Treasure the little things: ecology, management and creation of urban ponds

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Urban resilience involves ecosystems

Indiatimes| The Times of India |The Economic Times

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Bengaluru may have to be evacuated in a decade if water crisis persists

Manu Aiyappa | TNN | Dec 28, 2015, 08.15 AM IST

A- A+

Long queues can be seen at various places in the city due to dwindling underground water levels. (TOI photo)

When a residential complex near Bellandur Junction recently drilled a borewell, they found water at a depth of 1,050 ft. "This is the sixth borewell we got drilled in 10 years. And we are not sure how long water would last in this one," said Ajith Kaverappa, a resident of the complex that has 60 apartments.

28th December 2015

Bangalore: Heavy rain floods IT city; boats deployed as people fish on streets

Major roads like Old Madras Road, Hosur Road, Outer Ring Road, Bannerghatta Road and Ballari Road faced huge traffic jams.

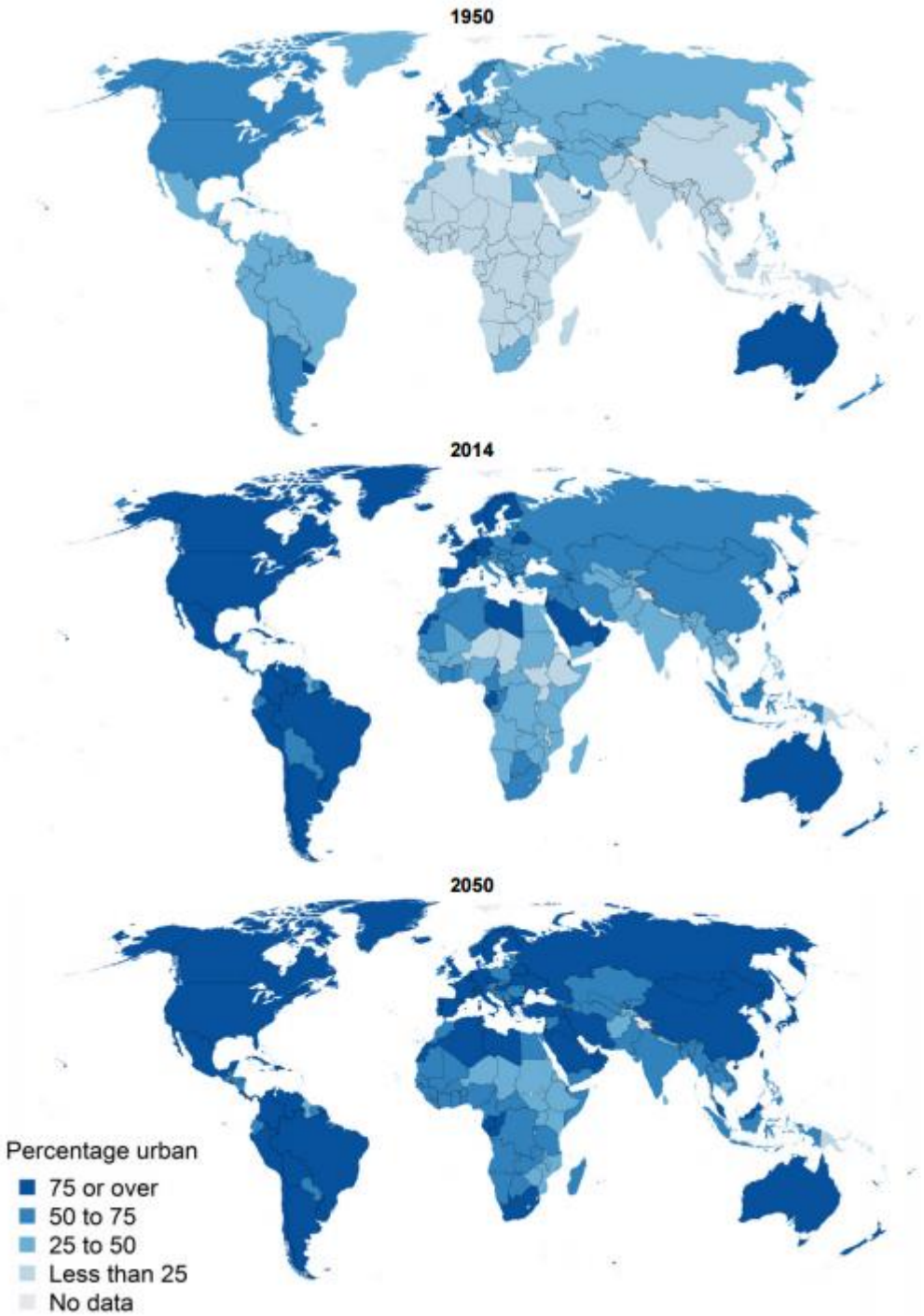
Asmita Sarkar

July 29, 2016 14:55 IST

202 SHARES

…7 months later…

29th July 2016



Global trends in urbanisation

50% in cities by 2008

Projected 66% by 2050

How do cities cope?

https://esa.un.org/unpd/wup/Publications/Files/WUP2014-Report.pdf

Servicing the urban majority

Non-urban resources

Non-urban resources

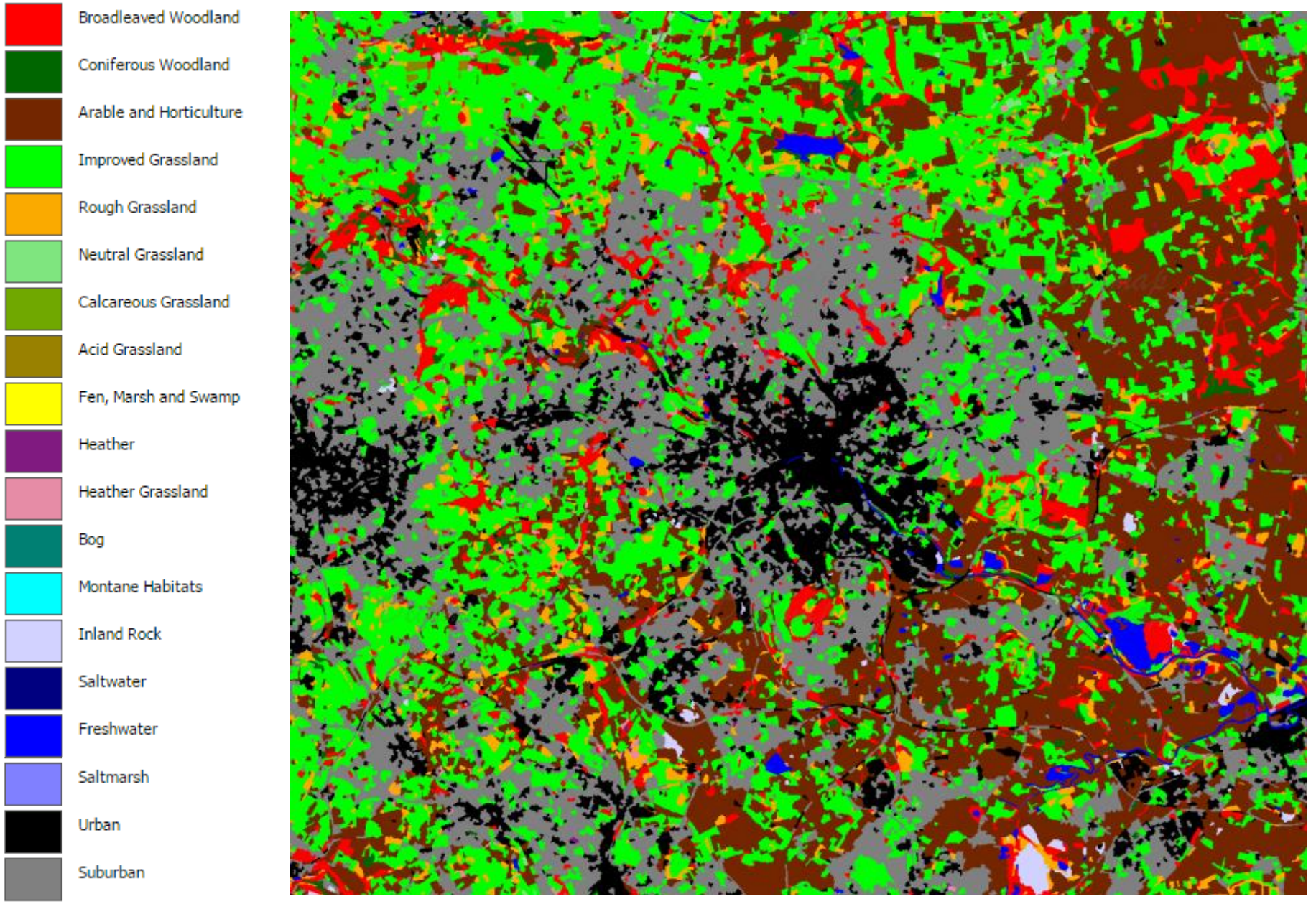
“Urban desert”

