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Enhancing adaptation to climate change in urban environments through brownfield land

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Outline

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- Introduction
  - Brownfield land
  - Urban ecosystem services
- Case study: Greater Manchester, UK
- Conclusions

Introduction

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- Green spaces provide important ecosystem services in urban areas
- Important role in adapting cities to climate change
- Difficult to create new green spaces in dense urban centres
- Brownfield land (or previously developed, vacant, contaminated, derelict land) may provide a solution

Brownfield land

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- Affected by the former uses of the site or its surrounding land
- Derelict or underused
- Mainly in developed urban areas
- Require intervention to return them to beneficial use
- Real or perceived contamination issues

(CABERN, 2012)

Brownfield land in the news

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Planning shake-up to get more homes built

10 July 2015 | UK Politics | 695

Developers could get automatic planning permission to build on disused industrial sites in England.

Ministers would also get powers to seize disused land, while major housing projects could be fast-tracked, and rules on extensions in London relaxed.

Business Secretary Sajid Javid unveiled **the plans as part of a broader push to boost Britain's productivity**.

It came as official figures showed new house building fell by 5.8% in May, the sharpest decline in nearly four years.

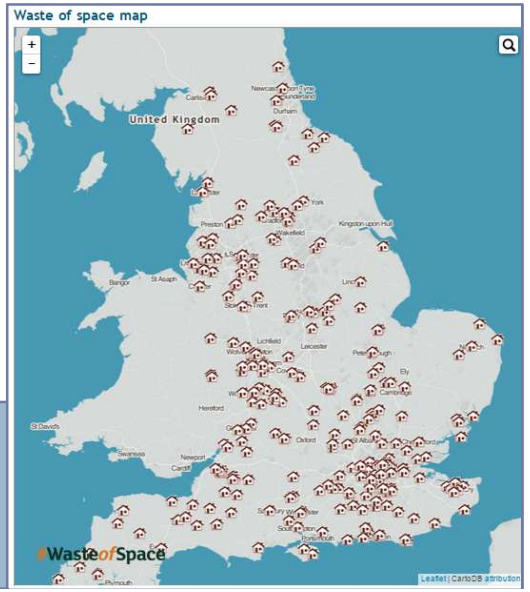
10.07.15

Automatic planning permission for brownfield land

Words: Laura Edgar

New policy announced by the government today will see automatic planning permission granted on brownfield sites in an attempt to raise the productivity of the economy.

CPRE 'Waste of Space' Campaign



Focus on biodiversity value

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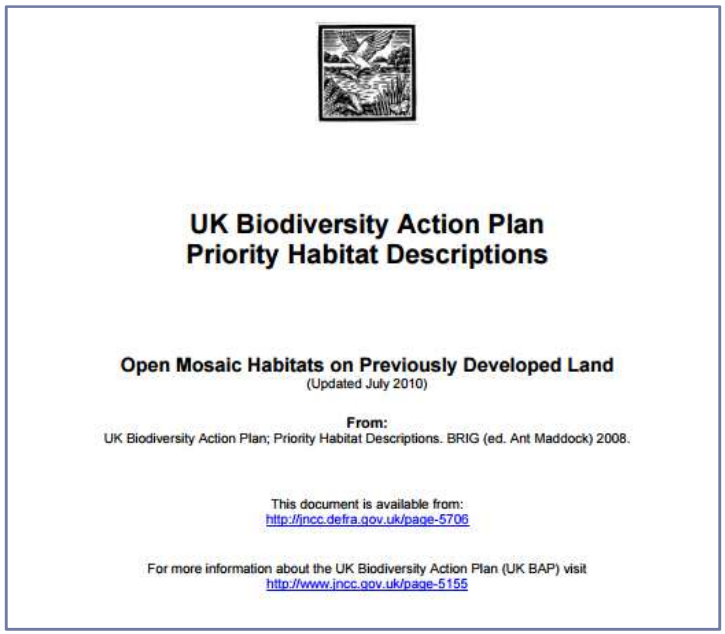
- Open mosaic habitat
- High value for biodiversity
- UK BAP Priority Habitat (2007)
- Threatened by redevelopment, inappropriate management, natural succession



UK Biodiversity Action Plan
Priority Habitat Descriptions

Open Mosaic Habitats on Previously Developed Land
(Updated July 2010)

From:
UK Biodiversity Action Plan; Priority Habitat Descriptions. BRIG (ed. Ant Maddock) 2008.

