ecosystems that provide some form of natural protection (e.g. mangroves provide storm protection)
- Estimate the value of the assets that are protected by intact ecosystems
- Difficult to quantify the change in level of protection

Hedonic Pricing

- Revealed preference method – looks at decisions people make in reaction to differences in environmental quality in markets
- The monetary value of environmental attributes can be estimated by comparing house prices with different surroundings

Travel cost method (TCM)

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



- Revealed preference method used to value recreation sites (e.g. national parks, forests, coral reefs)
- Basic premise: the costs and time that people incur during a recreational trip to a natural area can be used to infer the value of that site.

Contingent Valuation

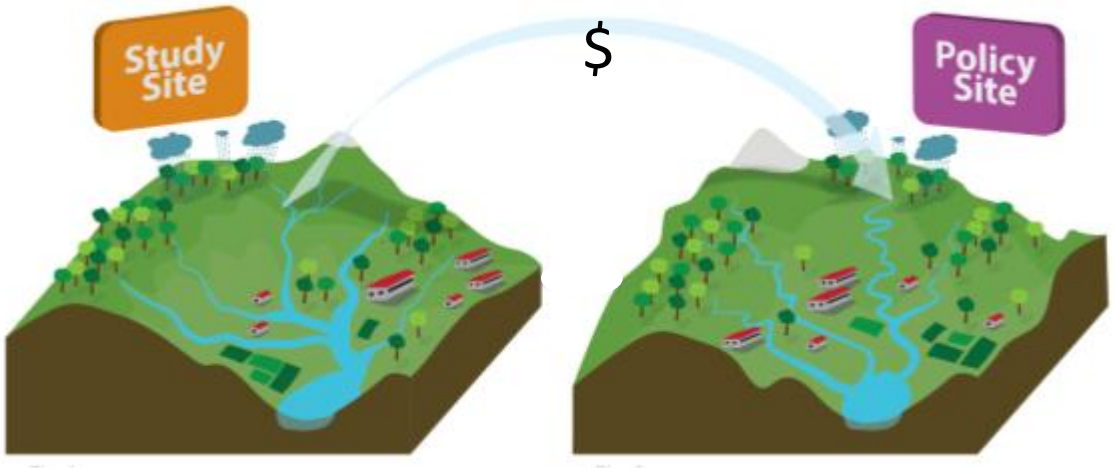
Steps in CV method:

1. Description of good/service
2. Payment vehicle
3. WTP elicitation
4. Questions on motivations
5. Compute mean sample WTP or value function
6. Aggregate to population

- Stated preference method using surveys and hypothetical markets for ecosystem services. Direct approach – ask WTP for ecosystem service
- Widely applicable – can be used to estimate non-use values and future services
- Weaknesses: hypothetical and strategic bias; procedural variance; sensitivity to scope; aggregation of values

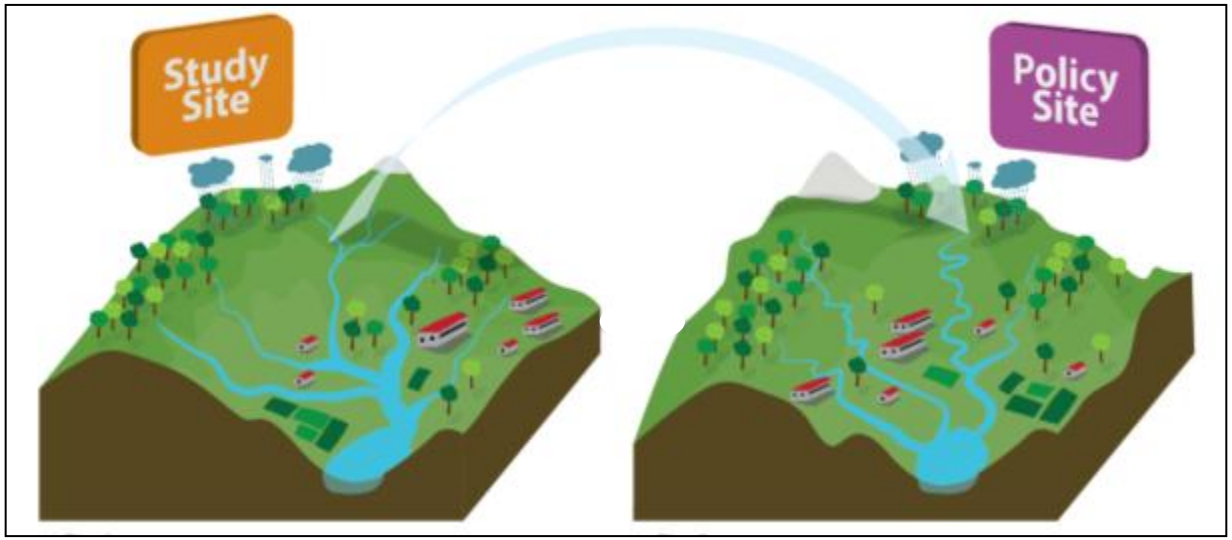
Value Transfer

- New ‘primary’ valuation studies are:
  - Time consuming
  - Expensive
  - Data intensive and requires expertise
  - Often conducted at local scales
- Value transfer uses exiting value information for a ‘study site’ to estimate the value of a new ‘policy site’.
- E.g. estimate the value of flood control by an upland forest based on an existing value estimate for a similar upland forest.

