Valuing benefits derived from wetland ecosystems

Introduction to Ramsar Guidelines

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Wetland loss and degradation – an economic perspective

- **Ecosystem services not priced and reflected in decision making – (Market failure)**

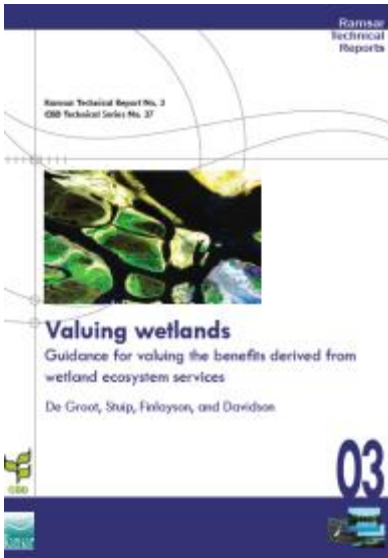
  Agriculture produce from converted lake does not reflect the values lost due to flood protection, fisheries, biodiversity etc.

- **Sectoral policies may provide incentives to activities causing ecosystem loss (Perverse incentives)**

  Grow more food campaigns leading to conversion of floodplains

- **People who degrade are not the same whose livelihoods are affected leading to continued degradation (Unequal sharing of costs and benefits)**

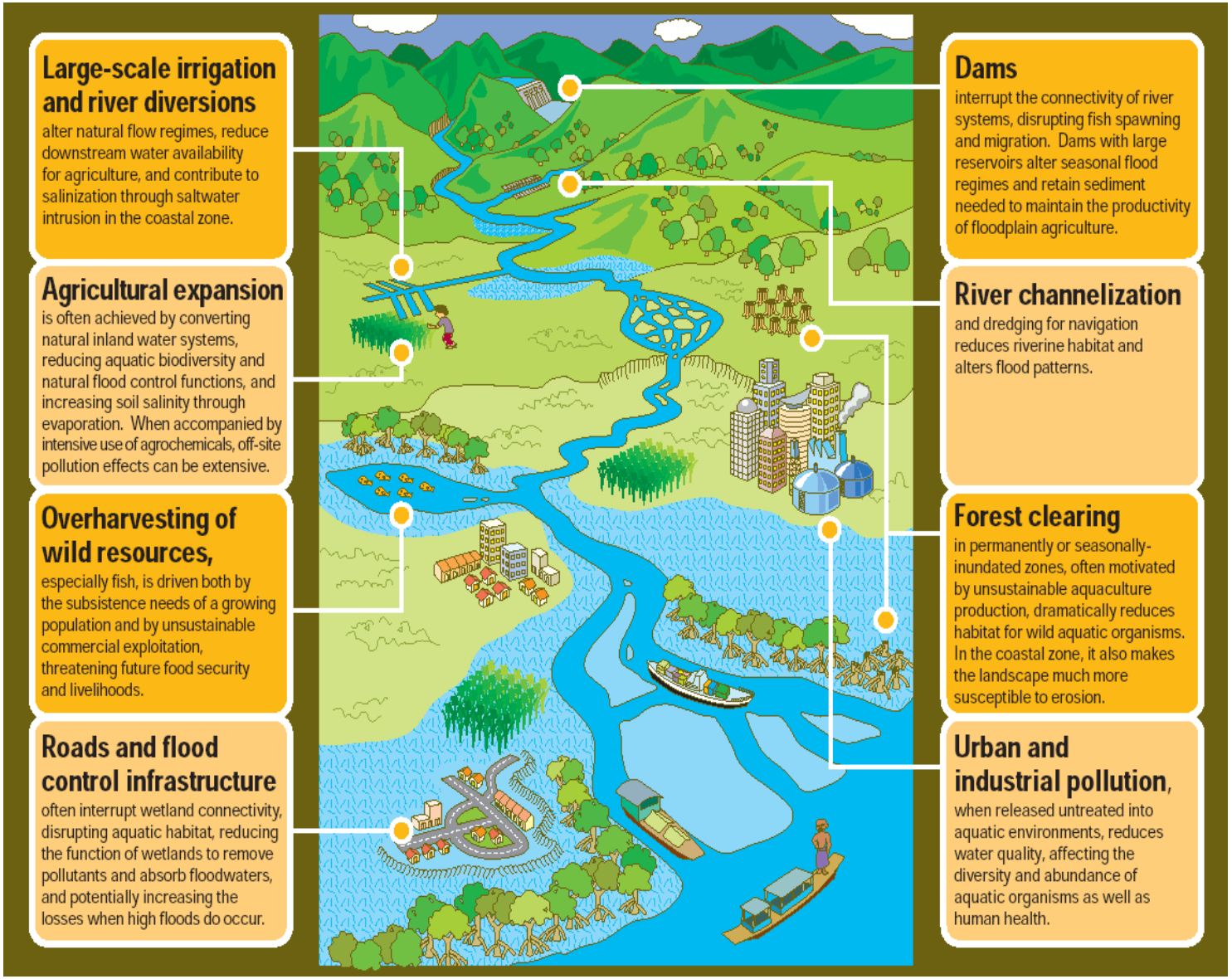
  Deforestation in upstream catchments creating flooding downstream as wetlands loose water holding capacity



We need to make choices !

Wetland loss and degradation – an economic perspective

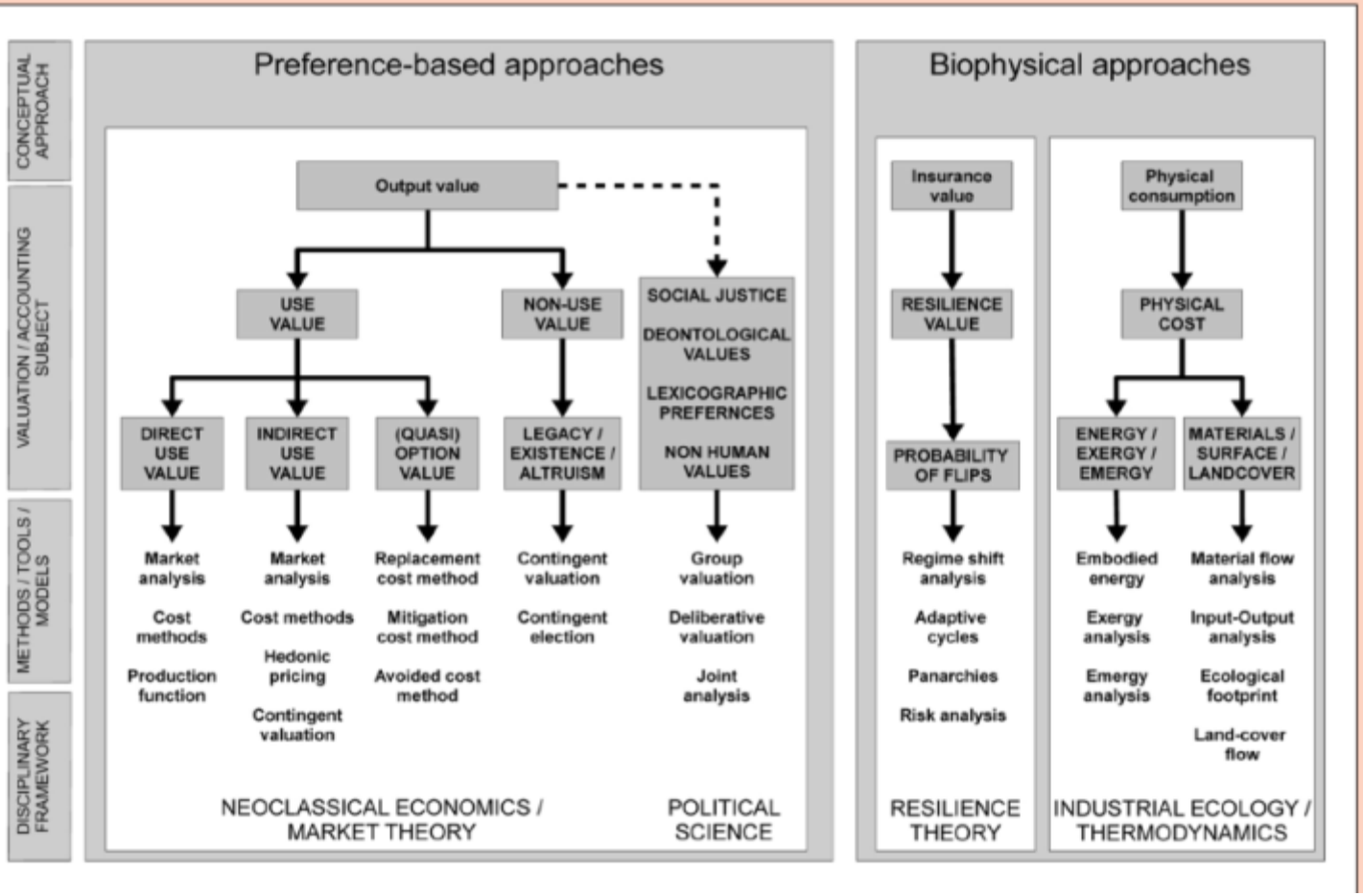
- Quantifying and valuation of wetland ecosystem services
- Making them comparable with the returns derived from alternative uses