Non-urban resources

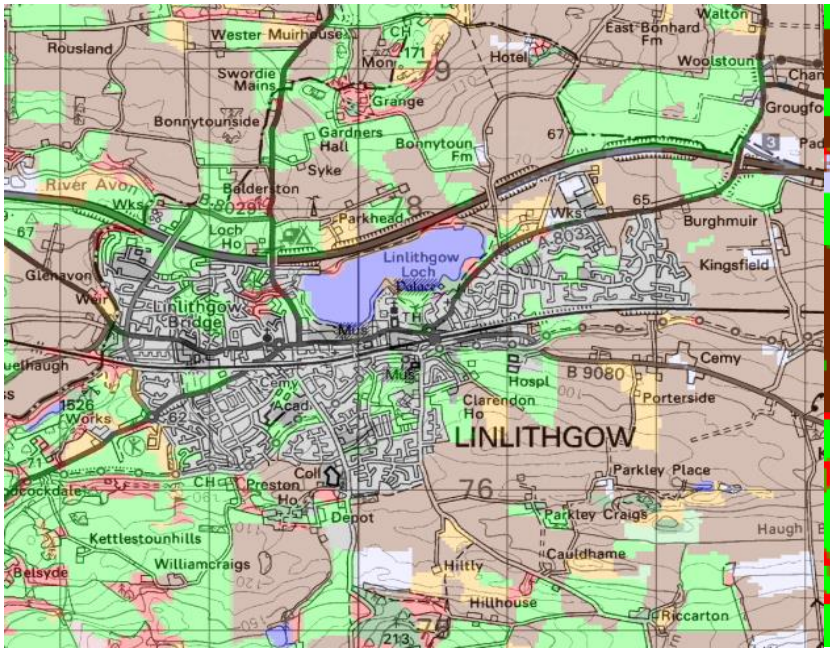
Non-urban resources

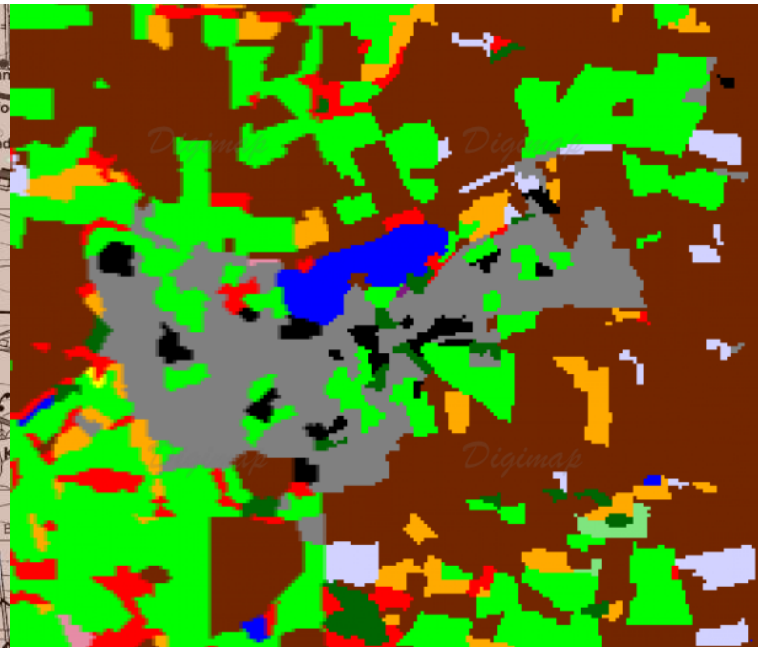
Images: valiunic CC0, http://bit.ly/2bQFCMG; glarcombe CC0, http://bit.ly/2c83QCC; Unsplash CC0, http://bit.ly/2bBPBrr; bernswaelz CC0, http://bit.ly/2cbsRNy

Urban deserts…?

