



IWUN

Improving wellbeing through urban nature



VALUING NATURE

Valuing Nature-based Interventions: the Economic Evaluation of Park Improvements for Health and Wellbeing

13-14 Nov 2018

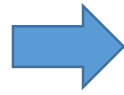
Jing Ma

Department of Urban Studies and Planning
The University of Sheffield



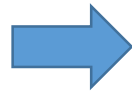
Introduction

IWUN



It aims to find out more about how Sheffield's natural environment can improve the health and wellbeing

Work
Package 4



4.1 Developed green blue infrastructure interventions
4.2 Undertaking economic appraisal of the interventions



IWUN WP 4.2 findings

Nature-based interventions



Finding 1: Cost-effectiveness of café and toilets

Direct costs and benefits

Costs

- Construction
- Professional fees
- Ground and turnover rent
- Service charges
- Utility costs
- Stocks
- Maintenance
- Staff
- Licenses and insurance

Benefits

Income from sales

of:

- Coffee
- Food and beverage

Wider costs and benefits

Costs (EDS)

Loss of:

- Carbon storage, carbon sequestration, Stormwater runoff, Compost biomass provision, Aesthetic and recreation

Benefits

- Physical and Mental health improvement
- Increased access to ES
- Increase in house price

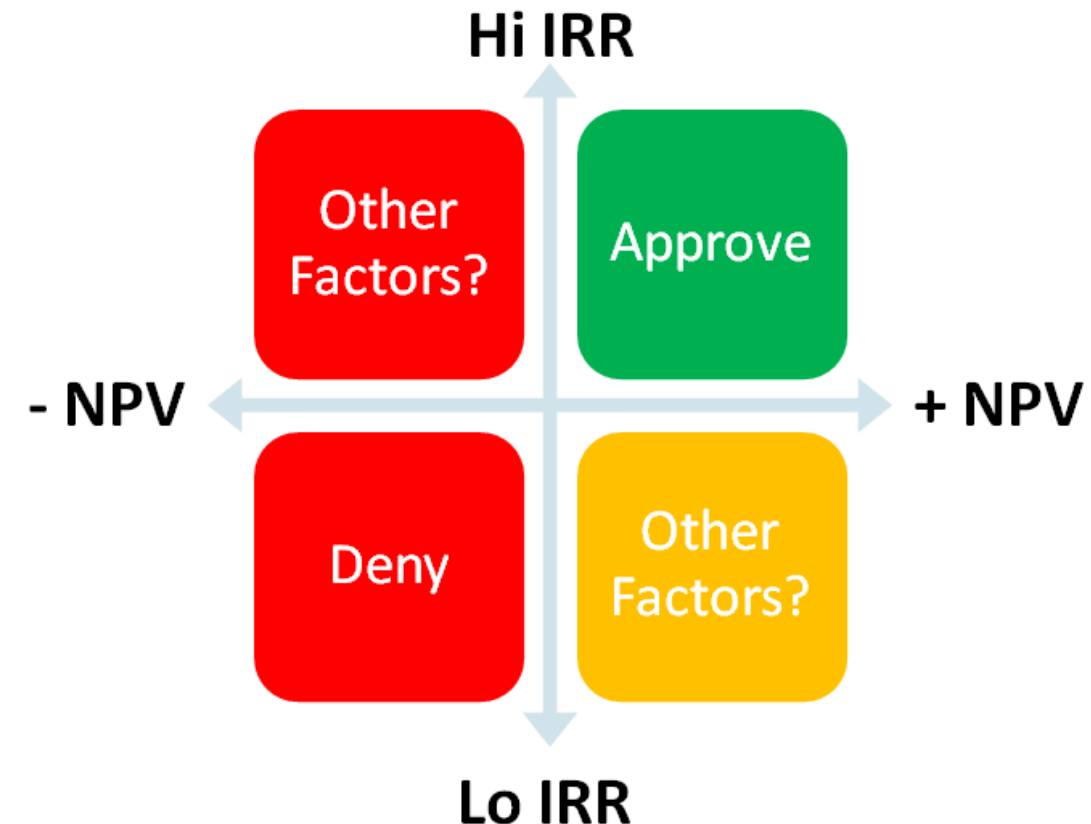


IWUN WP 4.2 findings

Results of the cost-effectiveness of café and toilets

	Project CBA (£)	Wider CBA (£)
Total costs	3,073,060	39
Total benefits	4,103,911	983,210
Net cash flow	1,030,851	983,167
NPV	806,290	813,431
IRR	39%	NA