Economic Valuation

Process of expressing value of ecosystem services in concrete monetary terms

Figure 1: Approaches for the estimation of nature's values



When does economic valuation help ?

Determining the value of ecosystem services –

What is the benefit stream that ecosystem services contribute ? (Total Economic Valuation)

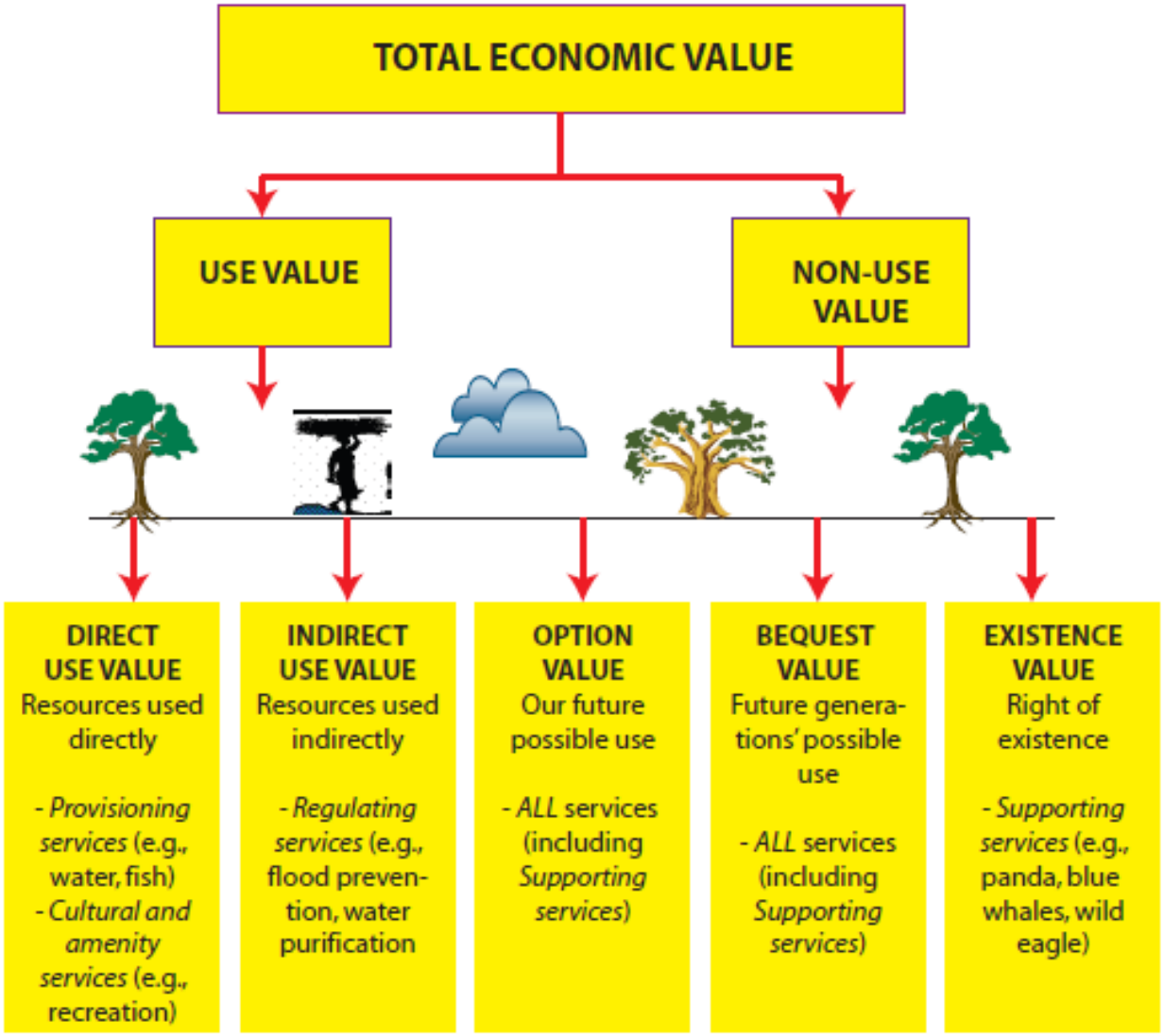
Impact assessment

What would be the overall economic impact of a developmental activity, say upstream hydrological regulation on wetland ecosystem services ? (Environmental Impact Assessment)