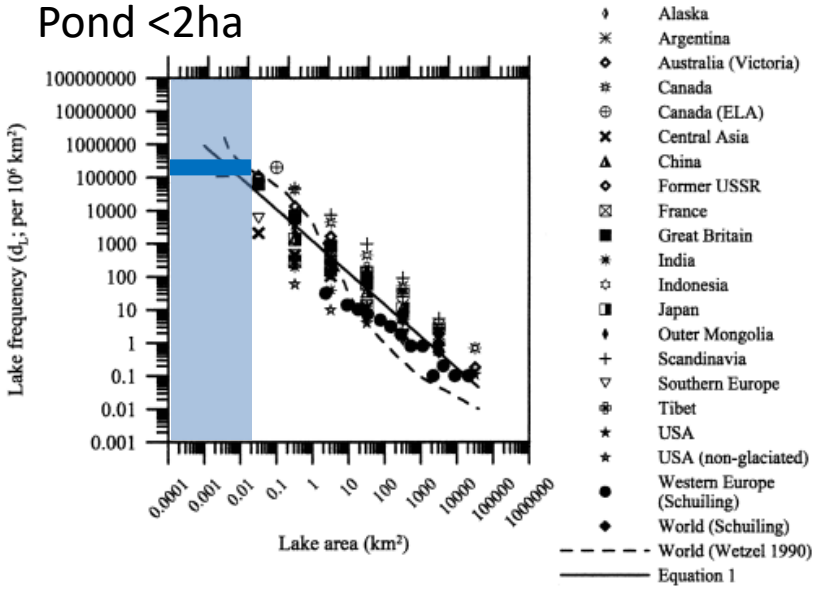


Urban Pondscapes





Pond <2ha

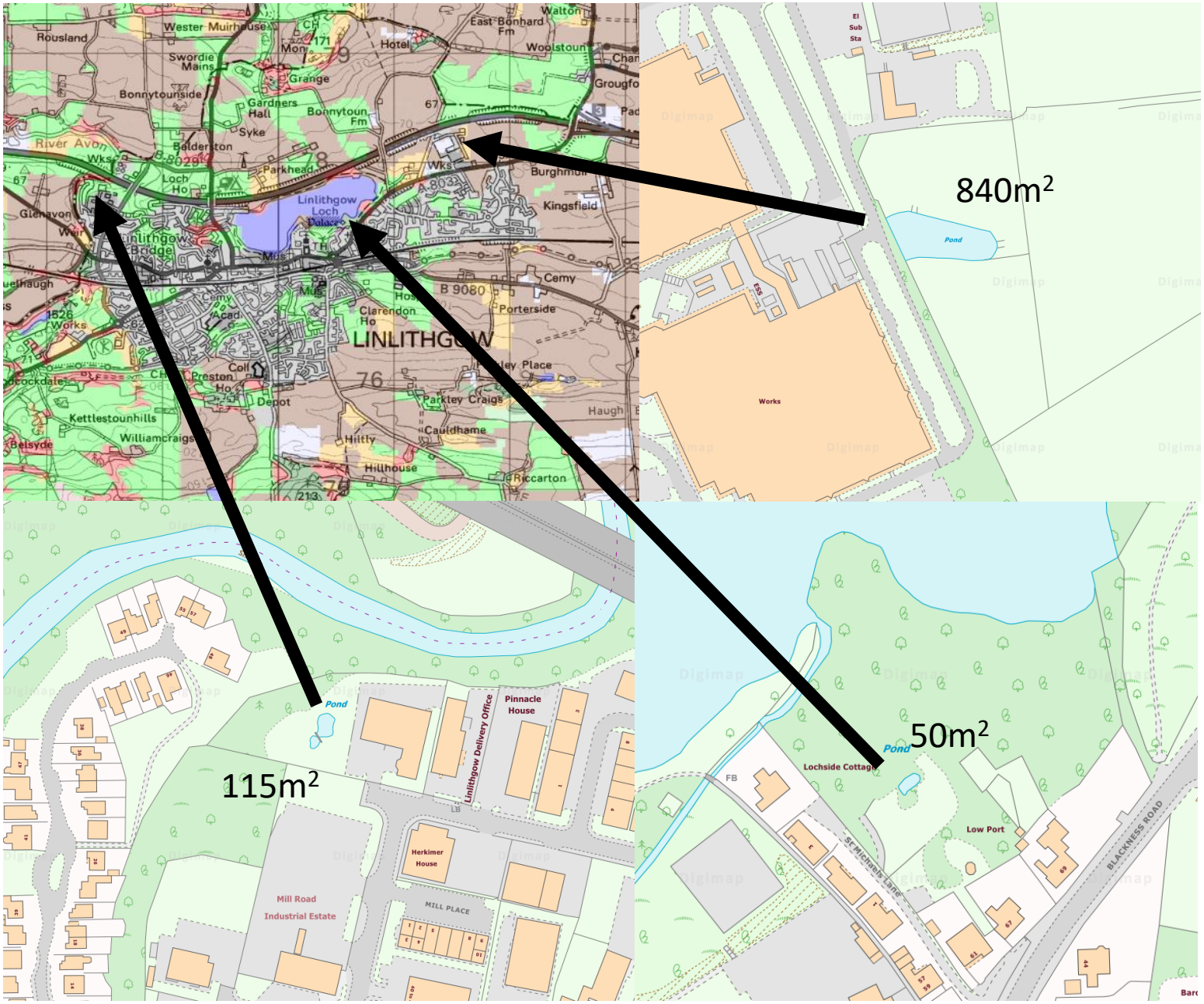


Ponds are invisible

But, up to 3.5m garden ponds
Davies et al. (2009) Biol. Cons.

Downing et al. (2006) Limnology and Oceanography

Urban Pondscapes



Urban Pondscapes

In here, somewhere

Urban landscapes are complex mosaics of private ownership

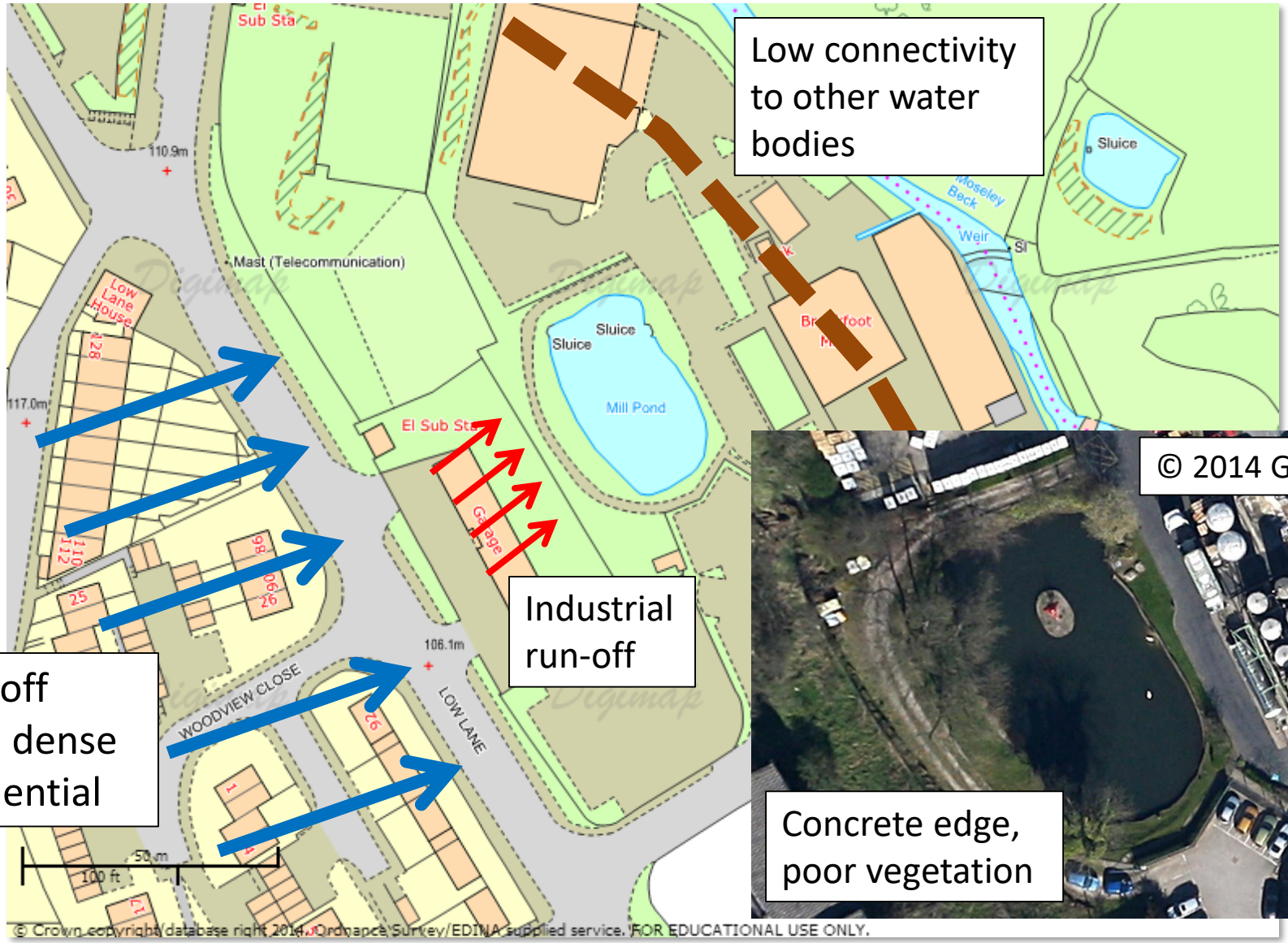
Urban Pondscapes

What is an “urban pond”?

urban

+

What is an “urban pond”?



What is an “urban pond”?





