Valuation of urban NBS: application of benefit transfer method and lessons learnt

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NATURVATION
cities – nature – innovation

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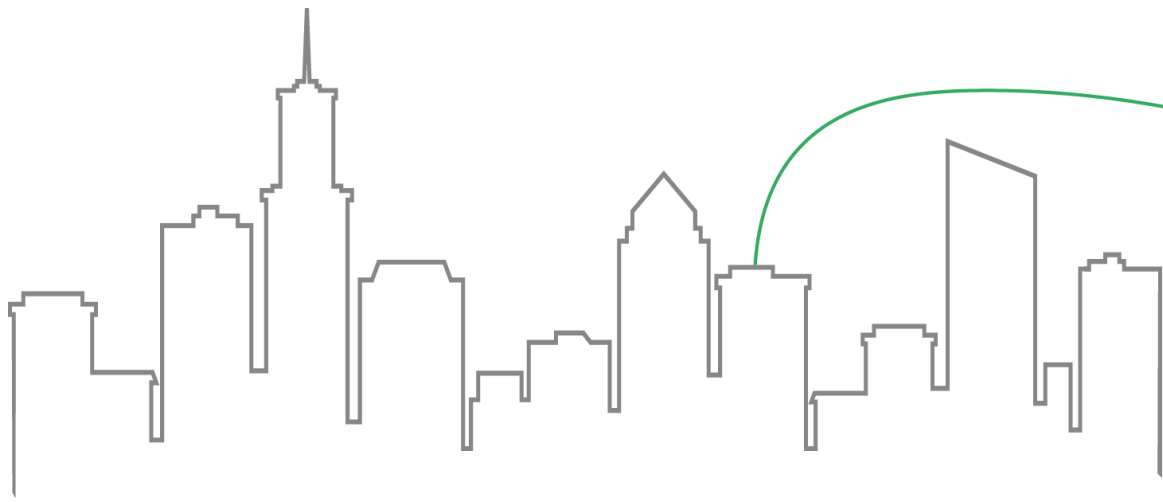Utrecht University School of Economics

CONTEXT

METHOD

FINDINGS

CONCLUSIONS
CHALLENGES
SOLUTIONS

CONTEXT

Economic valuation in H2020 NATURVATION project

1) Literature overview

- Economic values database

2) Methods for NBS assessment and NBSAF

- NBS assessment methods database
- **Estimation of NBS value functions**

3) Application of NBS value functions to assess NBS impacts

- European Urban Nature Atlas

**ECONOMIC
VALUATION
METHODOLOGY:**

**Stated preferences
Revealed preferences
Benefit transfer**

Benefit transfer method (BT)

FEATURES

- Uses primary valuation data / existing assessments
  → meta-analysis method

- Quantitatively analyses primary valuation data / existing assessments
  → Value transfer function (VTF)

- Enables applying VTF to a different location / context
  → obtain context & location specific values

ADVANTAGES

- Can be conducted relatively fast compared to primary valuation studies

- Based on up-to-date values and techniques from a variety of contexts, locations, nature types, ecosystem services, …

DISADVANTAGES

- Aggregates data

- Depend on data from existing studies (e.g. NBS type)

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METHOD

BENEFIT TRANSFER:

value transfer function specification

$$y_{ij} = \alpha + \beta^c X^c{}_{ij} + \beta^\alpha X^\alpha{}_{ij} + \beta^s X^s{}_{ij} + \mu_j + \varepsilon_{ij}$$

y_{ij} - the annual per hectare urban nature values (2016 EUR)

$\beta^c X^c{}_{ij}$ - socio-economic matrix

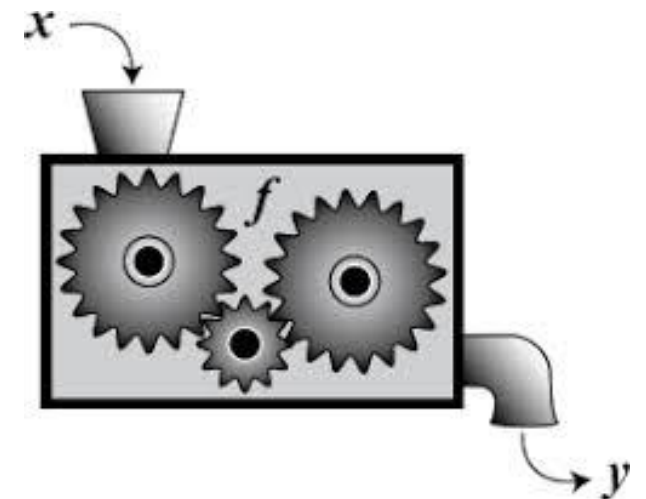$\beta^\alpha X^\alpha{}_{ij}$ - study characteristics matrix