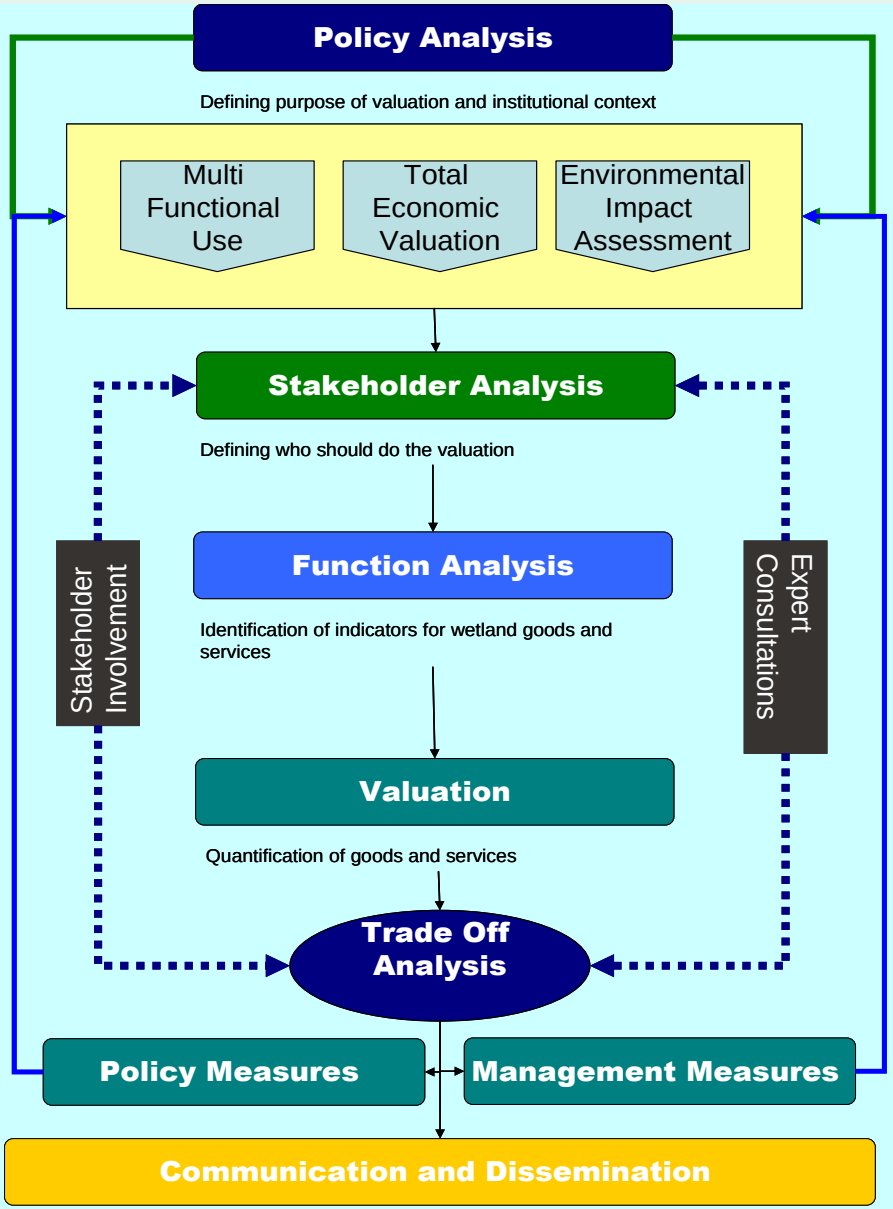
Understanding tradeoffs

What do alternate uses of ecosystems entail ? Shrimp culture versus maintaining intact mangroves ? (Multi-functional use)

Classifying wetland values



Framework for Integrated Assessment and Valuation of Wetland Services



- *Why undertake valuation ?*
- *Valuation for whom ?*
- *What is to be valued ?*
- *What is the value ?*
- *Communicate ?*

Step 1: Policy Analysis

Defining the purpose of valuation

- Who requires the value ?
- Which stakeholders influence the value ?
- What is the objective of valuation ?
- What is the valuation question ?
- Ensures reflection of policy goals in valuation process

Step 2: Stakeholder analysis

Stakeholders: Person , organization or group with interest in wetlands

Varying degree of influence on wetland management

Likely to be impacted by wetland management

- Who would be affected by a decision ?
- What are the conflicts between stakeholders ?

Step 2: Stakeholder analysis

		Degree of influence	
		High	Low
Degree of importance	High	Significant loss / gains due to decisions and high power to influence <u>Need to represent interests +maintain strategic relationships</u> *Organized recreation industry*	Significant loss / gains due to decisions but low power to influence <u>Need to represent interests</u> *Traditional communities dependant on wetland resources*
	Low	High power to influence but not directly affected <u>High source of risk</u> *Governmental implementing agencies*	No power to influence and not directly affected *External world*

Step 3: Function analysis

Wetland ecosystem services are dependent on functional properties of ecosystems, for example

- *Biotic and abiotic interactions*
- *Nutrient cycles*
- *Food-chain dynamics*

- *Identification of what services are important for valuation process*
- *Quantification of capacities of wetlands to deliver services on sustainable basis*

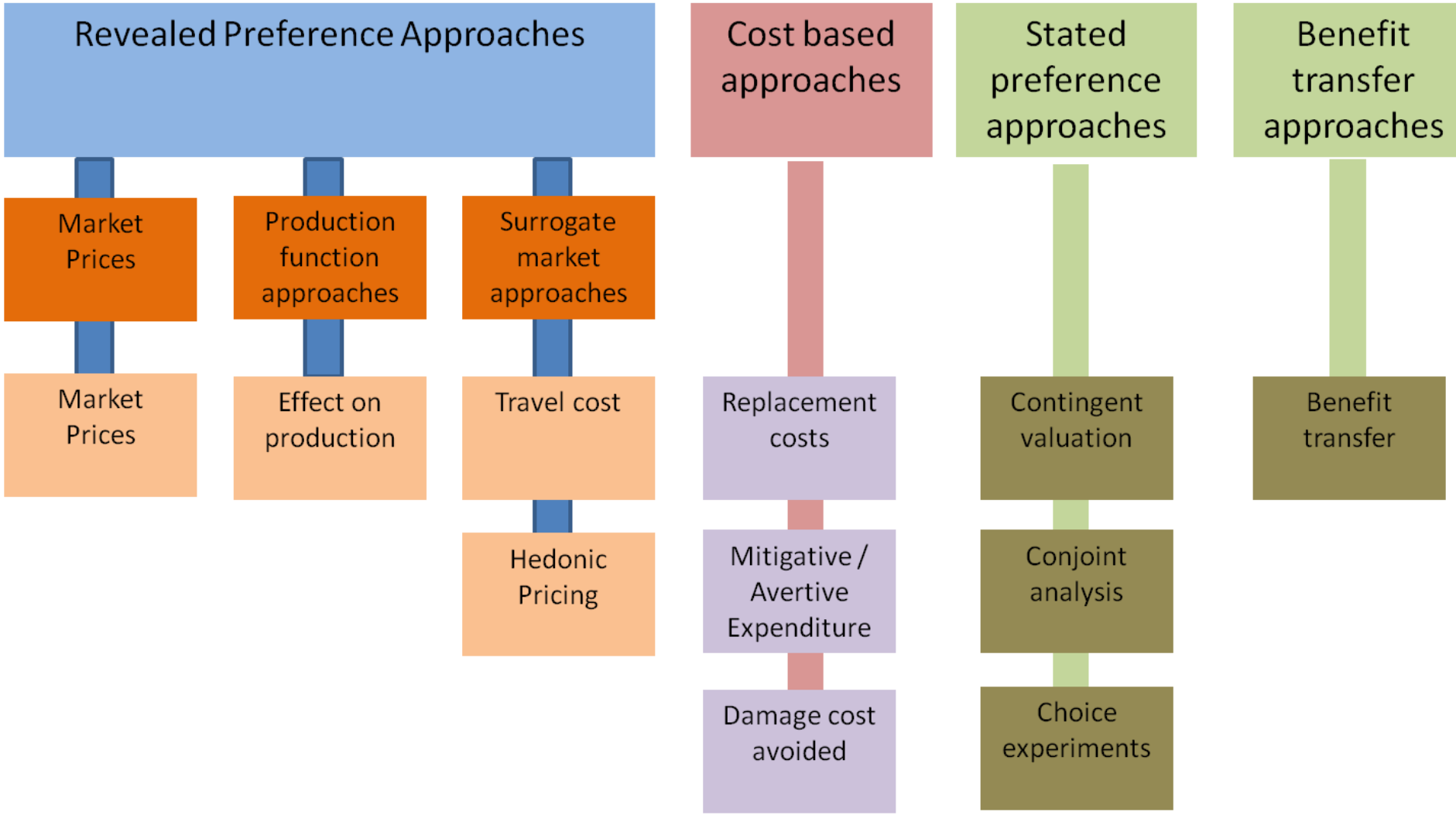
Step 3: Function analysis

Ecosystem Service	Indicators		
	Ecosystem function	Ecosystem state	Ecosystem performance
Provision of freshwater	Precipitation, runoff, inflows Biotic and abiotic processes influencing water quality	Water quantity Water quality	Net water available for use
Natural hazard mitigation	Role of ecosystems in dampening extreme events	Buffer ; (mangrove) structure	Reduction of flood danger Prevented damage to infrastructure

Step 4: Valuation

- *Revealed preference*: Observing real market behavior
- *Costs based approaches*: Focus on costs related to ecosystem services (damage/ replacement / maintenance expenditure)
- *Stated preference*: Observing hypothetical market behavior
- *Benefit transfer*: Values imputed from an existing assessment