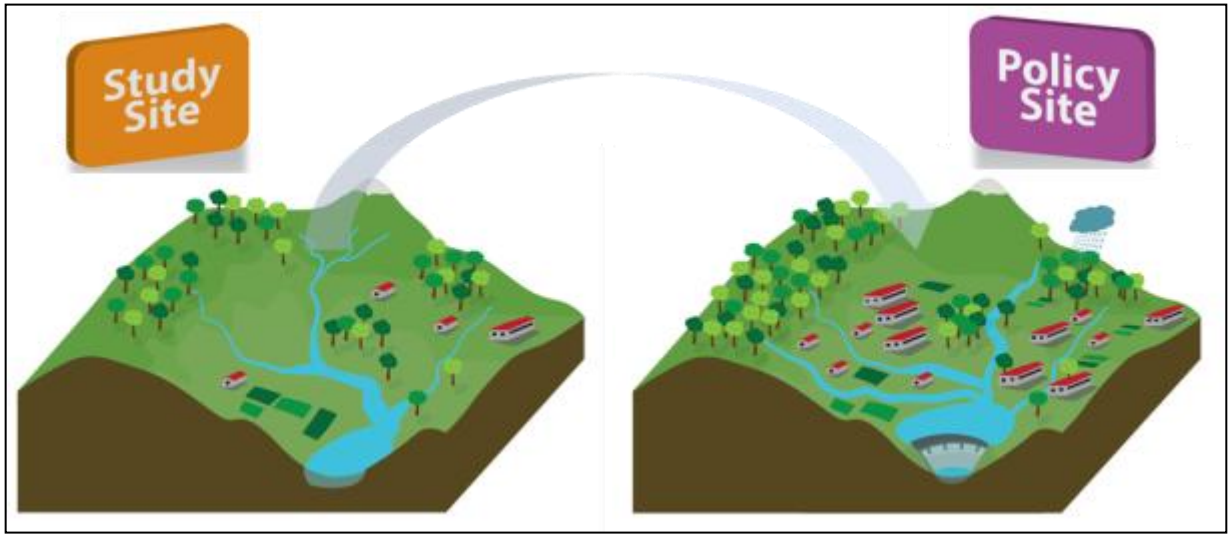


Value Transfer

Value transfers can be accurate when ‘study’ sites and ‘policy’ sites are similar

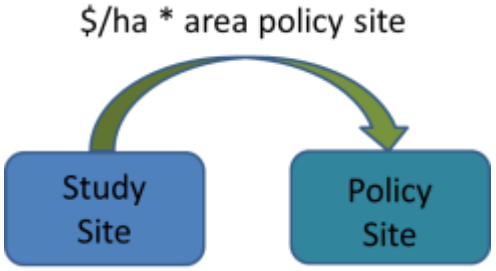


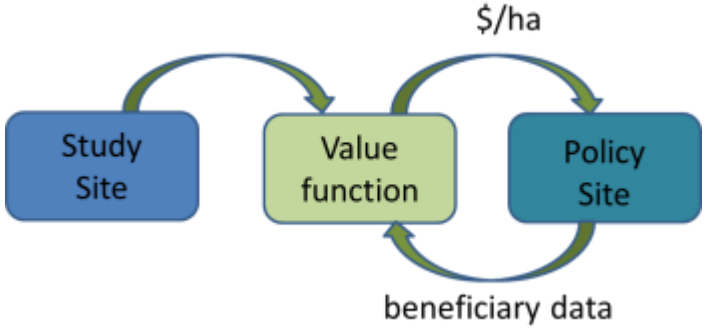
Otherwise we need to adjust values for bio-physical and socio-economic differences