This document is available from:
http://jncc.defra.gov.uk/page-5706

For more information about the UK Biodiversity Action Plan (UK BAP) visit
http://www.jncc.gov.uk/page-5155

Urban ecosystem services

- Value of urban ecosystems & green space widely recognised
- Essential for adapting cities to climate change
- Brownfield land may also be a valuable resource (Kim et al., 2015; Kremer et al., 2013)

Figure: metrovancouver.org

Greater Manchester, England

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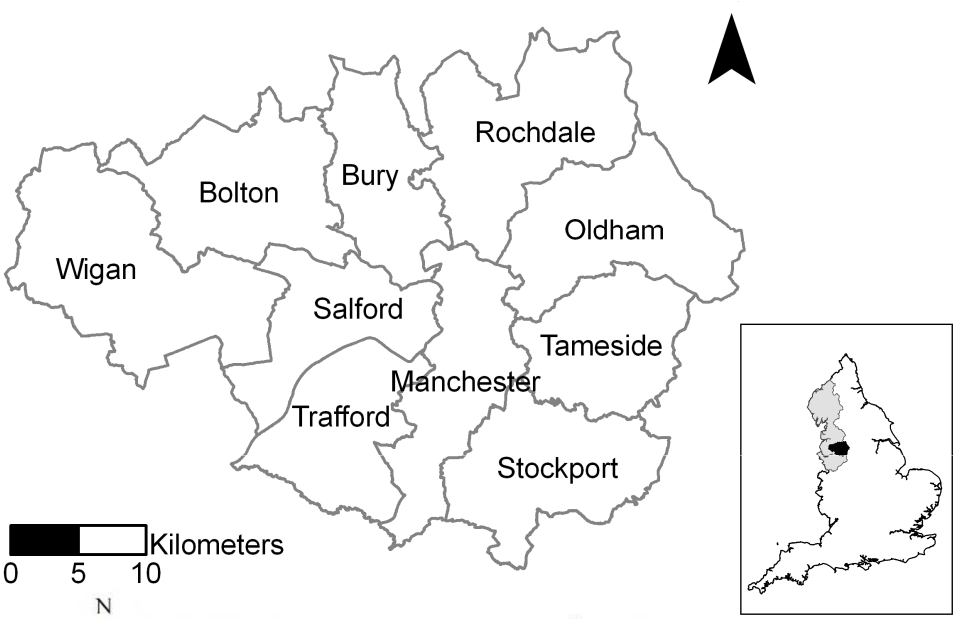