Step 4: Valuation



Step 4: Valuation

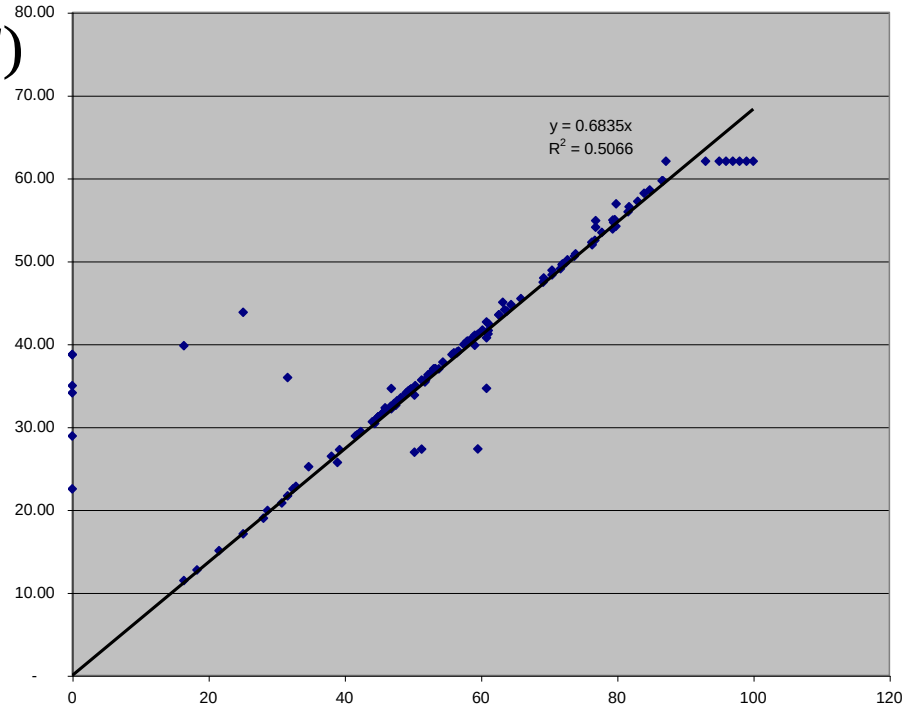
- *Production function approach : environment as an input to production of tangible outcome*

  Eg. Hydropower generation in Loktak Lake, Manipur

$$\ln(Y) = 0.866\ln(W) + 0.110\ln(M) + 0.178\ln(C)$$

Y = hydropower production (MW)
W = water usage (Mm3)
M = costs of manpower (Rs.)
C = operational costs (Rs.)

Hydropower accounts for 86% of value = Rs. 227 m per annum

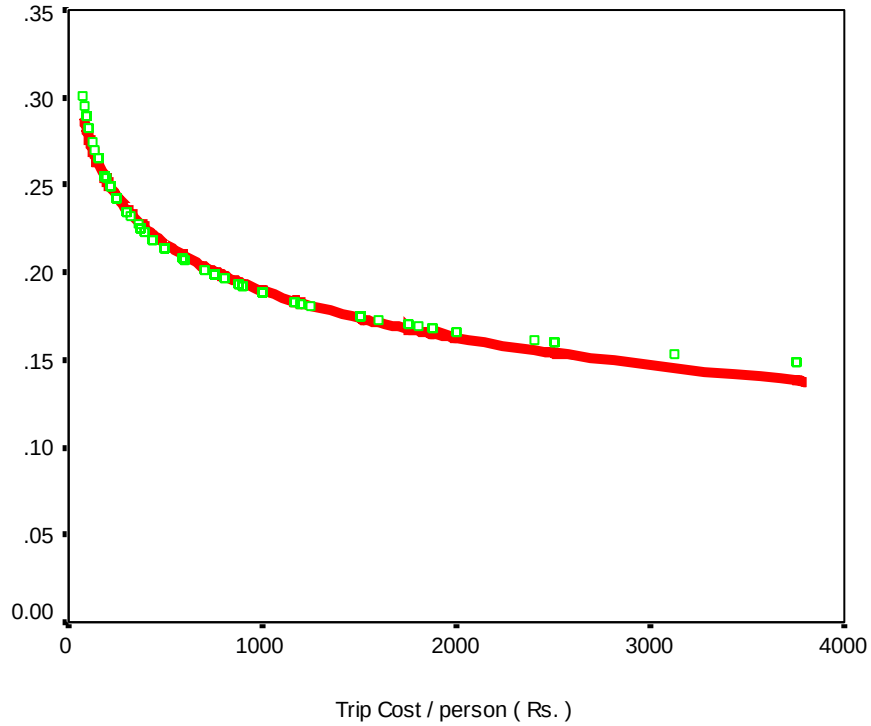


Step 4: Valuation

- *Travel costs: Modeling travel expenses as an indicator of benefits Eg. Chilika Lake, India*

Expressing visitation rate as a function of trip duration, trip cost per person, distance travelled, journey purpose, income, age

	Av WTP		Arrivals	Total Surplus (Rs. Millions)
	US$	Indian Rs.		
Domestic		5,806	378,370	2,197.12
Foreign	2868.56	120,479	1,153	138.88
Total				2,336.00



Step 4: Valuation

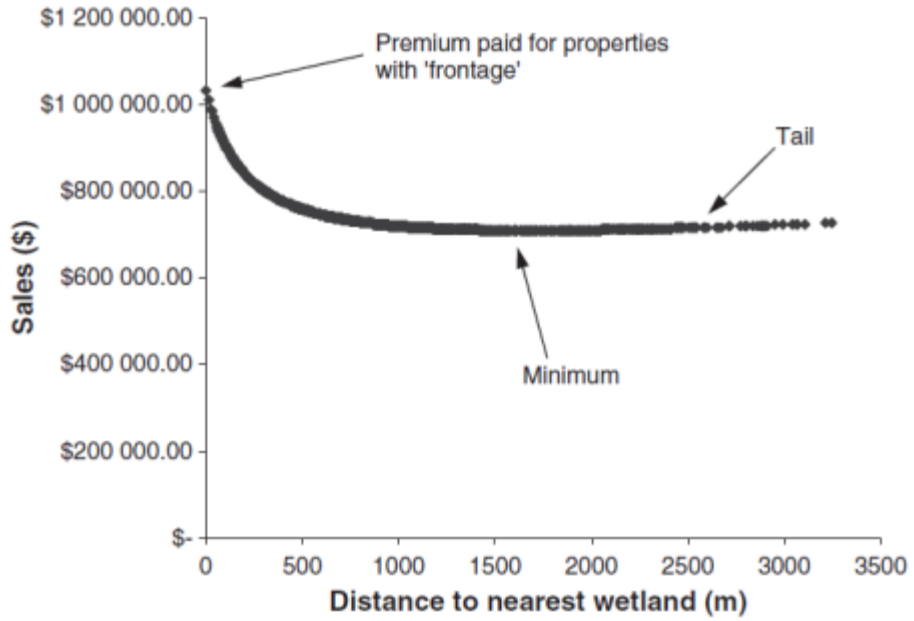
- *Hedonic approaches: Estimating values based on ecosystems as a determinant of land values / wages*

Valuing urban wetlands in Perth, Australia

$$\ln(ADJSALE_i) = \beta_0 + \sum \beta_j S_{ji} + \sum \beta_k N_{ki} + \sum \beta_l W_{li} + \sum \beta_m SUB_{mi} + \varepsilon_i$$

ADJSALE = property value
S= Structural attributes
N = Neighborhood attributes
W = Wetland attributes
Sub = Suburban attributes

