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Benefits and costs of urban parks

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Why is it necessary to value the benefits and the costs of urban green spaces (UGSs)?

Market is unable to provide the right amount of UGSs since:

- they assume the characteristic of public goods and merit goods
- they provide relevant positive externalities.

MARKET FAILURES

Only public intervention can ensure an adequate supply of parks in urban areas.

Even public intervention can be inefficient ("public failures")

In order to find the "right amount" of urban parks it is necessary to **compare the costs and the benefits**

$$\text{Average cost} = \text{Marginal Cost} = \text{Average benefit}$$

The calculation of the costs and especially of the benefits is anything but simple.

Urban green spaces encompass many types of green areas

Urban parks (UPs) are a component of the UGSs and can be defined as **landscapes that have been designed and are managed to meet some needs of the population**

Main types of Green Space			
ALL URBAN GREEN SPACE	Amenity Green Space	Recreation Green Space	Parks and Gardens Informal Recreation Areas Outdoor Sports Areas Play Areas
		Incidental Green Space	Housing Green Space Other Incidental Space
		Private Green Space	Domestic Gardens
	Functional Green Space	Productive Green Space	Remnant Farmland City Farms Allotments
		Burial Grounds	Cemeteries Churchyards
		Institutional Grounds	School Grounds (including school farms and growing areas) Other Institutional Grounds
	Semi-natural habitats	Wetland	Open/Running Water Marsh, Fen
		Woodland	Deciduous woodland Coniferous woodland Mixed woodland
		Other Habitats	Moor/Heath Grassland Disturbed Ground
		Linear Green Space	River and Canal Banks Transport Corridors (road, rail, cycleways and walking routes) Other linear features (e.g. cliffs)

Source: Dunnett, Swanwick and Woolley, 2002

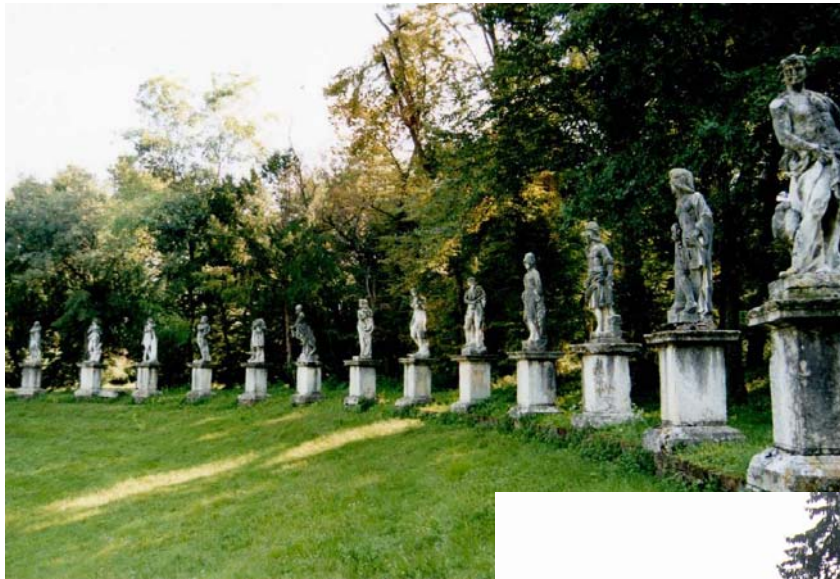
Needs considered when designing a urban park:

- relaxing spending time in contact with nature;
- socializing meeting people or participating in social activities;
- playing and taking part in physical activities and sports
- enjoying the view of landscapes of high aesthetical and architectural quality

The effectiveness of a UPs system has to be valued mainly considering its capacity to satisfy these needs



In some cases, due to their high architectural, artistic, historical and environmental quality, UPs can also have a relevant **educational and cultural value**