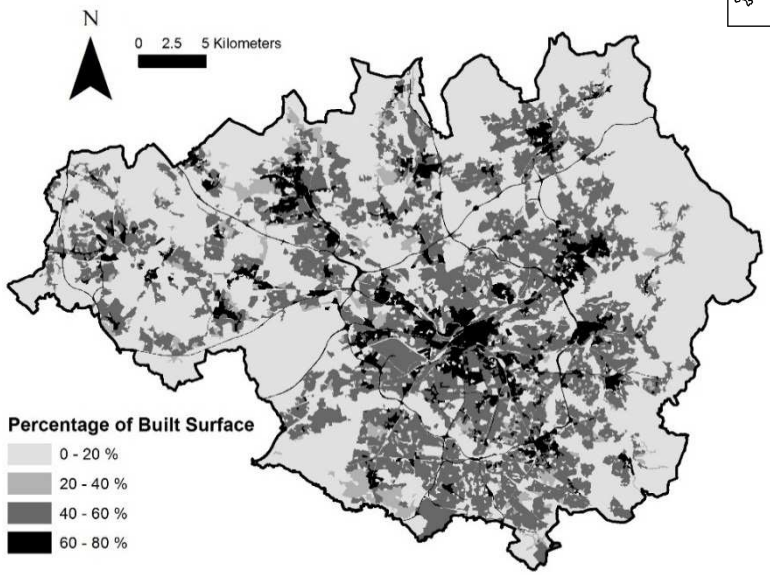

Greater Manchester:
Area: 1277 km²
Population: 2.7 million

Brownfield land in Greater Manchester

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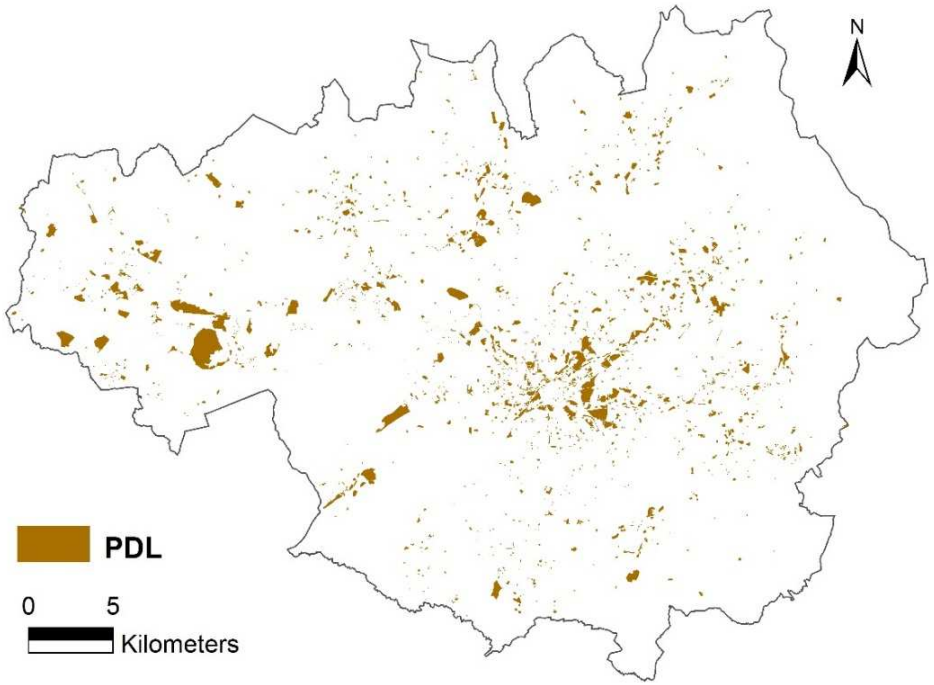
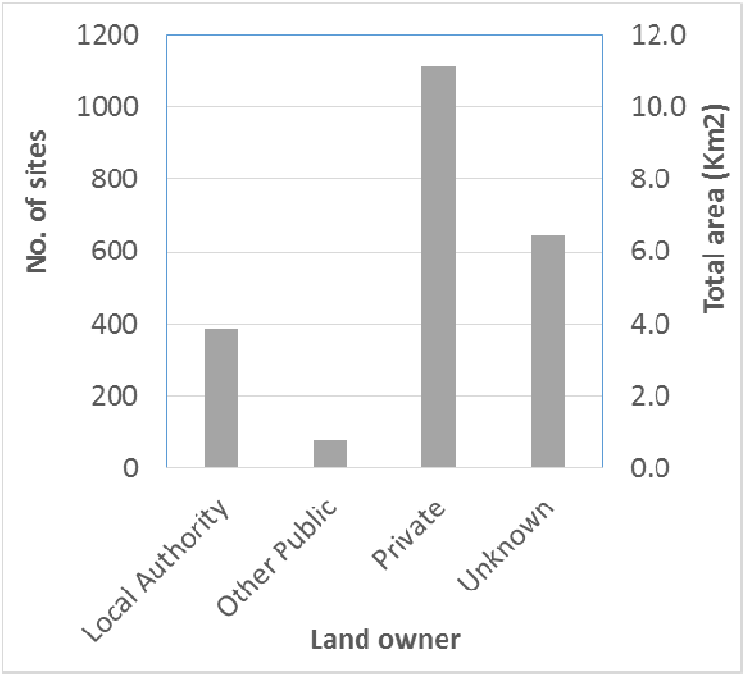
- 2200 sites, approximately 42 Km^2 , ~3.4% Greater Manchester
- High density of sites in urban centres
- Over 50% privately owned





How 'green' is brownfield land?