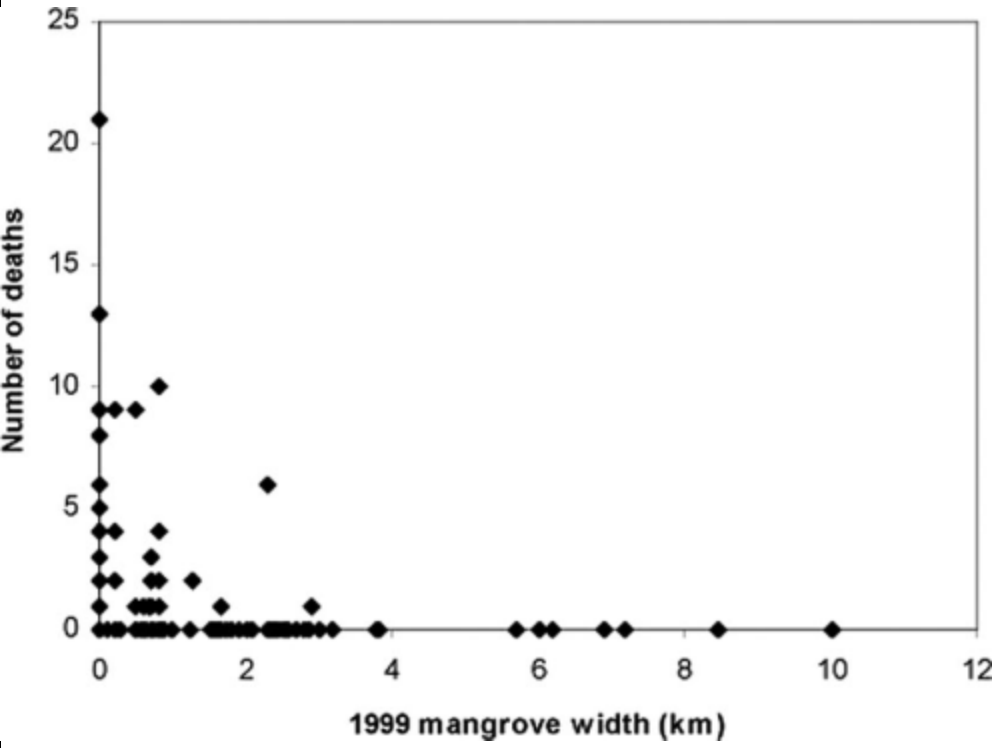
Presence of wetland within 1.5 km of property increases house prices by AU$ 6976 (Tapsuwan et al, 2009)

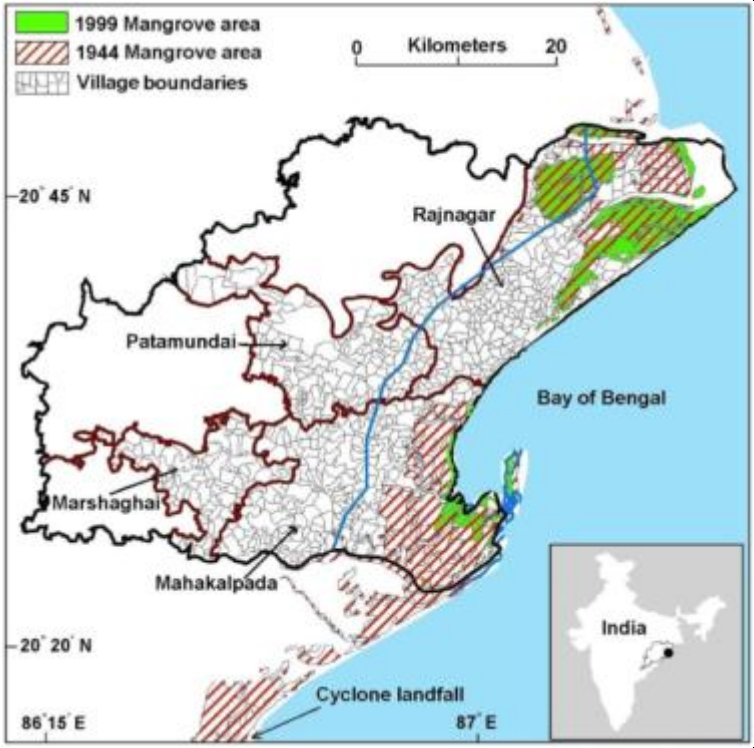


Step 4: Valuation

- *Damage costs avoided: Estimating damages avoided by ecosystems*

Hurricane Protection Function, Bhitarkanika Mangroves, Orissa, India





Average opportunity cost of saving a life by retaining mangroves was 11.7 million rupees per life saved. (Das et al, PNAS, 2009)

Step 4: Valuation

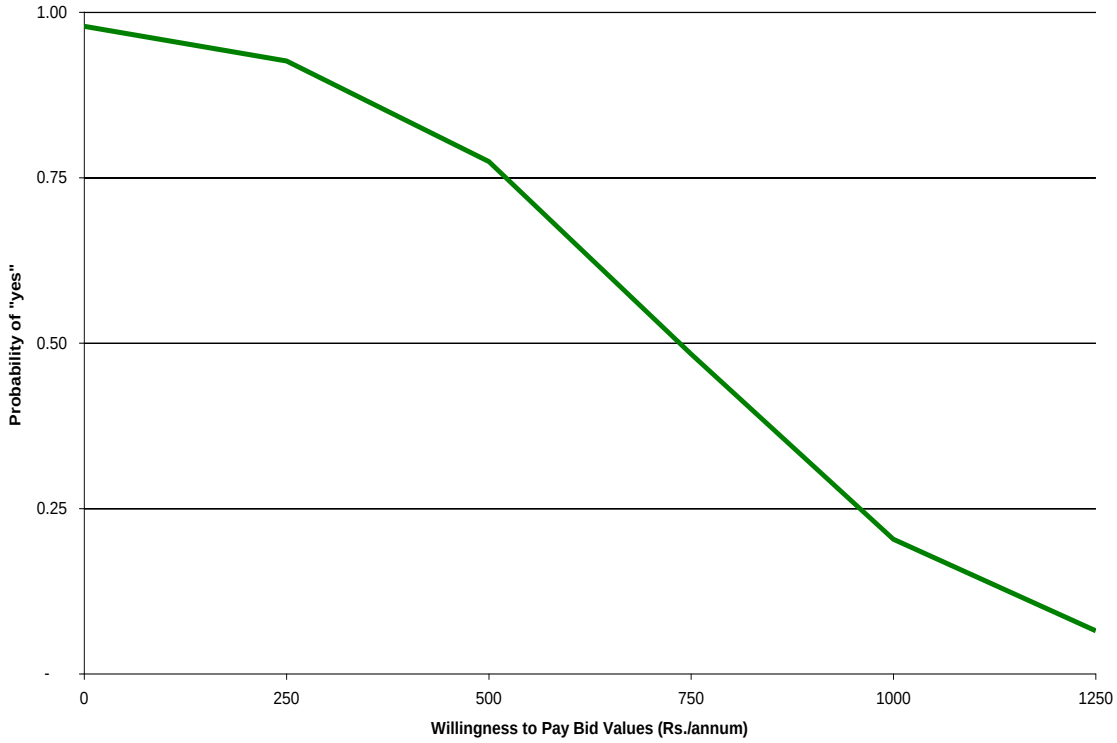
- *Contingent valuation: Estimating willingness to pay in hypothetical markets*

Biodiversity values, Chilika Lake, Orissa , India

Estimating probability of paying a certain amount to a reserve fund for Chilika conservation

Probability of paying decreases with increasing WTP

Total non-use benefits estimated to be Rs. 858.78 millions (21% of overall benefits)