Notes: 10-year lifespan, 3.5% discount rate



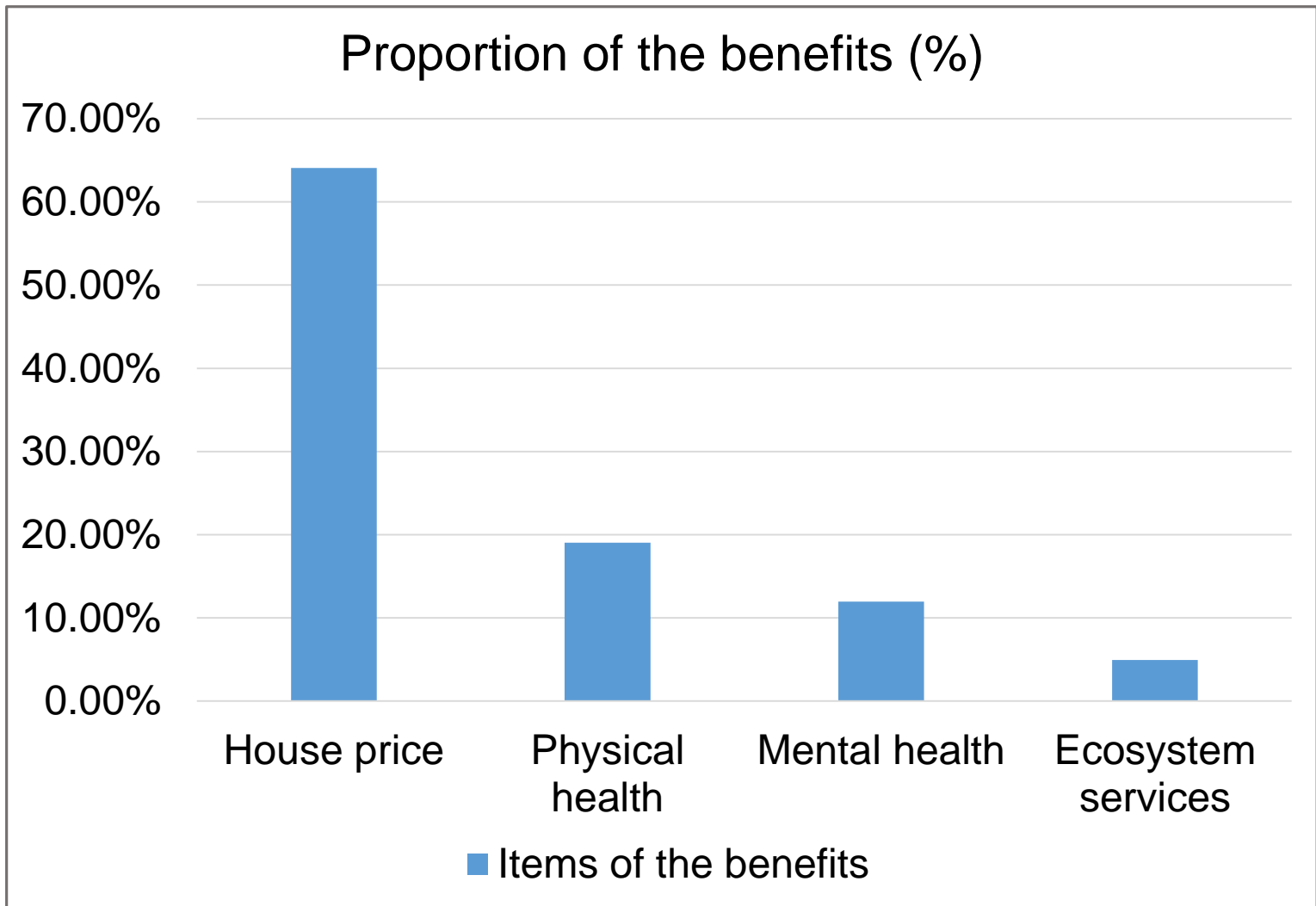
IWUN WP 4.2 findings

Wider Benefits

House price increase

Physical and mental health improvement

Ecosystem service



Finding 2: Estimating impact on visitors/visits

Costs and benefits dependent on visitors/visits/duration

Direct costs

- Construction
- Professional fees
- Ground and turnover rent
- Service charges
- Utility costs
- Stocks
- Maintenance
- Staff
- Licenses and insurance

Direct benefits

Income from sales

of:

- Coffee
- Food and beverage

Wider costs (EDS)

Loss of:

- Carbon storage, carbon sequestration, Stormwater runoff, Pollination, Compost biomass provision, Aesthetic and recreation

Wider benefits

- Physical and Mental health improvement
- Increased access to ES
- Increase in house price