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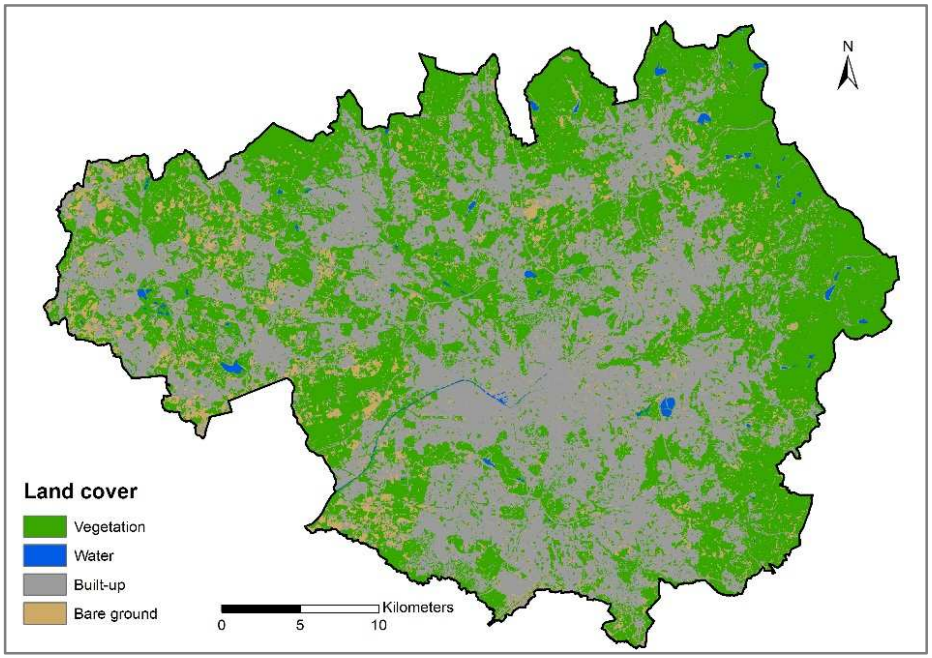
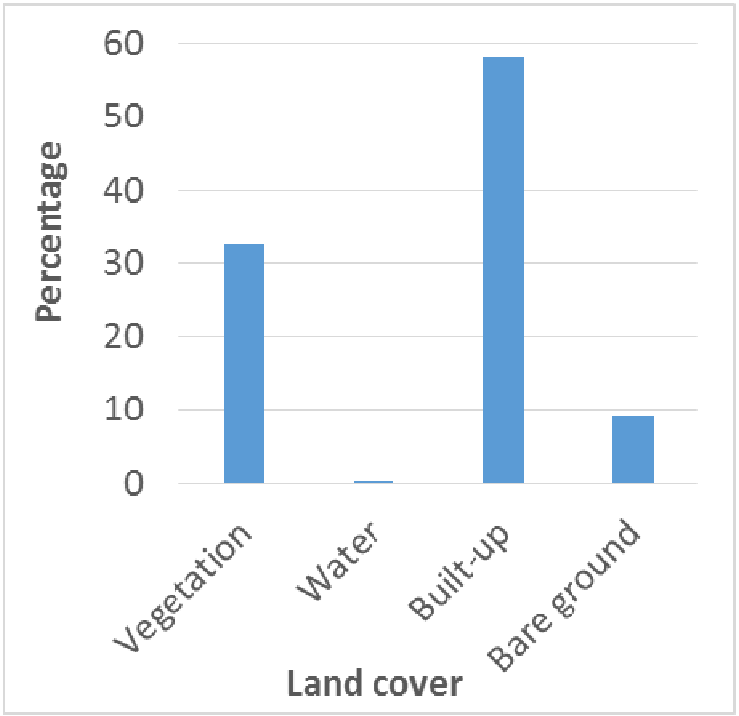
- Over 30% of brownfield land is trees and grassland
- Likely to already provide some ecosystem services

