NATURE-BASED RECREATION SERVICES VALUATION

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Goals

- Ecosystem services as contribution of nature
- Obtain estimates of output and intermediate consumption
- Consistency with exchange values used in national accounts
- Exclude consumer surplus

Ecosystem services

- Ecosystem services as contribution of nature (Edens and Hein 2013; Hein et al. 2020)
- Irrespectively of the method used, man-made inputs need to be deducted to arrive at the ecosystem service (as resource rent).
- Following the SEEA Central Framework:

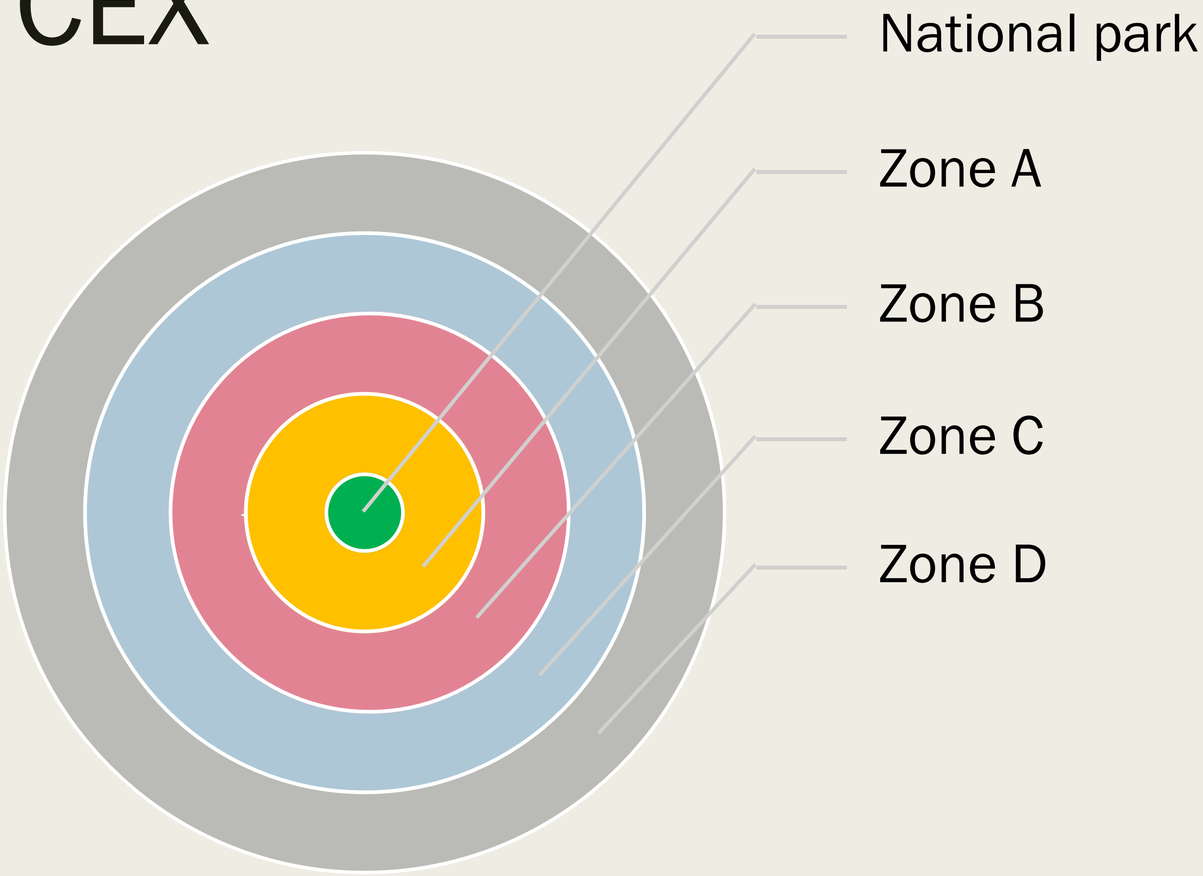
Output (consumption final products)
less intermediate consumption
less compensation of employees
less other taxes on production
plus other subsidies on production
less consumption of fixed capital (depreciation)
less return on produced assets
less labour of self-employed persons
Equals resource rent