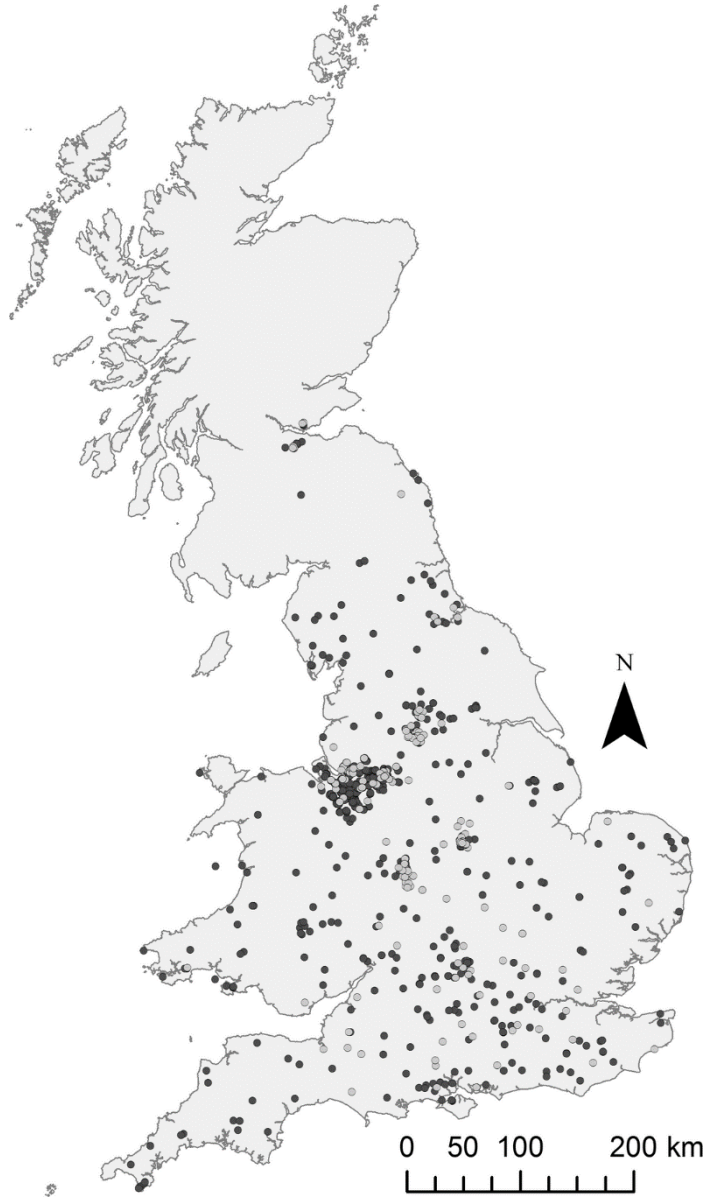
Different design
Different context
Different management
Different priorities

→ *Diverse ecology*

Hassall C (2014) The ecology and biodiversity of urban ponds. WIREs Water, **1, 187-206.**

A comparative analysis of urban ponds

Dataset	N ponds
Moyers & Hassall (unpub)	11
Noble & Hassall (in review)	21
Barber & Hassall (unpub)	10
Hassall et al. (2011)	425
Wood et al. (2000)	36
Gledhill et al. (2008)	37
FHT (NPS)	153
FHT (TP)	76
FHT (ROPA)	179
TOTAL	938



○ 186 urban ponds

● 751 non-urban ponds

Noble A, Hassall C (in review) Urban Ecosystems; Hassall C, Hollinshead J, Hull A (2011) Biodiversity and Conservation, ***20, 3189-3222;*** Wood PJ, Barker S (2000) Applied Geography, ***20, 65-81;*** Gledhill DG, James P, Davies DH (2008) Landscape Ecology, ***23, 1219-1230;*** Williams PJ, Biggs J, Barr CJ *et al. (1998) Lowland Pond Survey, London, DETR.*

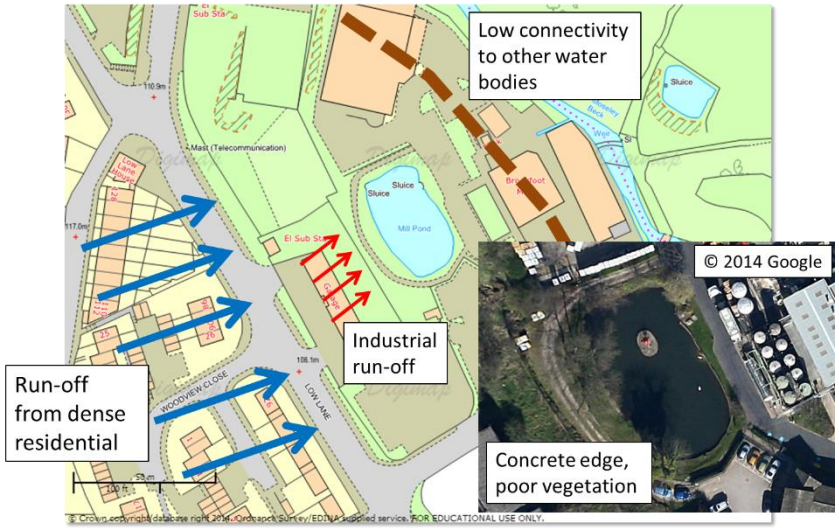
“Urban” vs “non-urban” ponds

Three hypotheses:

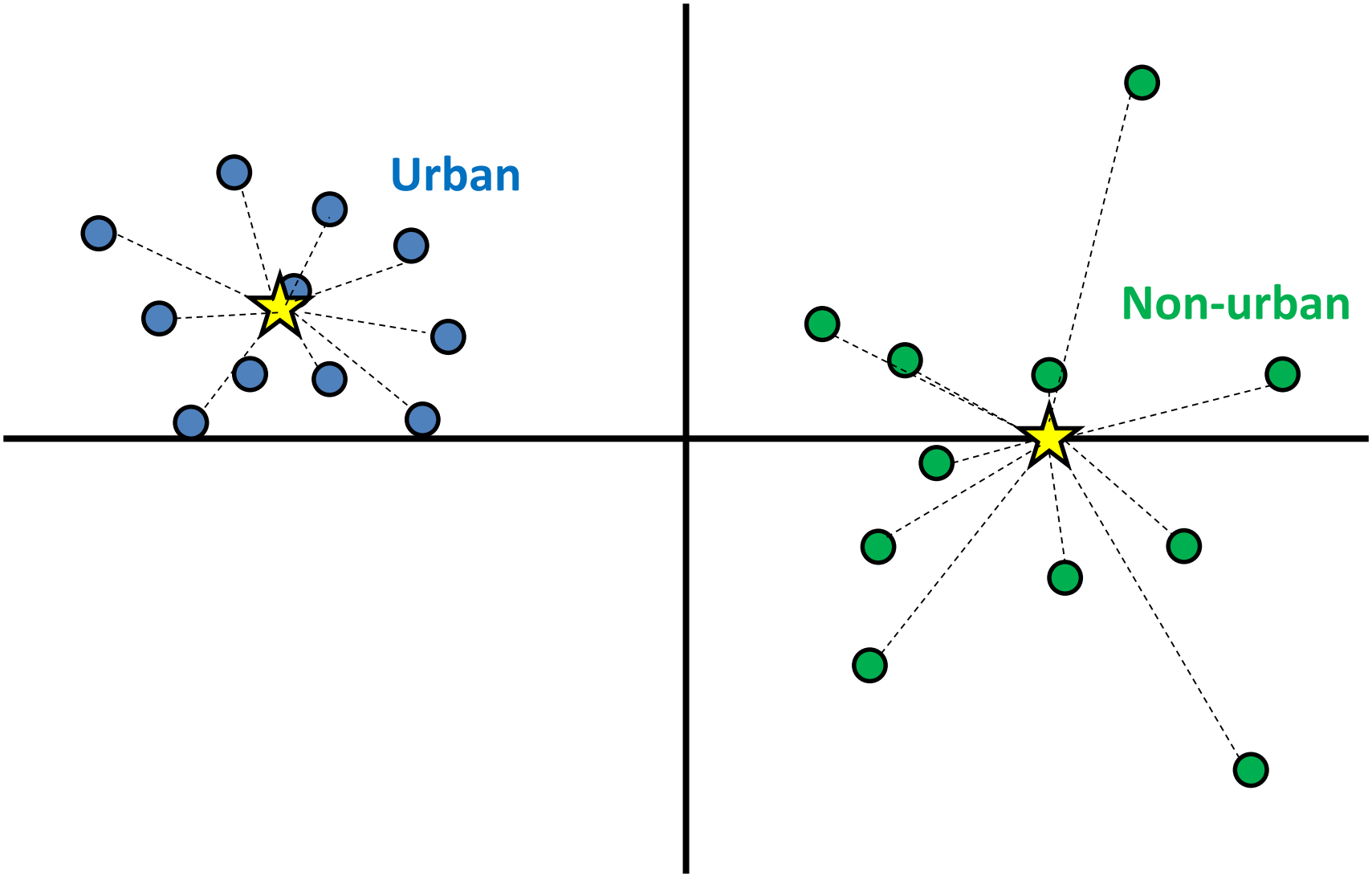
1. Urban ponds exhibit **biotic homogenisation**