Land cover assessment



Brownfield land



Temperature regulating services

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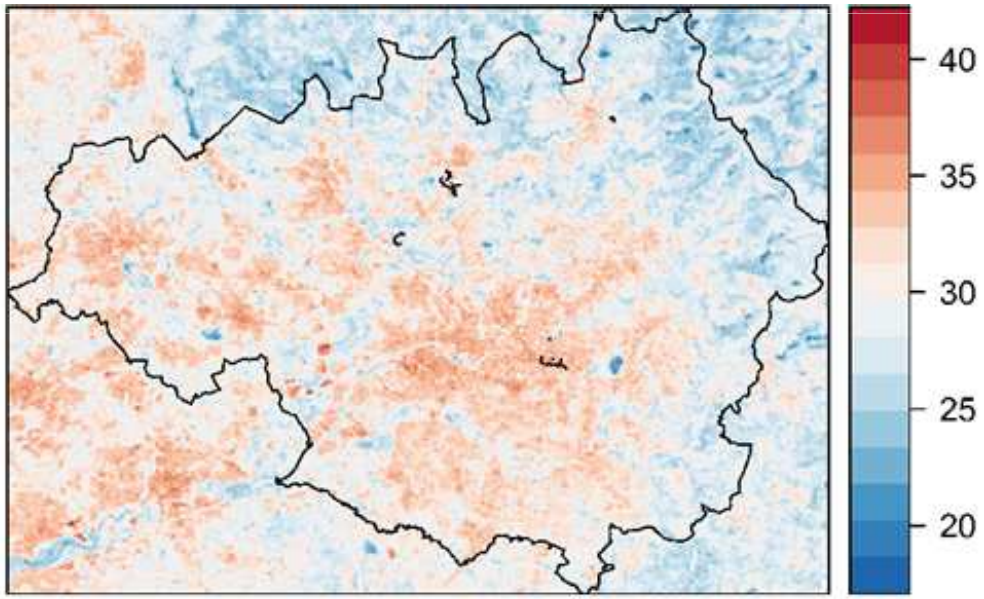
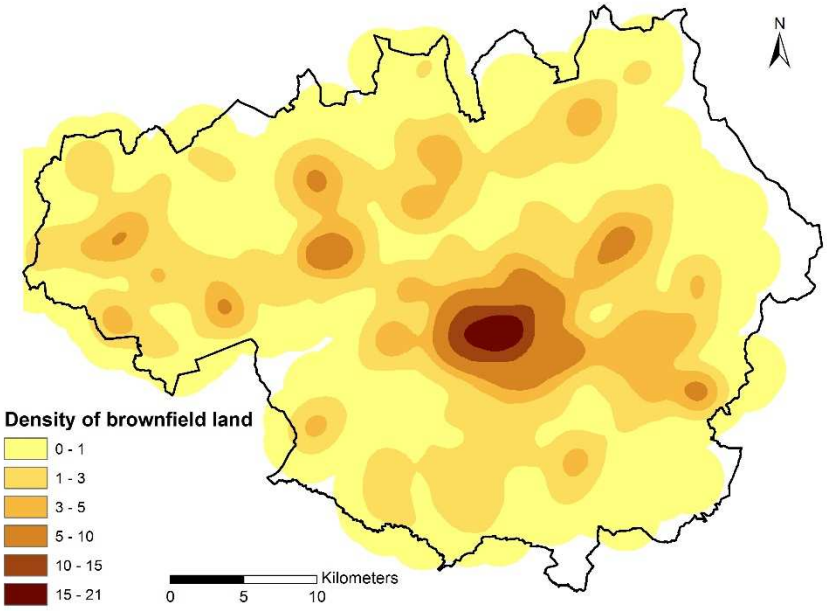
- Manchester's daytime air temperature UHI around 3°C (night-time, 5°C) (Smith *et al.*, 2011)
- Brownfield land situated in core UHI

Land surface temperature



19th July 2006 (Landsat 5)