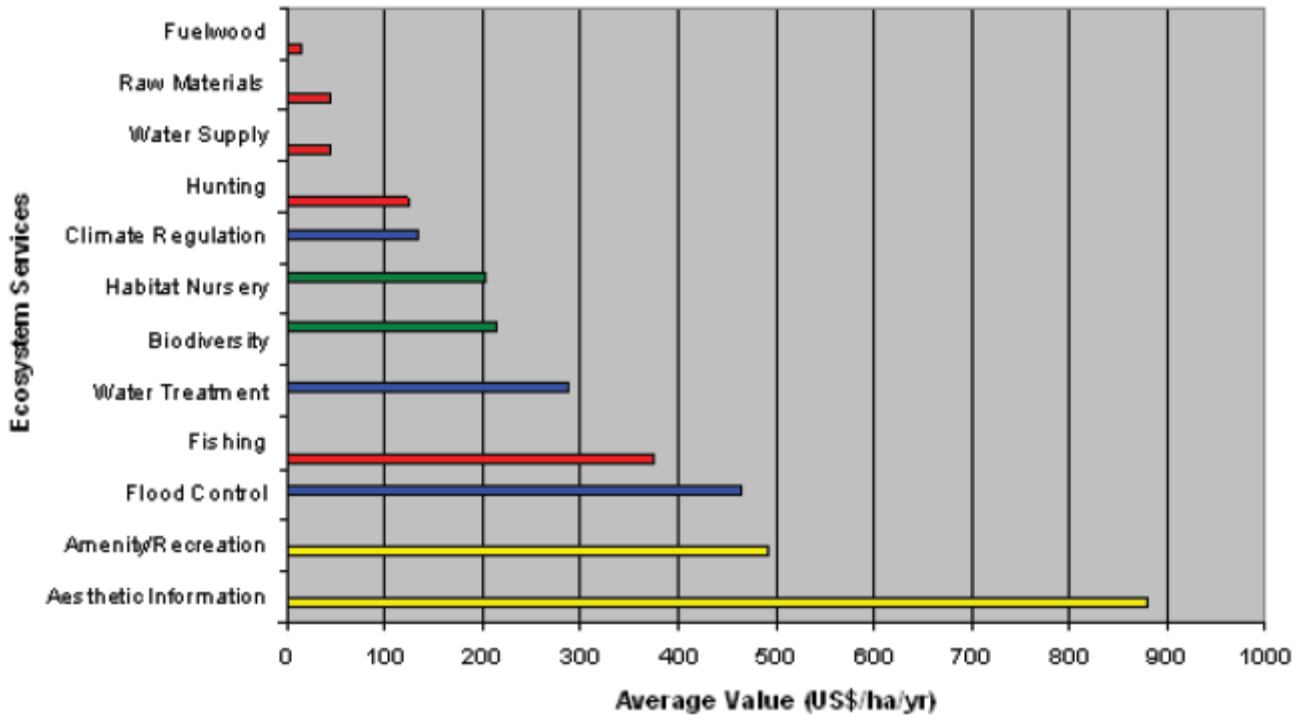
Step 4: Valuation

- *Benefit transfer: Using existing assessments to estimate values*

TEV of wetland ecosystem services (US$ /ha/year)