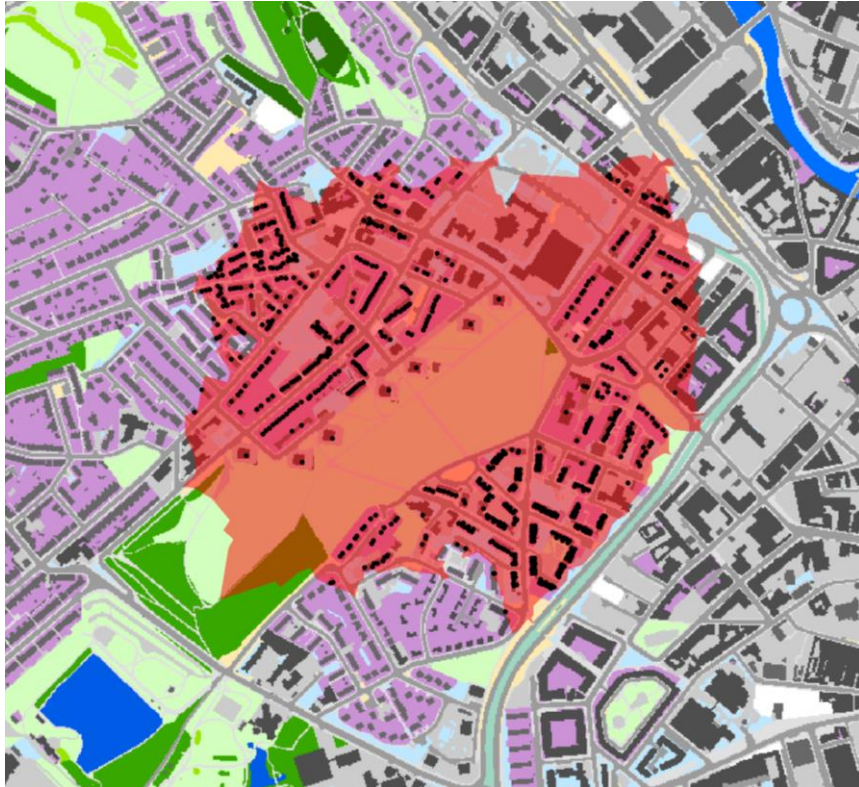
IWUN WP 4.2 findings

Café location in Ponderosa Park

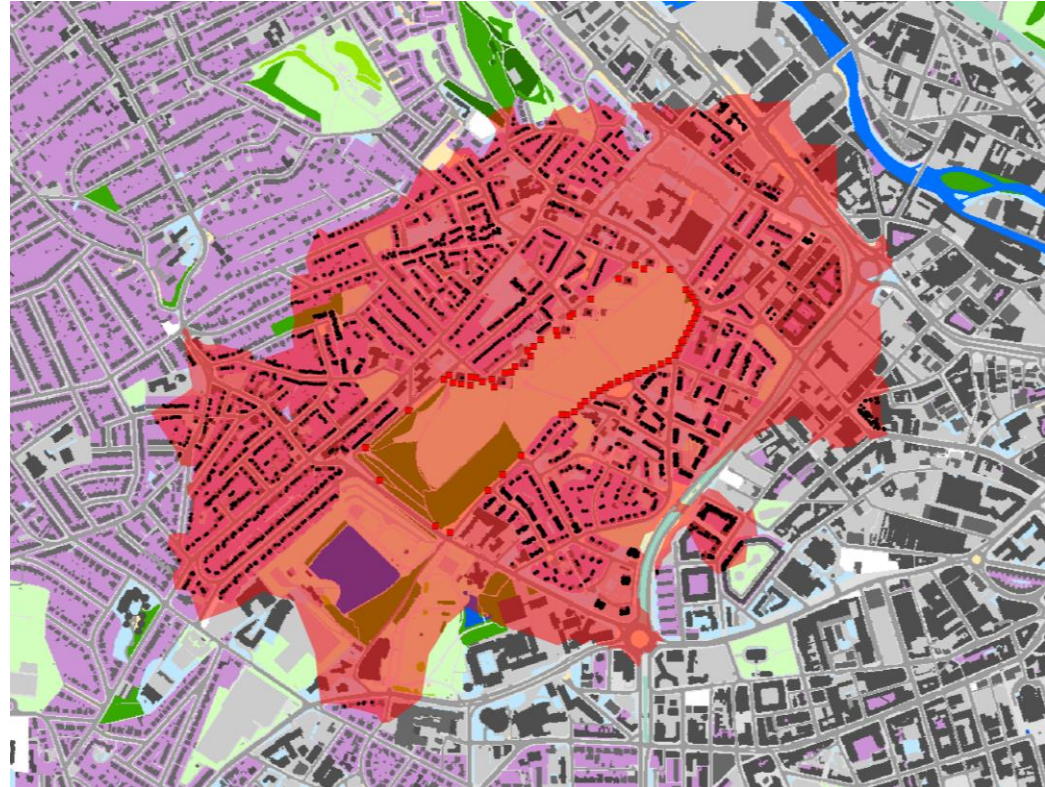


IWUN WP 4.2 findings

Change of the catchment data in Ponderosa Park



500m from café
Population: 2771
Households: 1128



500m from every possible entrance of the park
Population: 7532
Households: 2923

IWUN WP 4.2 findings

Estimating impact on visitors/visits/duration

	Without café	With café	Net increase	Increase rate
Number of visitors	299 daily	370	71	2.56%
Number of visits	607 daily	658	51	8.4%

Notes: number of visitors and visits depends on the catchment population, tendency of visit (%), and duration hours (no data)

Population base: 2771

Households: 1128

Data source used: Ponderosa Park survey 2018 , Sheffield City Council

IWUN WP 4.2 findings

* Physical health improvement (Source: Natural capital accounts for public green space in London)

Physical Health	Value (£)
Benefits	580m/yr
Estimated costs of physical inactivity	8.5bn/yr
Benefit from parks as a proportion of total cost	7%
Per person benefit (persons of all ages)	67/head/yr

WP 4.2 results: $67 \times 2771 \times 2.56\% = \underline{\underline{\pounds 4,752}}$
 $67 \times 2771 \times 8.4\% = \underline{\underline{\pounds 15,595}}$

IWUN WP 4.2 findings

* Mental health improvement (Source: Natural capital accounts for public green space in London)

Mental Health	Value (£)
Benefits	370m/yr
Estimated costs of mental ill health	17bn/yr
Per person benefit (persons of all ages)	42/head/yr



Mental
Health

WP 4.2 results:

$$42 \times 2771 \times \underline{2.56\%} = \underline{\pounds 2,979}$$

$$42 \times 2771 \times \underline{8.4\%} = \underline{\pounds 9,776}$$

Estimating impact on visitors/visits

	Data source
Catchment data	Generally average aggregated data from large areas
Tendency to visit data	Same as above
Duration of visit data	NO DATA
For each case study	NO DATA

- Data sources: Natural capital account for public green space in London (Vivid Economics);
- The contribution made by Sheffield's parks to the wellbeing of the city's citizens (Vivid Economics)