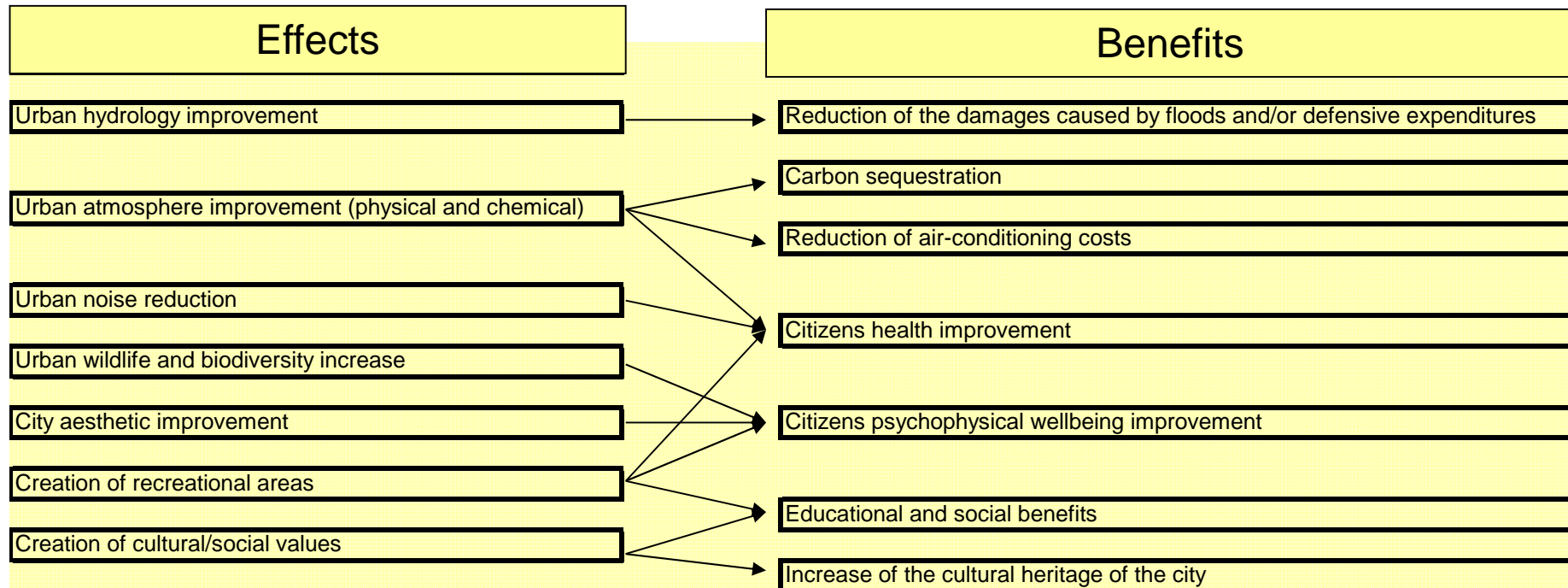


UPs are able to produce many other modifications of the urban environment:

- atmosphere improvement (physical and chemical characteristics)
- stormwater runoff regulation and water depuration,
- traffic noise reduction
- biodiversity increase

These modifications generate some not negligible benefits

Environmental effects and benefits of urban parks



The costs

The costs of UPs can be summarized as follows:

- acquisition
- development (design and construction)
- maintenance

The costs can vary widely depending on the specific characteristics of a park

In general maintenance costs range from 85% to 95% of the total cost (McPherson et al. 2005)



40 municipalities in the Veneto Region
(Tempesta, 1997)

Maintenance costs of UPs per year
(constant price 2012) :

- per m² : from 0.39 to 2.73 euro
average cost = 1.10 euro.
- per inhabitant = 10.08 euro.

15 UK municipalities (Dunnett et al., 2002)

Total costs of UPs per year (constant price
2002):

- per m²: from 0.28 to 1.34 euro
- per inhabitant from 10.61 to 44.12 euro



Benefits valuation methods

- Stated preferences (contingent valuation – choice experiments)
- Revealed preferences (hedonic pricing)
- Other methods (damage costs avoided, defensive expenditures and market value of goods and services provided by the natural environment)

However none of these methods permits to assess simultaneously all the benefits provided by the UPs

Hedonic pricing (HP)

Numerous studies used this method to estimate the value of UPs but the results are often not entirely comparable.

McConnell and Walls (2005) state that “the values tend to vary widely with the size of the area, the proximity of the open space to residences, the type of open space, and the method of analysis” so the results tend to be very case-study specific.

Despite the high variability of HP researches, “a positive impact of 20% on property value abutting or fronting a passive park area is a reasonable starting point guideline”.

“In the case of community size parks it tended to extend out to 450 – 600 m but after 150-180 m the premium price was very small” (Crompton, 2005).

Hedonic pricing limitations

The meaning of the HP is unclear

There are several motivations that can induce people to pay more for a home located near an UP: the view of the green area, less time needed to reach the park, health benefits, reduction in air-conditioning costs, etc.

HP can not estimate the total value of the benefits generated by a UP but a mix of some of them.

E.G. by means of HP it is not possible to capture the recreational benefits for people living far from the park.

The influence of an UP on house prices tends to disappear within a radius of 600 m

The visitors of Ups usually come from a wider area. 40% of visitors to 7 UPs in the Veneto Region travelled more than 5 km to reach the recreational area (Tempesta, 2009).