$\beta^s X^s{}_{ij}$ – site characteristics matrix

μ_j - residuals on the observation level

ε_{ij} - residuals on the author level

Mixed effect model;
multi-level model (MLM)

N=147

MAIN FINDINGS

BENEFIT TRANSFER:

results

- **Value transfer function (VTF) estimation:**
  economic variables are associated with values of NBS in an expected way, namely:
  - higher income per capita is associated with higher per ha NBS value
  - higher urban density is associated with higher per ha NBS value
  - bigger area of NBS is associated with lower per ha value of NBS

- **Types of urban nature:**
  Urban parks is valued higher than an urban forest, blue nature or urban green connected to grey

- **Scale:**
  VTF's based on global data and European-only data are estimated for various NBS types / ecological domains

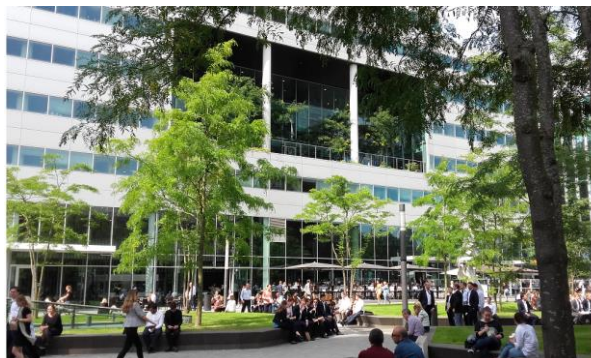 Additional BTF's are being estimated with focus on area size.

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MAIN FINDINGS

BENEFIT TRANSFER:

estimation results – average values

Type of nature:	Average value in 2016 USD per ha per year	
	Global data	**European data**
Park	$11,007	$ 12,338
Green connected to grey	$1,955	$ 2,601
Blue	$1,895	$ 1,058
Forest	$1,523	$980
Peri-urban areas	$1,187	$980

Bockarjova, Botzen and Koetse (2018), submitted to journal

APPLICATION

BENEFIT TRANSFER:

European Urban Nature Atlas

https://naturvation.eu/atlas

MAIN FINDINGS

BENEFIT TRANSFER:

example – application of VTF to specific NBS

	Cordoba	Stockholm	Strasbourg	Athens
	Asomadilla Park	*The Royal National City Park*	*Danube Eco-District*	*Hellenikon Metropolitan Park*
Area (ha)	27	2700	1	200
GDP per capita (2016 USD)	25587	65853	37160	35653
Population density	260	3597	3500	7500
BTF application (European data)				
Value per ha per year (2016 USD)	$509,194	$46,336	$33,527,530	$251,865
Total value, per year (2016 USD)	$13,748,234	$125,107,874	$33,527,530	$50,372,975

INFLATED VALUES OF NBS WITH LOW ARE SIZE

Bockarjova, Botzen and Koetse (2018), submitted to journal

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Meta-analysis of values of urban green and blue nature

CONCLUSIONS & REMARKS

ESTIMATION
APPLICATION
NEXT STEPS

CONCLUSIONS

- BT / meta-analysis is a useful tool to systematically analyse economic value of urban nature
  → meta-analysis method / VTF
- VTF applied to obtain economic value of actual NBS's
  → European Urban Nature ATLAS
- BT can be used at different scales
  → global / European

CHALLENGES / application

- NBS area sizes partially not available in Urban Nature Atlas
- Inflated values of small-size urban nature

SOLUTIONS

- Extra data search / approximation of area sizes
- Fine-tuning of VTF's for various area sizes
- Specify application procedure

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