2. Urban landscapes are **less permeable**

3. Urban stressors **reduce diversity**



Hypothesis 1: Biotic homogenisation



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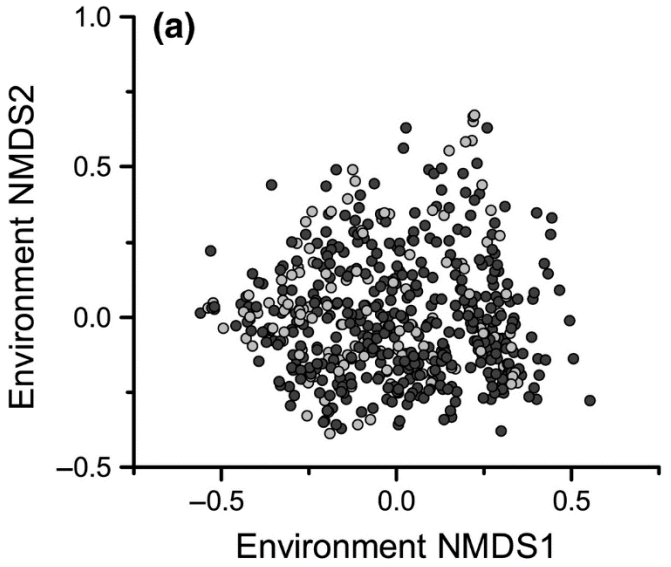
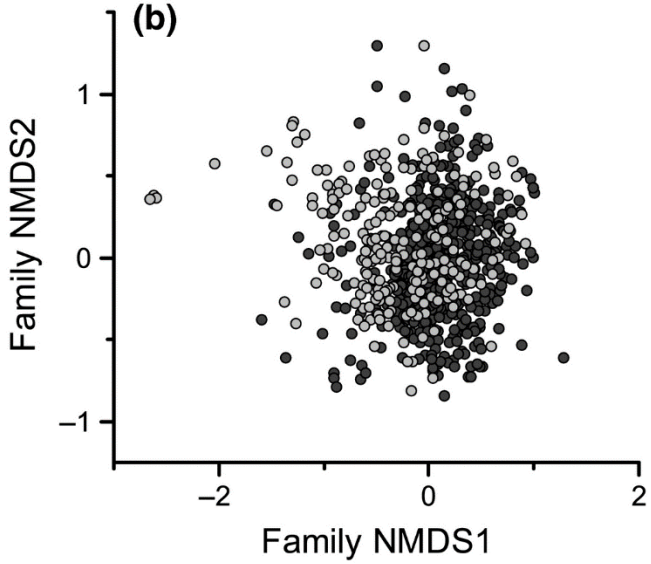