Brownfield land



Temperature regulating services

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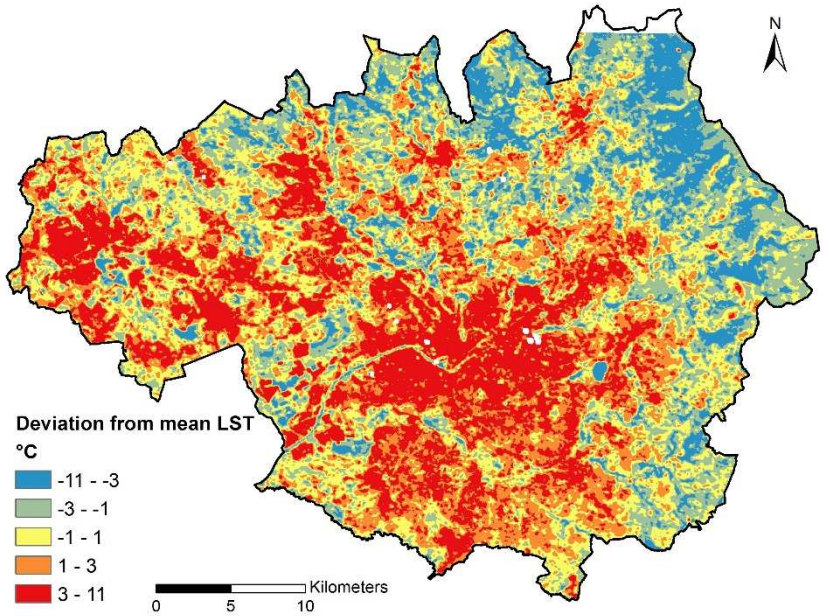
- Over 30% of brownfield land situated in core UHI
- Very important role in cooling temperatures

Land surface temperature (deviation from mean)



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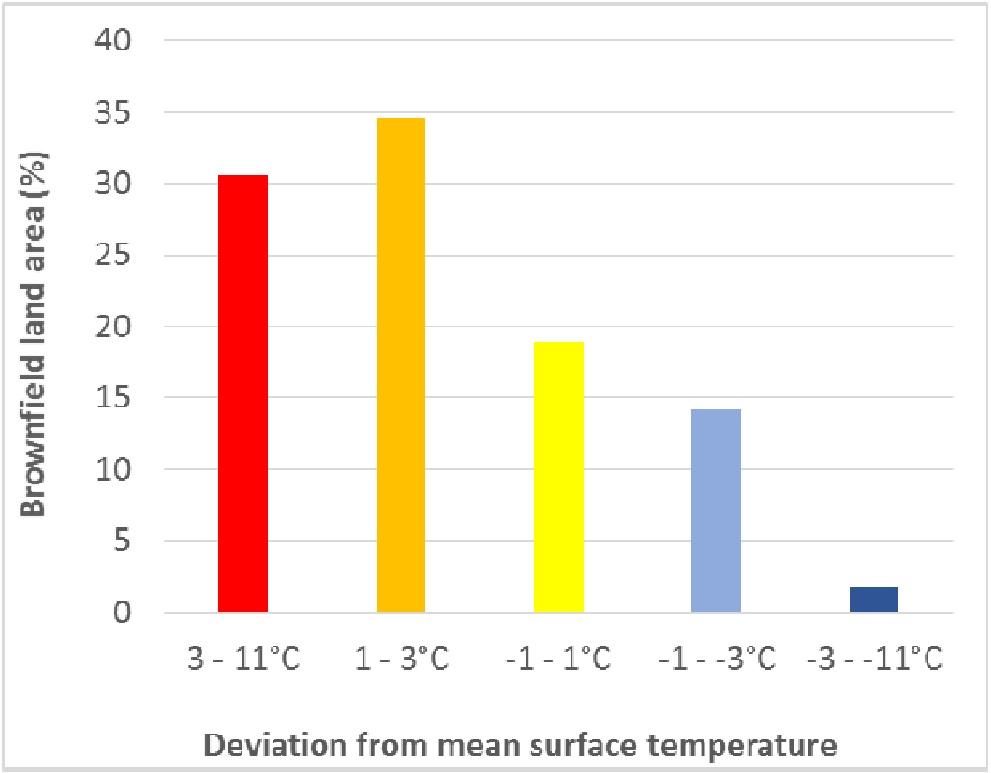
Brownfield land