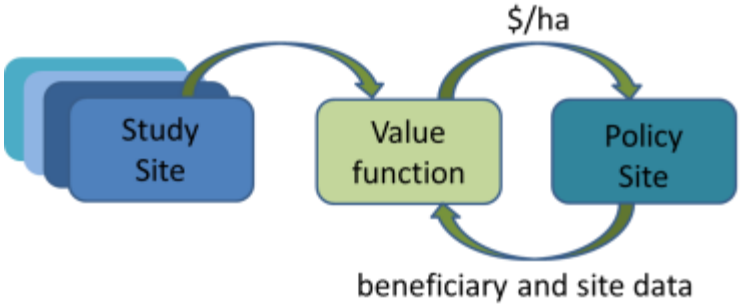


Value transfer methods

- Unit value transfer
  - multiply unit value from ‘study site’ by quantity of ecosystem service at ‘policy site’
- Value function transfer
  - characteristics of the ‘policy site’ are plugged into the value function from an existing study
- Meta-analytic function transfer
  - uses a value function estimated from multiple study results





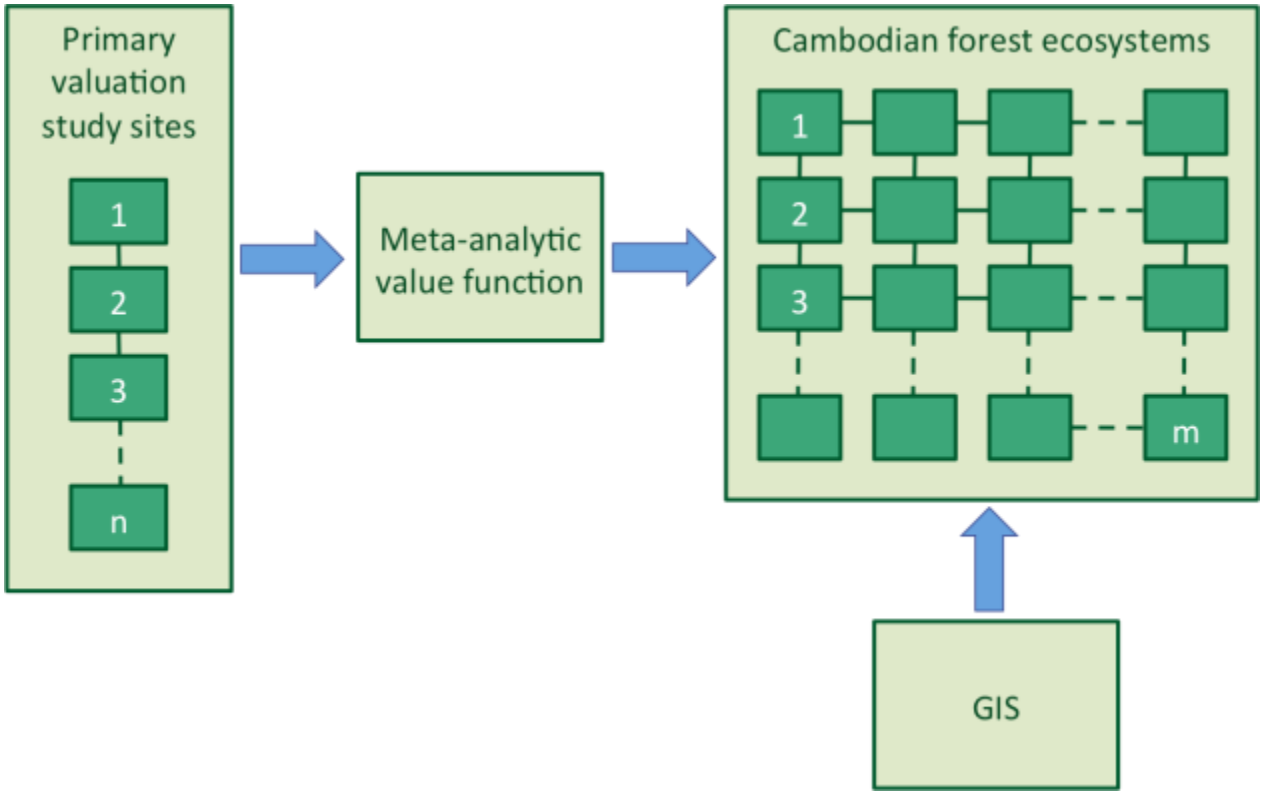


Case study: Cambodian forest ecosystem services

- Objective: to assess the economic value of change in the provision of ecosystem services from forests in Cambodia over the period 2010-30 under a business-as-usual scenario of land use change
- A "cost of policy inaction" analysis
- Forest cover approximately 58% of total land area in 2010
- Under continuing trends national level change in forest area is approximately -1.2 million hectares (11.7%) 2010-2030

Methods for ES valuation

- Value transfer for non-carbon forest ES:

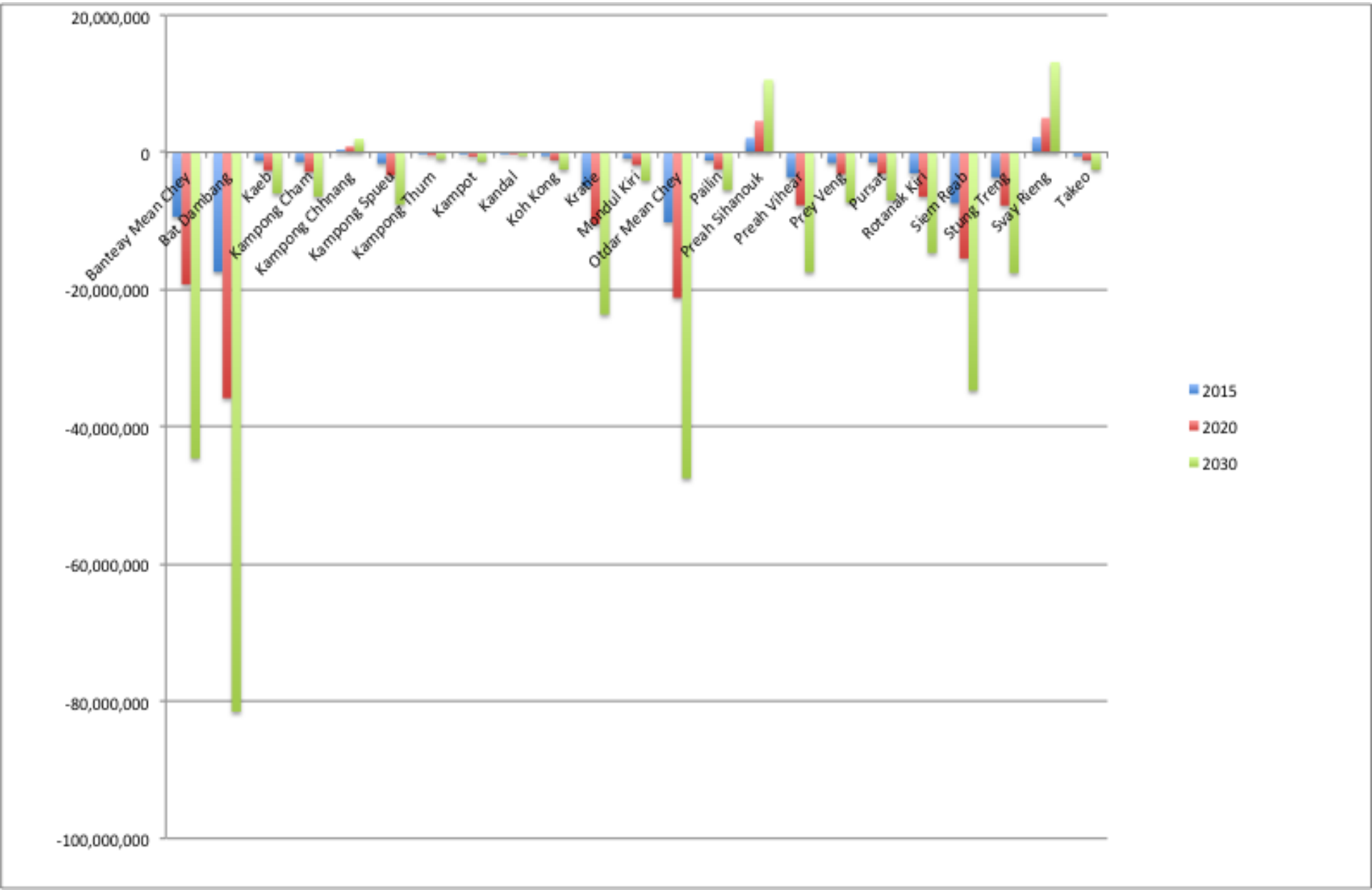


- Damage cost avoided for change in carbon storage (i.e. social cost of carbon)

Results

- Average annual value of forest ES:
  - 511 US$/ha/year in 2010 rising to 929 US$/ha/year in 2030
  - Unit (per hectare) values increase over time due to increasing scarcity of forests, incomes and population
- Change in total annual value of forest ecosystem services in Cambodia approximately **US$ -300 million** in 2030
- The present value of changes in non-carbon forest ecosystem services 2010-2030 is approximately **US$ -1.6 billion** using a discount rate of 5%
- The present value of carbon emissions from forest change is approximately **US$ -3.2 billion**

Change ecosystem service values 2030



Conclusions

- The present value of ecosystem services (including carbon) lost due to declining forest cover 2010-2030 is approximately **US$ 4.8 billion**
- **Carbon storage is a high value** global benefit that is difficult for Cambodia to capture. Markets for carbon are currently weak and prices are low
- Other forest ecosystem services **accrue directly to Cambodia** and should be considered in national decision making related to land use change
- Valuation can help make the **economic case for policy action**

Thank You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