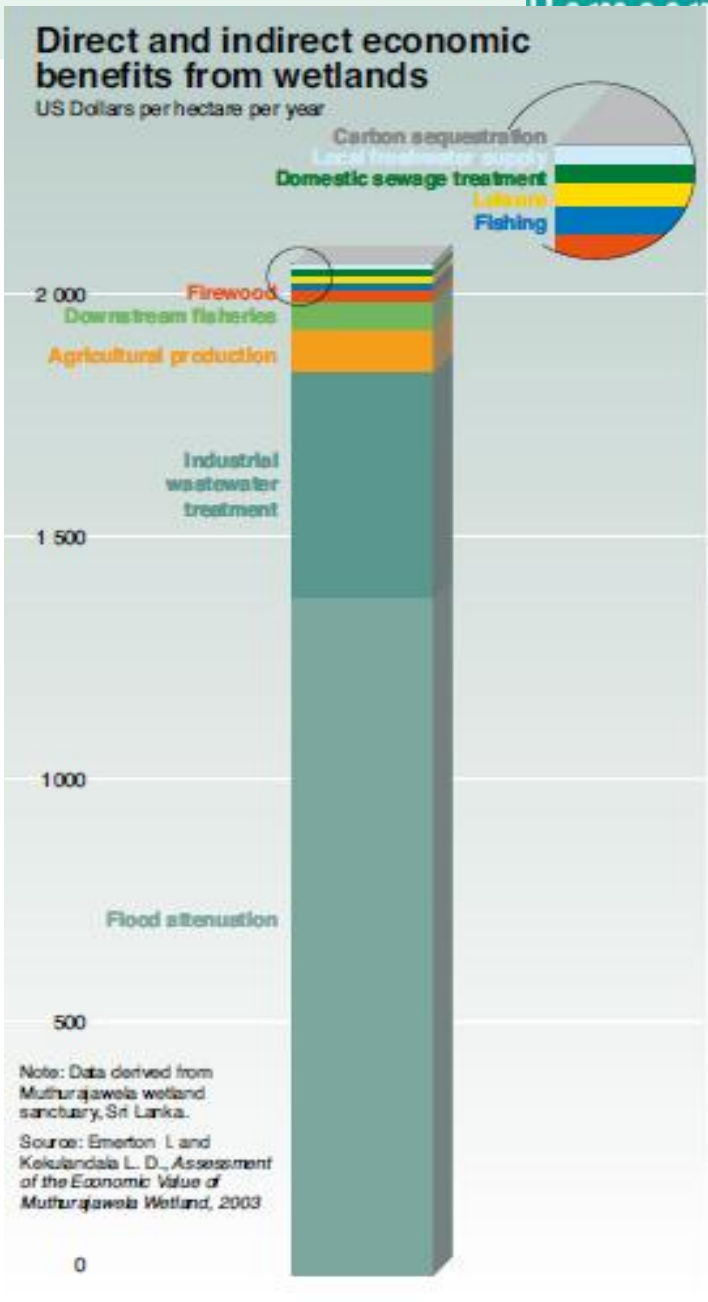
TEV of wetlands:
200 b US$ / annum

Results based on benefit transfer from > 200 valuation studies

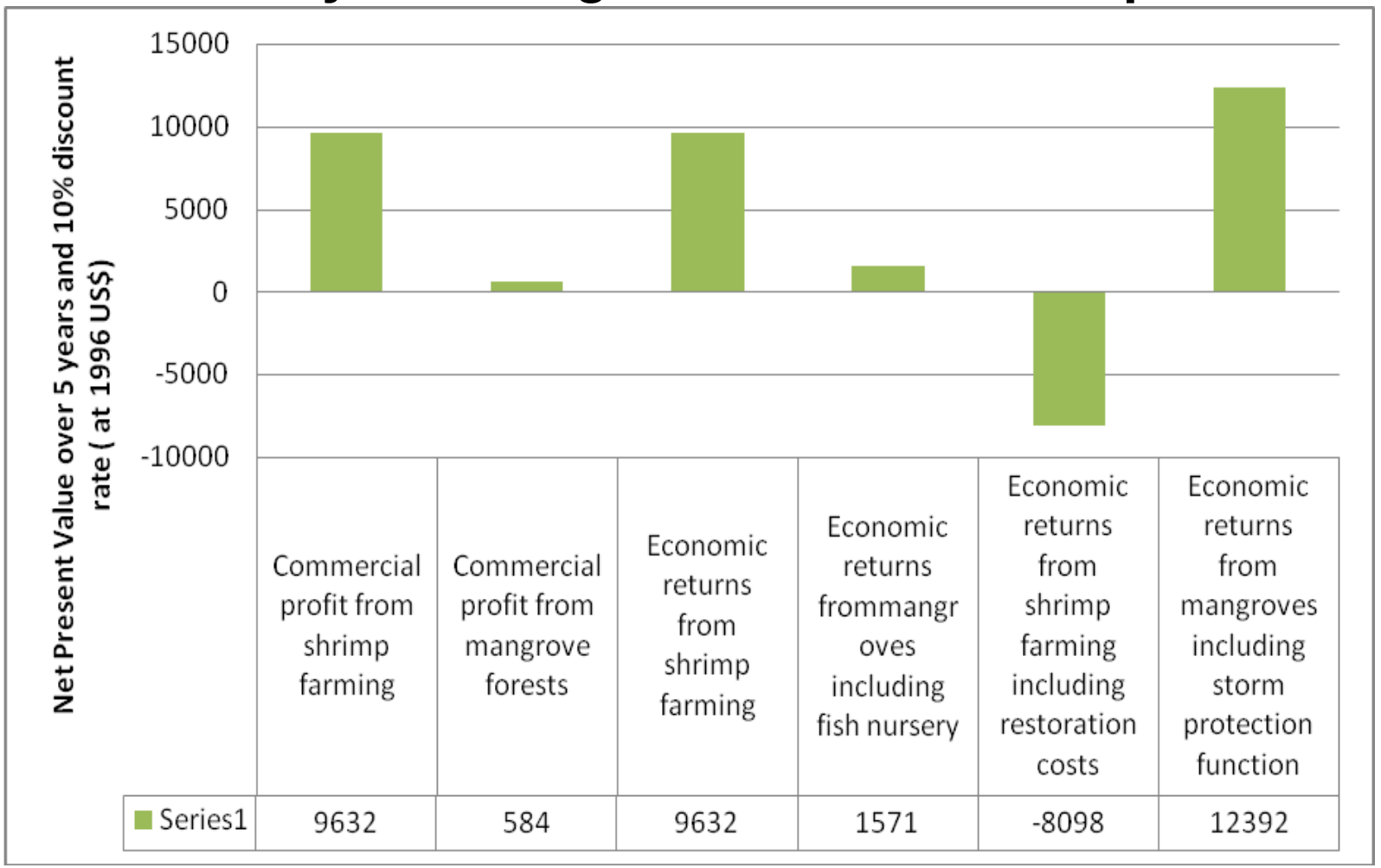


Step 5: Linking valuation to decision making

a) Cost benefit analysis
b) Cost – effectiveness analysis
c) Risk effectiveness analysis
d) Multi – criteria analysis