Temperature regulating services

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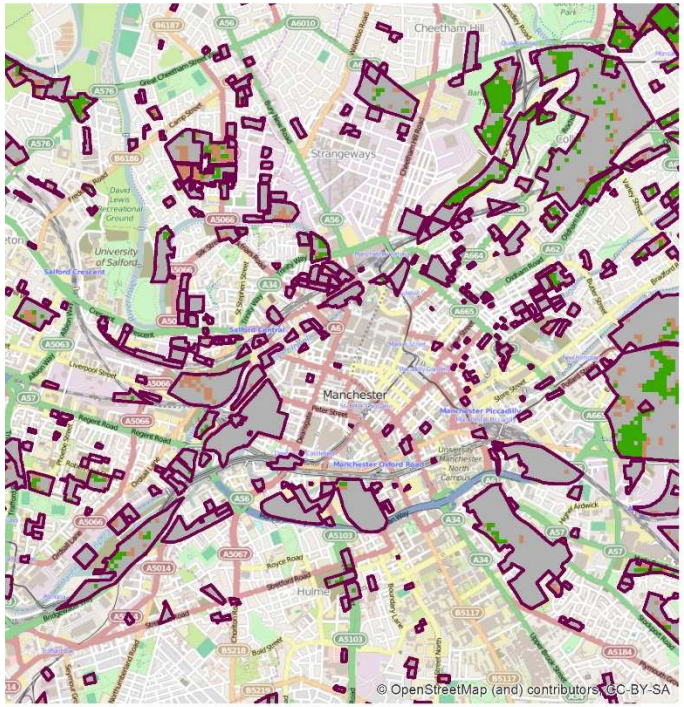
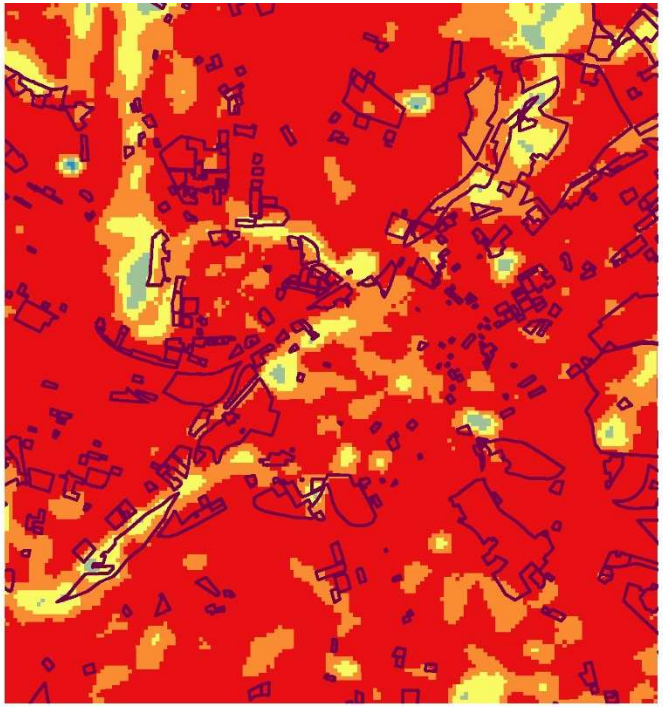
- Brownfield land in city centre contains little vegetation and appears to contribute little to cooling temperatures





Brownfield land
Vegetation
Water
Built-up
Bare ground

Brownfield land
Deviation from mean LST (°C)
-11 - -3
-3 - -1
-1 - 1
1 - 3
3 - 11