Contingent valuation (CV)

Contingent Valuation is the most applied method to value the benefits produced by several categories of amenities.

Despite some limitations and some of bias (Arrow et al., 1999), in the case of familiar goods (like UPs) the values obtained may be considered substantially reliable.

Several studies applied CV to estimate mainly the recreational value of existing parks

The recreational benefits per hectare are very variable

Recreational value of 13 Italian urban parks

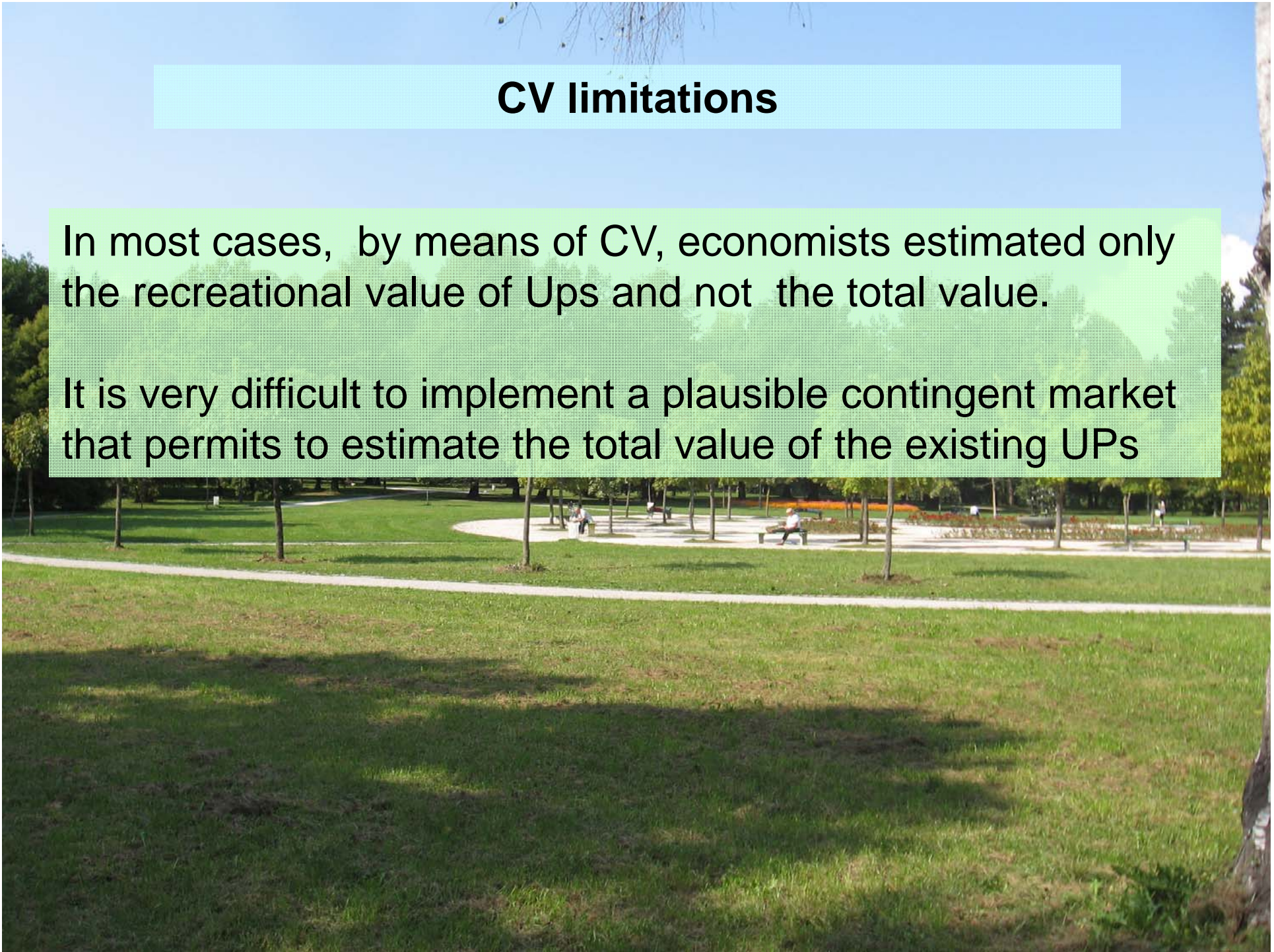
Park	Municipality	Surface (ha)	WTP (euro per visit)	Total WTP euro per ha per year
Villa Voegel	Florence	4.98	3.19	5,924.2
Villa Strozzi	Florence	8.70	4.31	12,165.9
Piazza Tasso	Florence	0.62	2.08	22,427.5
Borgo Allegri	Florence	0.19	4.25	8,145.8
Campo di Marte	Florence	2.60	3.23	9,415.3
Galluzzo	Florence	1.22	5.33	<u>24,754.9</u>
Castello S. Martino	Cervarese Santa Croce (PD)	1.88	1.49	<u>1,535.0</u>
Villa Bolasco	Castelfranco Veneto (TV)	7.63	2.79	2,560.0
Manin	Montebelluna (TV)	3.20	1.40	14,427.0
Buzzaccarini	Monselice (PD)	3.24	0.90	2,781.0
Iris	Padova	6.50	1.12	18,748.0
Bosco di Pianura	Piove di Sacco (PD)	5.00	2.68	16,529.9
Villa Margherita	Treviso	6.50	2.03	14,354.3