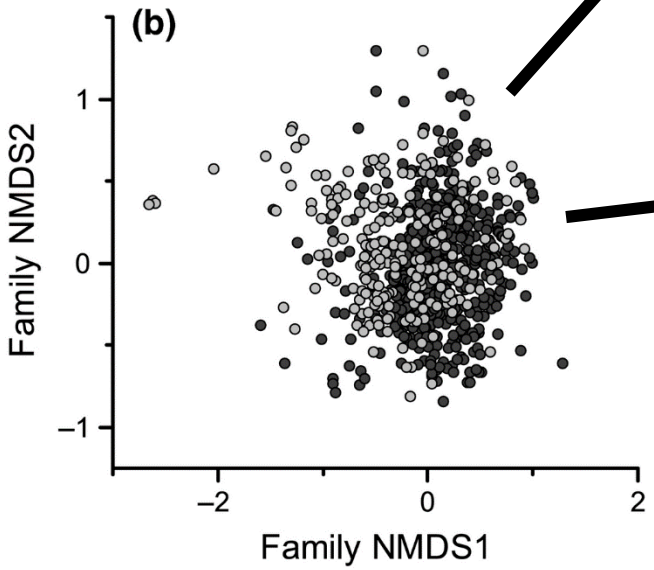
Environment

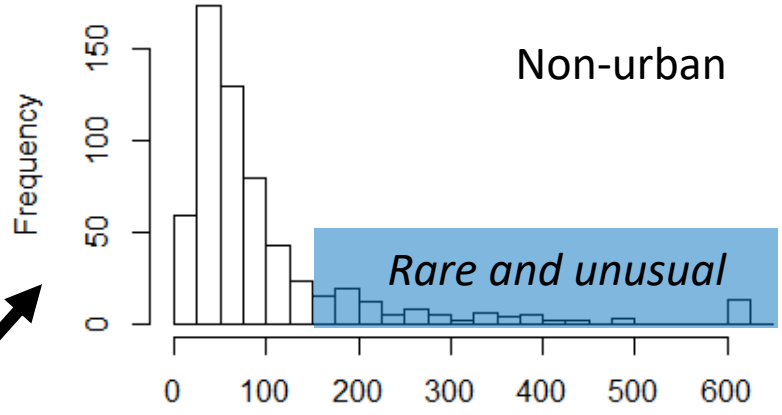
W = 16514, p= 0.312

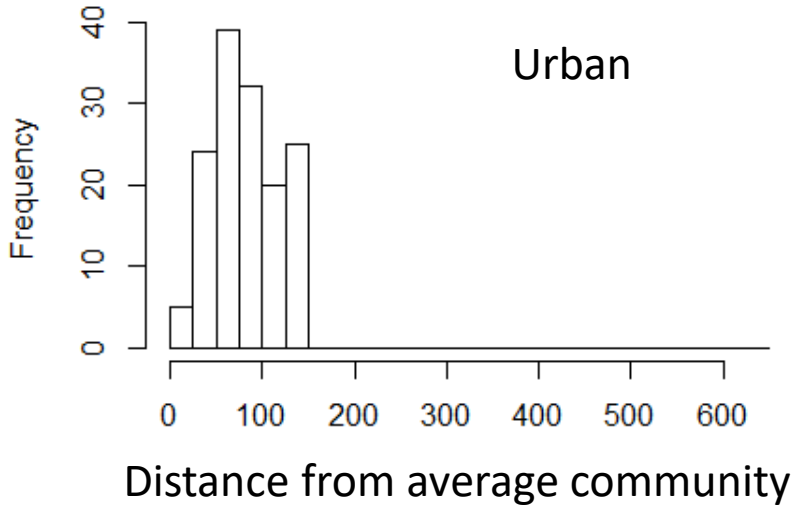
Biological community

W = 50282, p= 0.008

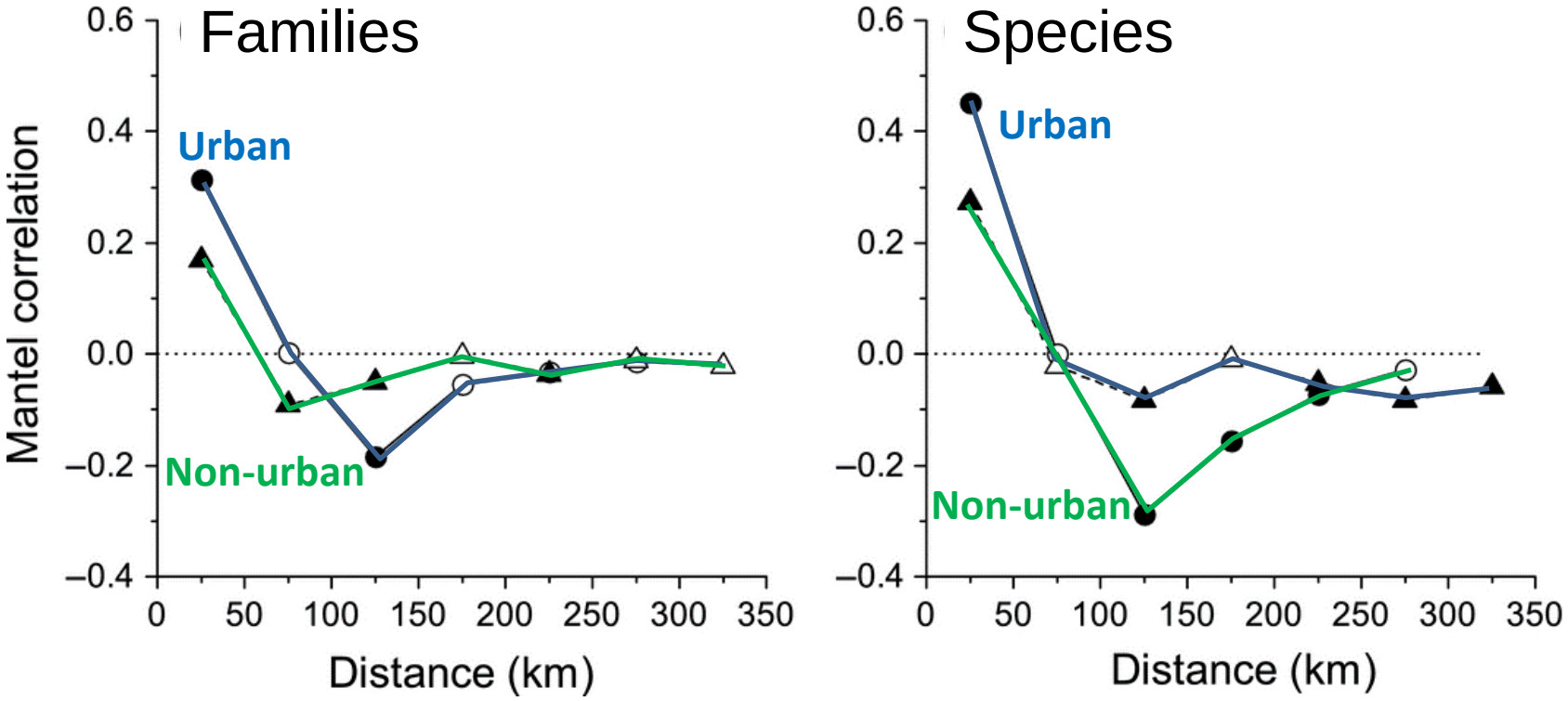
Hypothesis 1: Biotic homogenisation





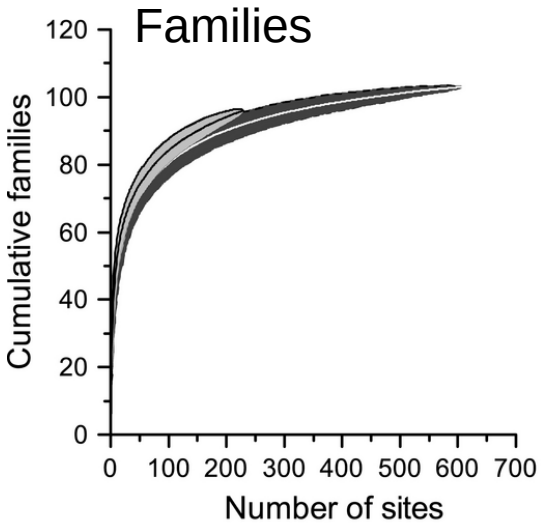


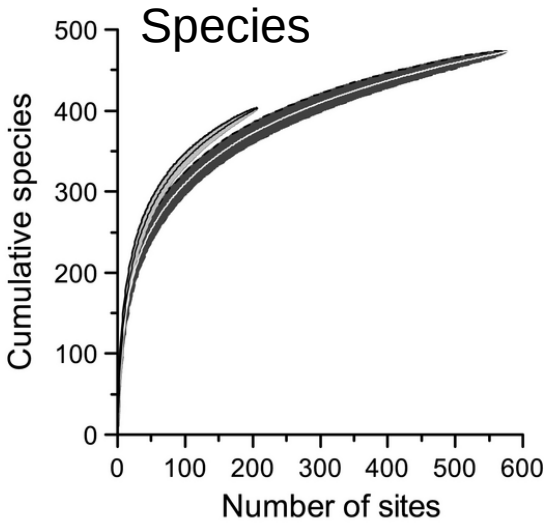
Hypothesis 2: Landscape permeability

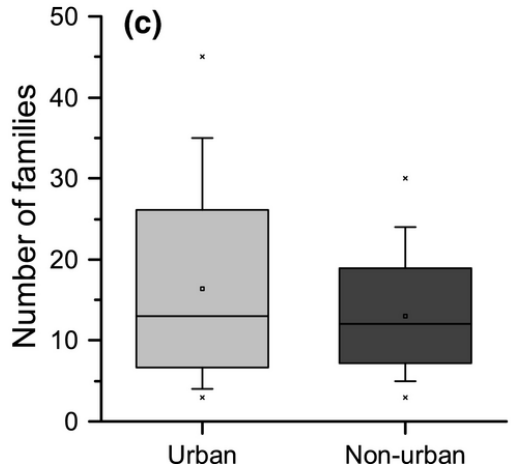


Urban ponds show greater fine-scale spatial autocorrelation, with negative autocorrelation at intermediate (inter-city?) distances