N

0 1 2 Kilometers

Assessing the need of ecosystem services

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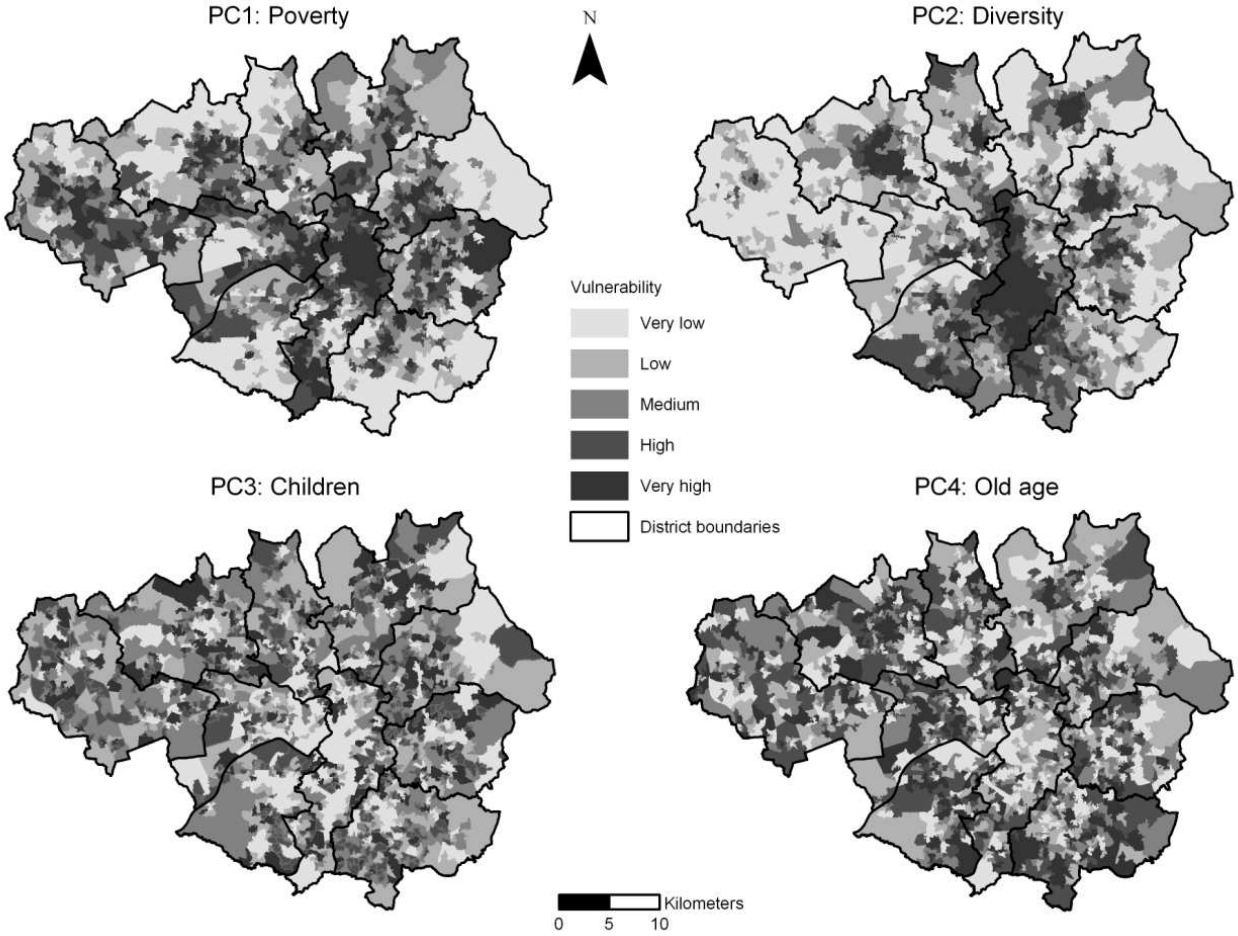
- Exposure to brownfield land associated with population health (Bambra *et al*. 2014)
- Relationship between social vulnerability and brownfield land (poverty: r=0.10, p<0.01) diversity (r=0.52, p<0.01)



(Kazmierczak & Cavan, 2011)

Conclusions

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- Brownfield land could enhance provision of urban ecosystem services and provide climate adaptation benefits
- Strategic approach to brownfield re-development is important
- Robust evidence is needed to provide site-scale analysis of both current and potential ecosystem services of brownfields

Thank you

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Key references

Bambra *et al*. (2014). Healthly land? An examination of the area-level association between brownfield land, morbidity and mortality in England. *Env & Plan A*, 46, 433-454.

Kazmierczak, A. & Cavan, G. (2011). Surface water flooding risk to urban communities: analysis of hazard, exposure and vulnerability. *Lands & Urb Plan* 103: 185-197.

Smith *et al*. (2011). Fine-scale spatial temperature patterns across a UK conurbation. *Climatic Change* 109, 269-286.