IWUN WP 4.2 findings

Finding 3: House price – typically the largest benefit in most studies

Based on average
Stock not flow
Capital accounting



IWUN WP 4.2 findings

House price increase

Source of house price	House price (£)
UK average	226,351
Yorkshire & Humber average	158,966
Local house price average	90,000 – 135,000
1,128 x 50% x local house price average	50,760,000 – 76,140,000

Notes: the number of households in the case area is 1128

Data from HM Land Registry, field work, market price from private agencies

IWUN WP 4.2 findings

** Increase in house price (source: UK House Price Index, HM Land Registry)

Average price per household in Yorkshire and the Humber is £158,966, the average annual increase in house price is **2.9%** (UK House Price Index), the increase of house prices close to green space increase 3-12% (Noor, Asmawi and Abdullah, 2015). Take **3%** as the example, the number of households around Ponderosa Park is 1128, and only 50% of them are on the market.

WP 4.2 results: $112,500 \times 2.9\% \times 3\% \times 1128 \times 50\% = 55,201$ (£/per year)

Noor, N. M., Asmawi, M. Z., & Abdullah, A. (2015). Sustainable Urban Regeneration: GIS and Hedonic Pricing Method in determining the value of green space in housing area. *Procedia-Social and Behavioral Sciences*, 170, 669-679.

Incoming research

Ecosystem Service (ES) and Ecosystem Disservice (EDS)

Wider costs	Annual costs (£)	Years	Total costs (£)
Carbon storage	0.85	10	8.54
Carbon sequestration	0.02	10	0.24
Stormwater runoff	0.69	10	6.94
Compost biomass provision	0.55	10	5.51
Aesthetic information	1.52	10	15.21
Recreation	0.30	10	3.0
Total	3.93	10	<u>39.3</u>

Markandya, A. (2016). Cost benefit analysis and the environment: How to best cover impacts on biodiversity and ecosystem services (No. 101). OECD Publishing. P. 14

- **1. Benefits obtained from Ecosystem Service (ES)**
- 2. Impact on ecosystem services by increased number of visitors/visits/duration in the park
- 3. CBA of green interventions 2 & 3