Hypothesis 3: Urban biodiversity

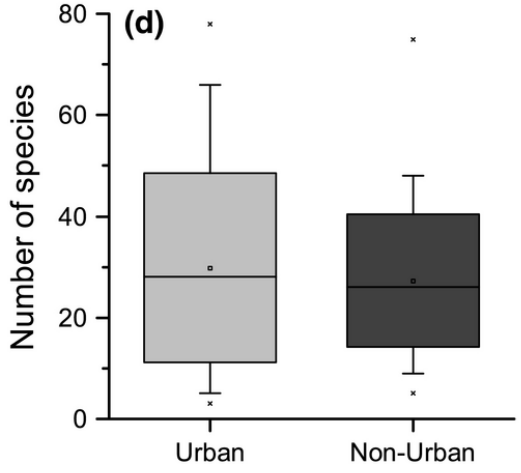






103 taxa 91 taxa

W = 10835, p = 0.886

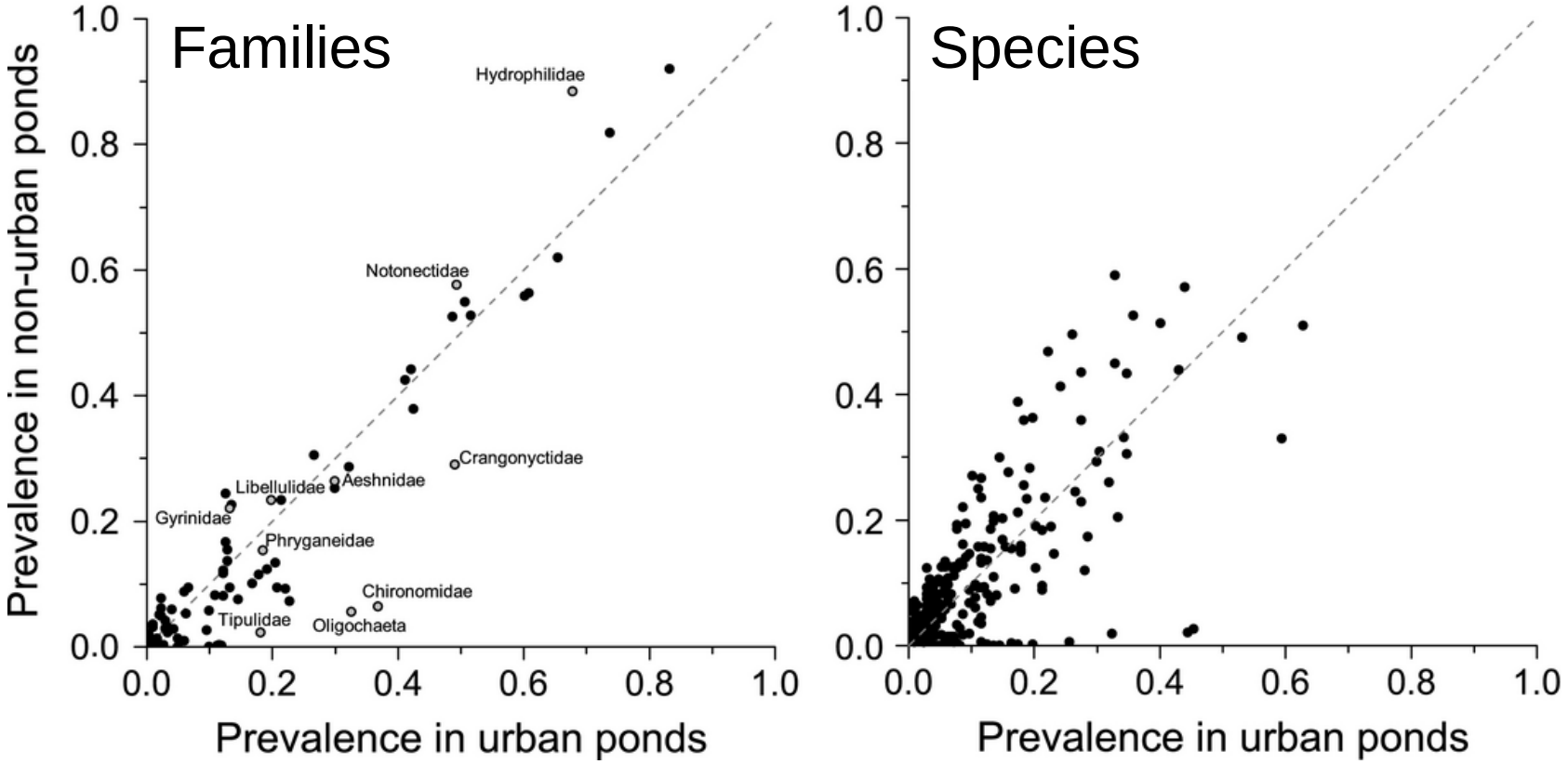


403 taxa 473 taxa

W = 17310, P = 0.507

No difference between urban and non-urban pond biodiversity, even after controlling for sample size.

Hypothesis 3: Urban biodiversity



“Urban” vs “non-urban” ponds

Three hypotheses:

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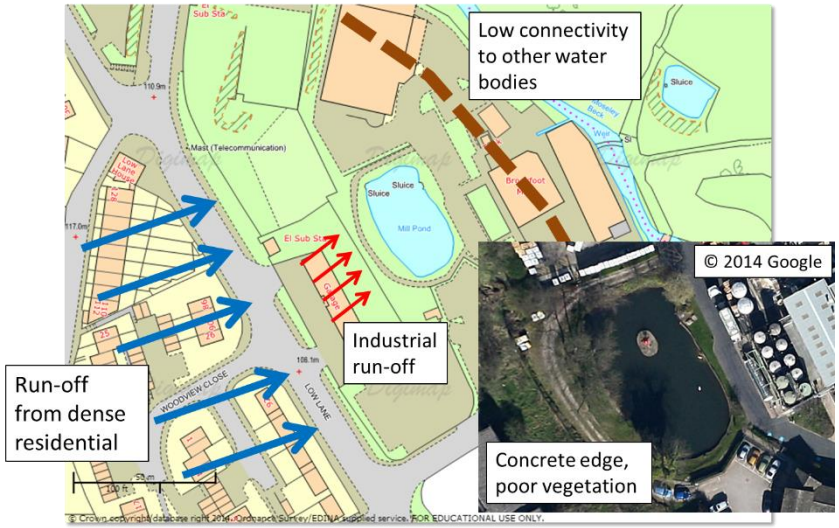
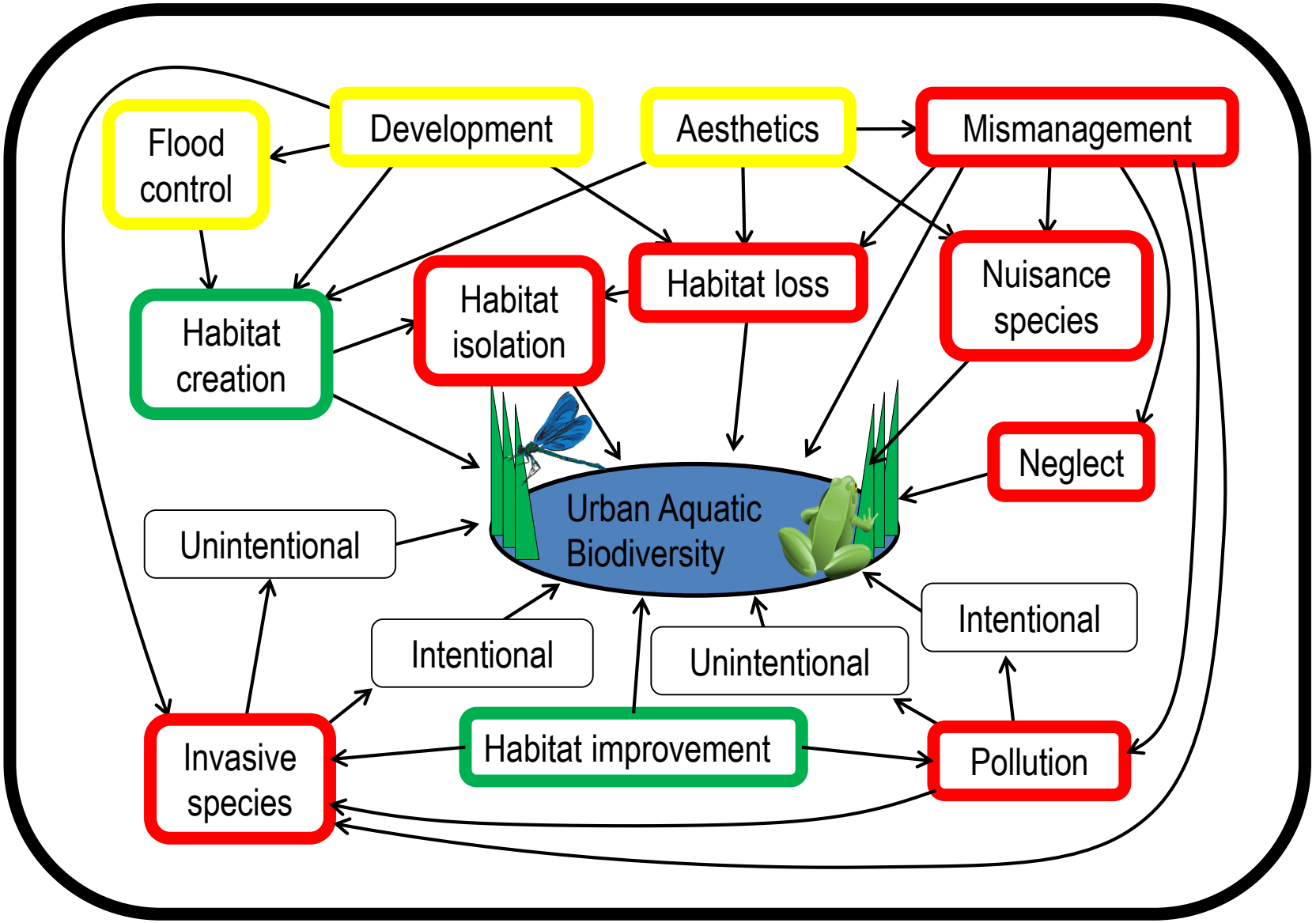
2. Urban landscapes are **less permeable** ☑