In 4 cases out of 13, the maintenance costs are higher than the recreational benefits.

CV limitations

In most cases, by means of CV, economists estimated only the recreational value of Ups and not the total value.

It is very difficult to implement a plausible contingent market that permits to estimate the total value of the existing UPs



Other methods

In recent years, there has been an attempt to evaluate the benefits generated by Ups one by one

With this aim some authors applied the STRATUM methodology originally proposed by the US Forest Service to estimate the total economic value of urban trees (McPherson and Simpson, 2002; Millward and Sabir, 2011).

These approaches try to transform trees and/or other elements of parks cover into a monetary value by defining a trade-off between the environmental modifications and the costs saved by the community

Municipal Forest Benefits and Costs in Five US Cities

Table 2. Annual benefits and costs for each city

Total benefits	Ft. Collins	Cheyenne	Bismarck	Berkeley	Glendale
Energy	112,025	186,967	84,348	553,061	116,735
CO ₂	40,454	29,134	27,268	49,588	12,039
Air Quality	18,477	11,907	3,715	-20,635	32,571
Stormwater	403,597	55,297	496,227	215,648	37,298
Property increase	1,596,247	402,723	367,536	2,449,884	467,213
Total benefits	2,170,799	688,029	979,094	3,247,545	665,856
Total costs					
Planting	111,052	45,913	5,880	95,000	21,100
Pruning	405,344	84,677	94,850	770,000	88,412
Remove/dispose	130,487	23,337	50,061	70,000	12,710
Im/liter/gm waste	94,394	97,840	38,241	195,000	65,813
Infrastructure and liability	72,200	0	21,490	1,062,000	3,000
Amin/inspect/other	184,161	76,130	106,118	180,000	85,401
Total costs	997,638	327,897	316,640	2,372,000	276,436
Net benefits	1,173,161	358,133	662,454	875,545	389,421
BCRs	2.18	2.09	3.09	1.37	2.41

Source: McPherson et al. 2005

Summary Table. The Estimated Annual Value of the Denver Park and Recreation System

Revenue-Producing Factors for City Government

Tax receipts from increased property value	\$4,081,302
Tax receipts from increased tourism value	\$3,048,861
Total	\$7,130,163

Cost-Saving Factors for City Government

Stormwater management value	\$804,187
Air pollution mitigation value	\$128,914
Community cohesion value	\$2,674,422
Total	\$3,607,523

Cost-Saving Factors to Citizens

Direct use value	\$452,014,285
Health value	\$64,955,500
Total	\$516,969,785

Wealth-Increasing Factors to Citizens

Property value from park proximity	\$30,690,771
Net profit from tourism	\$18,027,542
Total	\$48,718,313

Source: Trust for Public Land - Center for City Park Excellence, 2010

Other methods limitations

The relationship between urban parks and urban environment transformations has not yet been completely analyzed

Sometimes the coefficients utilized to transform the physical modifications of the urban environment into a monetary value do not seem to be scientifically grounded.

Since the aesthetic value is estimated by means of a simplified hedonic pricing approach an evident problem of double counting exists.



Conclusions

Scholars have devoted a lot of attention to estimate the total economic value of UPs in the last years

The scientific literature review has shown some not negligible drawbacks

None of the existing valuation approaches are free of limitations and bias

Despite these negative aspects past researches have to be considered very useful since they allowed :

- to refine the methodologies
- to put on evidence that UPs has a positive interaction with the economy of the cities

The assessment of the recreational value can be considered substantially reliable

Past studies seem to indicate that the recreational benefits generated by UPs, in many cases, overcome the management costs.

This knowledge is useful since it can foster the creation of new green areas and correct the market failures in the allocation of land between alternative uses

More efforts are necessary to estimate correctly also the total value of the urban parks



Thank you for your attention