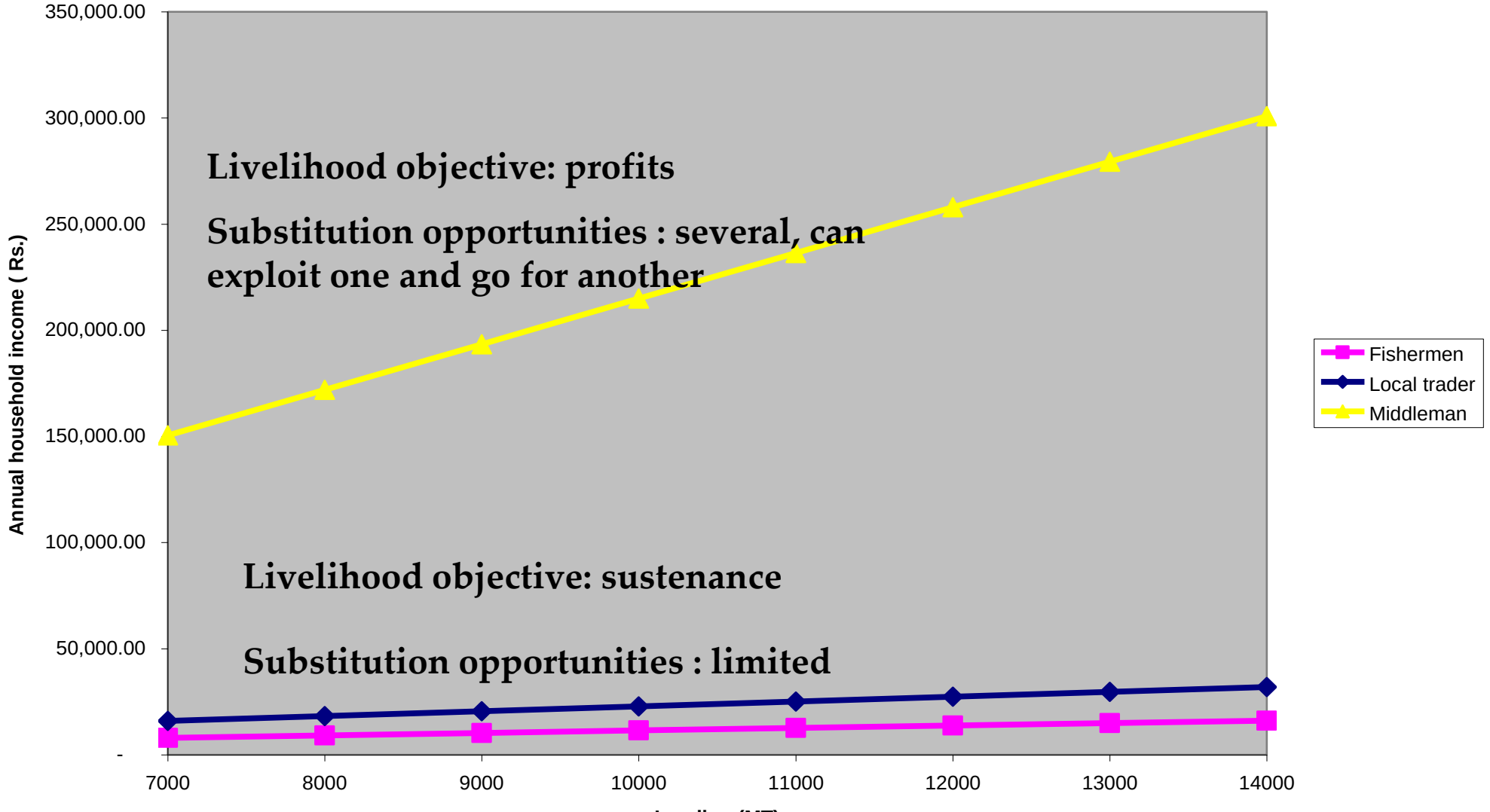


Cost Benefit Analysis: Mangroves versus Shrimp Culture

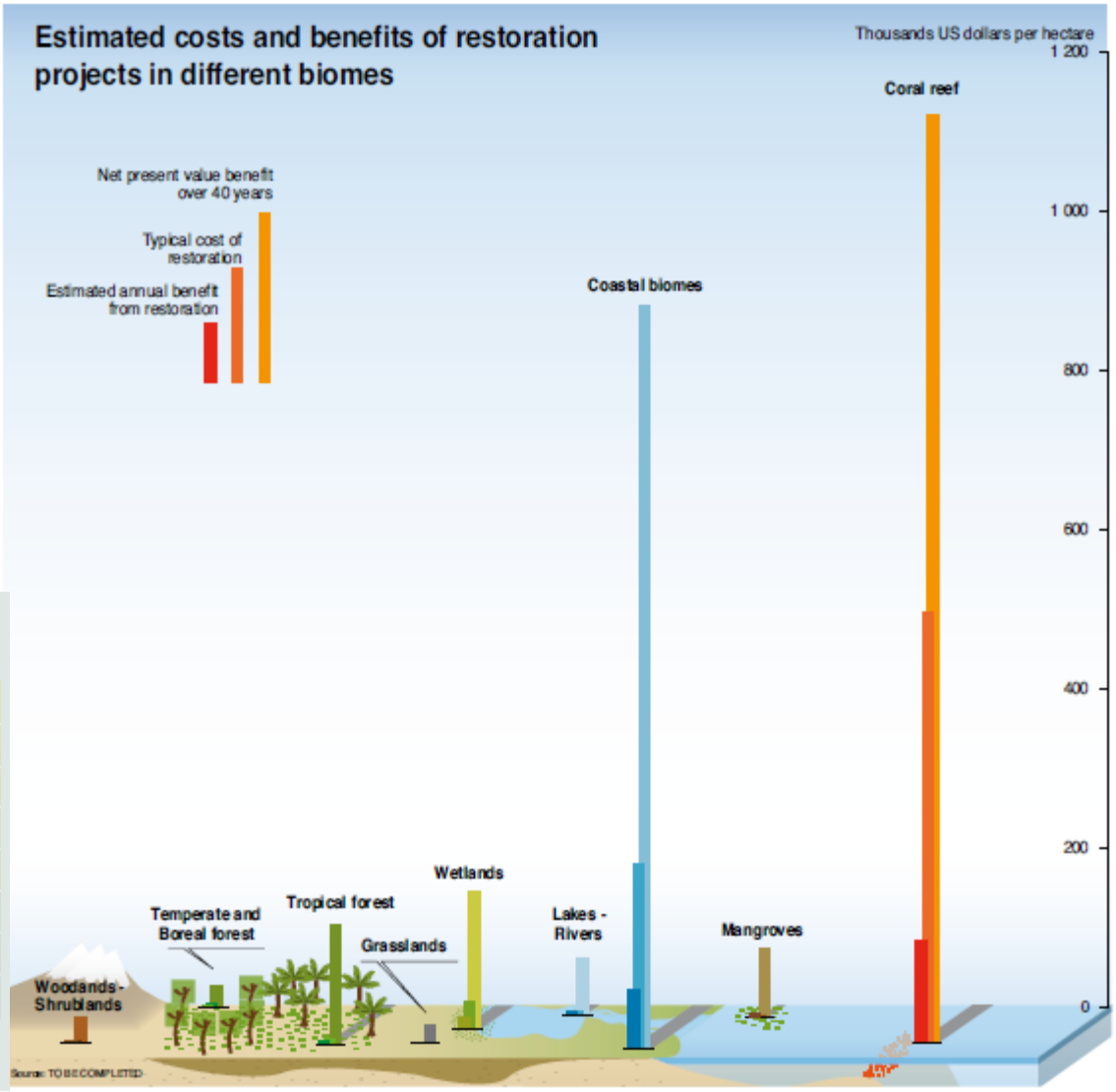


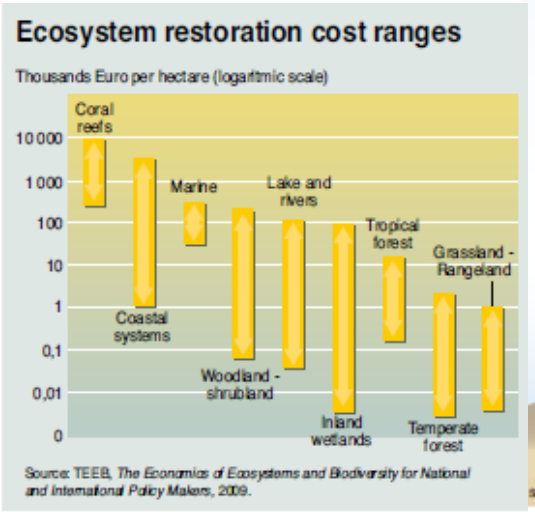
Understanding benefit distribution to stakeholders

(Chilika Lake, Orissa, India)



Assessing costs and benefits of restoration efforts





Questions:

a) What is the role of economic valuation in managing your wetlands ?

b) How can we increase the utility of these guidance?
   1. Tools …
   2. Methods…
   3. Case studies…
   4. Collaborative projects…

Real life decision making is complex

- Real-life decision making uses several forms of valuations, **not merely economic valuation**
  - *Social valuations*
  - *Institutional relationships*
  - *Moral and ethical valuations*

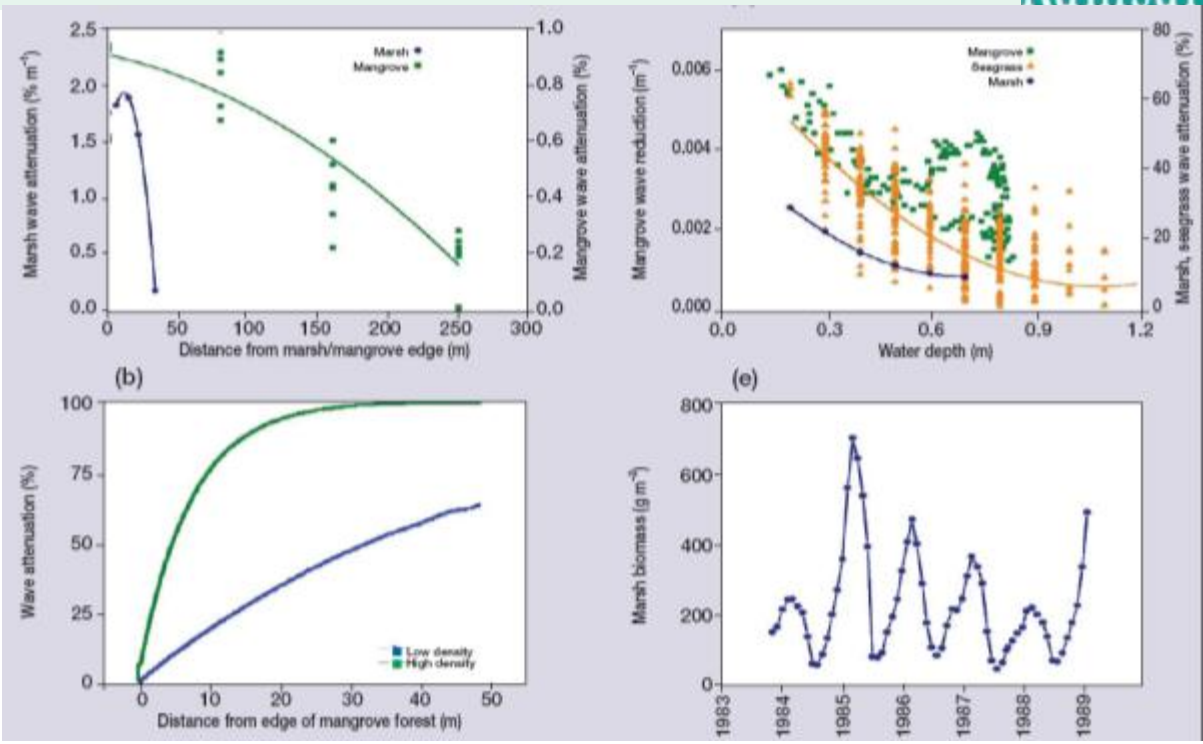
- Economic valuation is just **one** of the decision making tools, and therefore at the best **partial**

Good valuations need to be based on systems understanding

- Ecosystems are complex, and so is the delivery of ecosystem services

- Relationships are not definitive, nested at multiple scales and non-linear

- Valuation should ideally be integrated with rigorous and credible assessment processes



Economic valuation is Utilitarian thinking

- Economic valuation is a largely anthropocentric way of looking at things
- Certain things are beyond utalitarian framework
  - *Culture*
  - *Religious systems*
- Extending economic valuation beyond a certain point raises ethical questions
- For certain things, valuation is **not needed**

Economic valuation is not totally definitive

- Values need to be interpreted as a range , *valuation serves to narrow the range*

- Ascribed to perceptions and preferences of people

- Often not universally valid and transferable