Approach		Method	Description
Market Data for ES Available		**Directly observable**	Observed transaction prices for the ES
		Similar markets	Observed transaction prices for the ES in similar markets
No Market Data for ES Available	Production function	**Residual value (Resource rent)**	Deducting cost of inputs from gross value of the final products (1)
		Productivity Change	Change in the market value of a product consequent upon a change in the supply of the ecosystem service
	Cost-based	**Replacement Cost/ Shadow Project**	Cost of replacing the ecosystem service
		Defensive expenditure	Expenditures incurred in preventing adverse environmental impacts
		Avoided damage cost	Cost of damage that would occur if the ecosystem service was lost
		Consumer expenditures	Expenditures to reach recreational area
	Opportunity cost based	**Opportunity cost of alternative uses**	Forgone benefits of not using the same ecosystem asset for alternative objectives
		Simulated exchange value, SEV (current use)	Forgone benefits of not trading in the market the current use of the ecosystem asset
	Revealed preferences	**Hedonic price**	Econometric analysis of property data to derive demand curve for environmental characteristics
		Travel cost*	Econometric analysis of visitor expenditure data to derive demand curve for recreation
	Stated preferences	**Contingent valuation***	Statistical analysis of answers on WTP for a hypothetical environmental change
		Choice experiments*	Statistical analysis of answers on WTP for hypothetical environmental changes (multiple alternatives)

Consumer Expenditures and Simulated Exchange Value methods

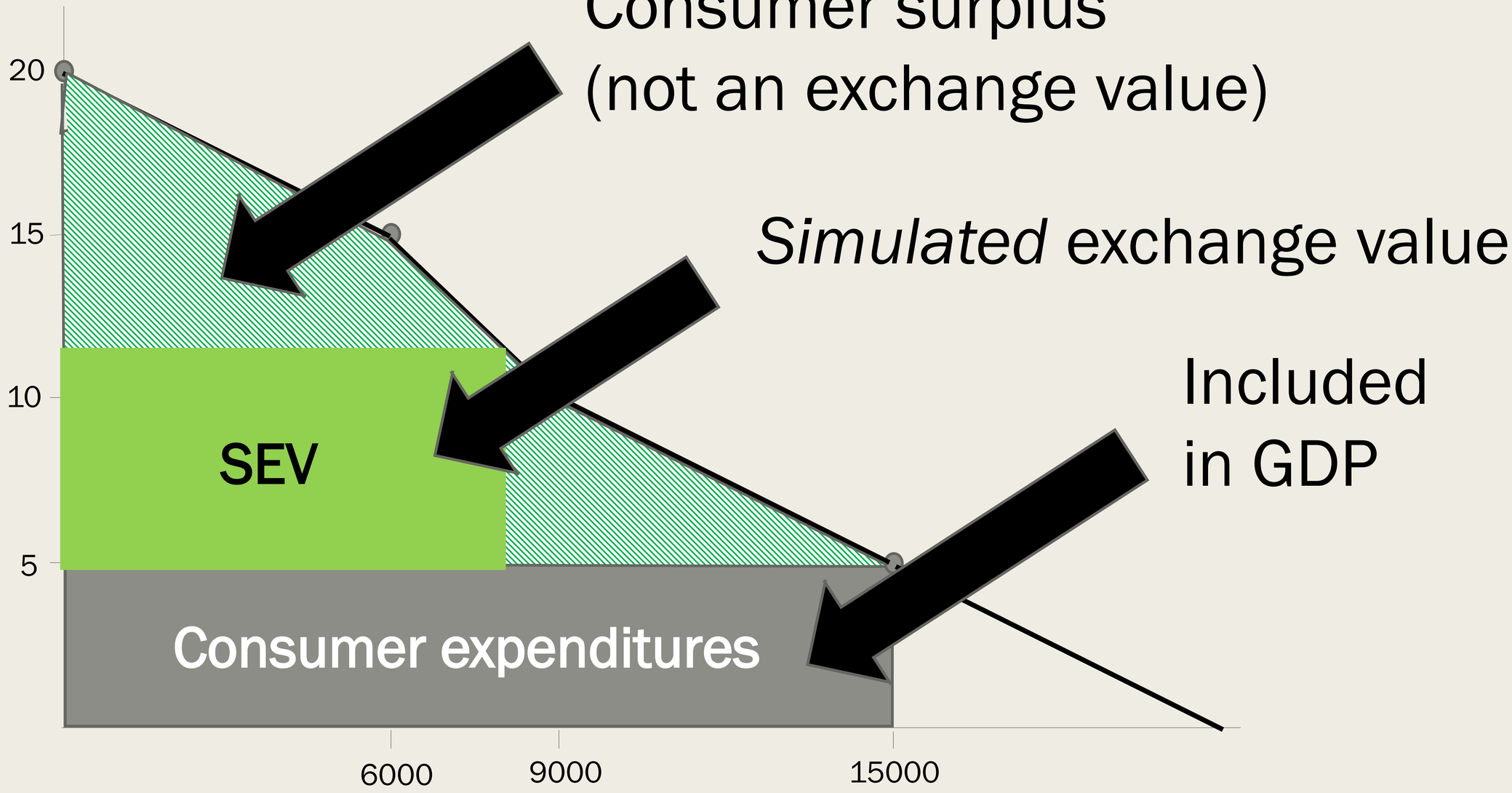
- Travel cost method, contingent valuation and choice experiments all estimate a demand function. Typically, this is used to estimate the consumer surplus.
  - *These estimates are not exchange values*
- The Consumer Expenditures method (CEX) values the recreational use based on the expenditures incurred by consumers to reach the recreational area.
- The Simulated Exchange Value (SEV) method uses the estimated demand to calculate the price that would occur if the ecosystem service were actually marketed (Caparrós et al., 2003, 2017).
  - *The SEV estimates the opportunity cost of not trading in the market the current use of the ecosystem asset, with the current objectives (using the demand, the supply function and the appropriate market structure).*
  - *E.g. if visitors to a National Park pay no entrance fee, the estimated opportunity costs are the foregone benefits of charging an entrance fee*

TCM, SEV and CEX

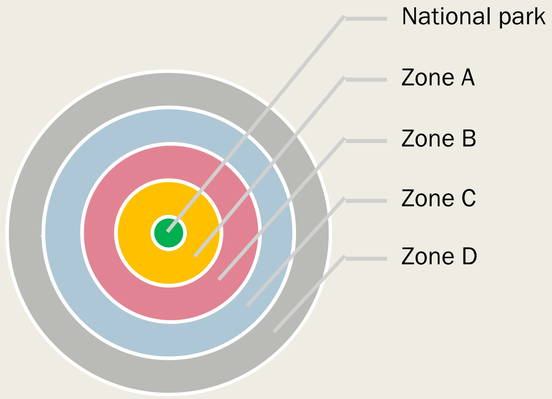


Zone	Travel cost	Population	Visitors from zone …
A	5	25000	15000
B	10	25000	9000
C	15	25000	6000
D	20	25000	0
Total		**100000**	**30000**

TCM, SEV and CEX– Zone A



TCM, SEV and CEX



Zone	Travel cost	Population	Visitors from zone …
A	5	25000	15000
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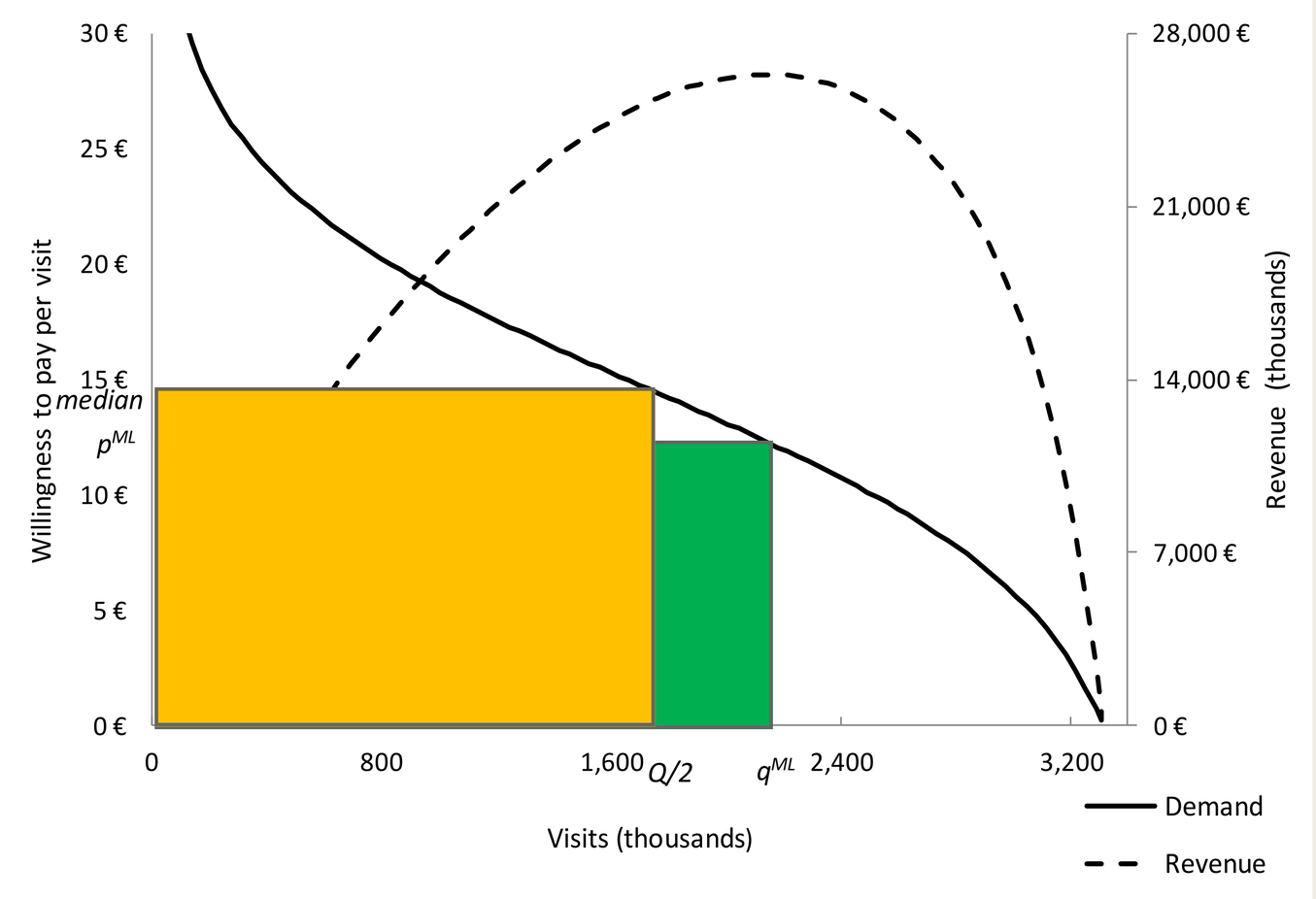
Total		**100000**	**30000**

Zone	Consumer surplus	Consumer expenditures	Simulated exchange value
A	112500	75000	52000
B	52500	90000	26000
C	15000	90000	0
D	**0**	**0**	**0**
Total	**180000**	**255000**	**78000**

SEV for Nature Based Recreation

- *Contingent valuation*
- *Monopolistic competition*
- *10 areas in Andalusia*
- *Costs are assumed to be constant*
- *Site-specific demand functions (Fig. Demand and revenue for recreation in Cazorla)*

Median of WTP times 50% of current visitors is a good approximation



Source: Caparrós et al. (2017)

SEV for Nature Based Recreation (Andalucía)

Model and estimated values	Per visit (€)	Aggregated values (€)	€/ha
Logit (bid)			
Compensating variation	12.91	345,723,904	78.82
Simulated exchange value *(median as proxy)*	12.91	172,861,952	39.41
Simulated exchange value *(short-term monopolistic competition)*	11.38	177,865,907	40.55
Log-logit (log bid)			
Compensating variation	38.52	1,031,783,830	235.22
Simulated exchange value *(median as proxy)*	15.14	202,712,988	46.21
Simulated exchange value *(short-term monopolistic competition)*	25.31	216,934,005	49.46

Median is good approximation

More robust than consumer surplus (Hicksian variations)

Source: Caparrós et al. (2017)

Conclusion

- Exchange values for nature based recreation can be estimated with various methods
- Man-made inputs need to be deducted to obtain the contribution of nature
- Consumer expenditures are relevant for the valuation of recreational services, but already part of GDP
- Travel cost method, contingent valuation and choice experiments provide exchange values when combined with the simulated exchange value method
- Consumer Expenditures are unrelated to consumer surplus while Simulated Exchange Values are always less than the consumer surplus

References:

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