3. Urban stressors **reduce diversity** ☒



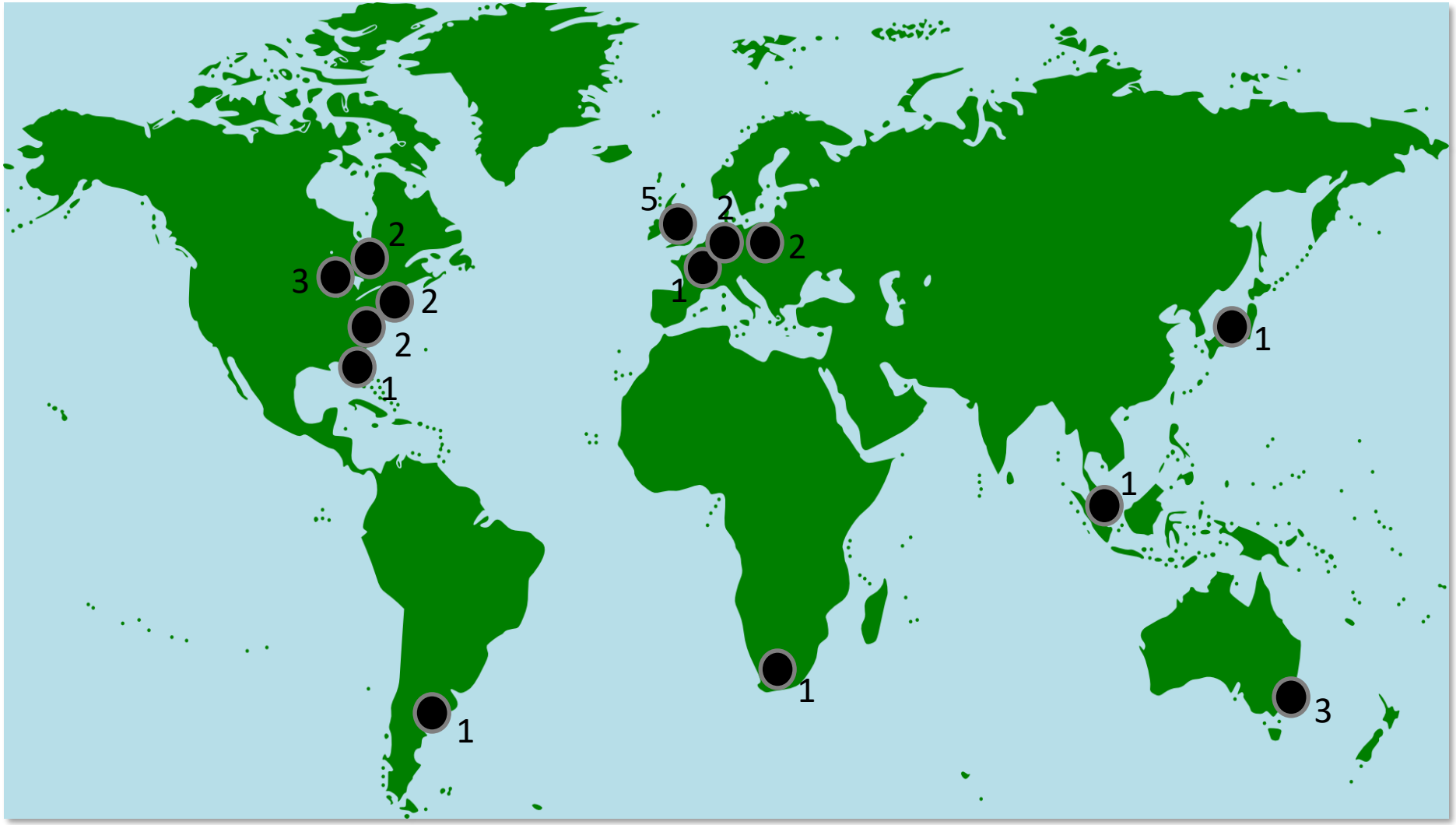
Management of urban ponds



Hassall C (2014) The ecology and biodiversity of urban ponds. WIREs Water, **1, 187-206.**

Management of urban ponds

…and those stressors vary depending on where they are located



Hassall C (2014) The ecology and biodiversity of urban ponds. WIREs Water, **1, 187-206.**

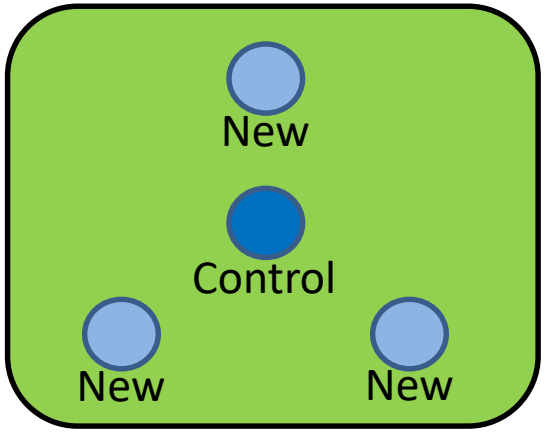
What about management?

Glasgow (pop 600,000)

Sprawling settlements

Peri-urban pond network

Eight pond clusters

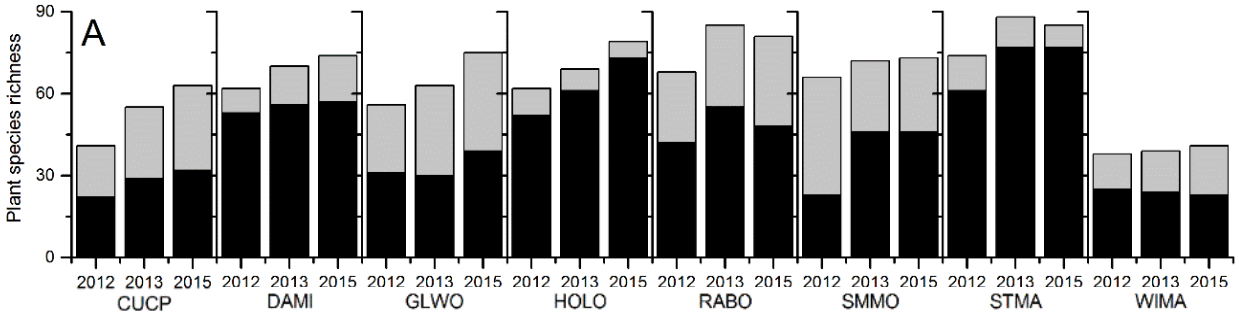


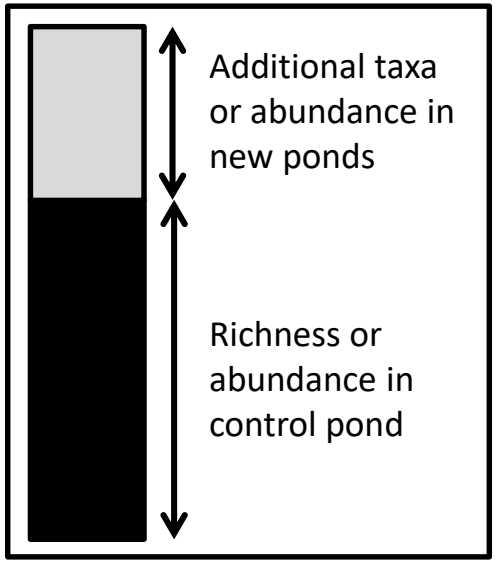
x 8

Surveyed 2012, 2013, 2015

Petrovan, S. and Hassall, C. (in review) Pond network enhancement increases biodiversity and buffers temporal variability in peri-urban aquatic communities, Landscape Ecology.

What about management?

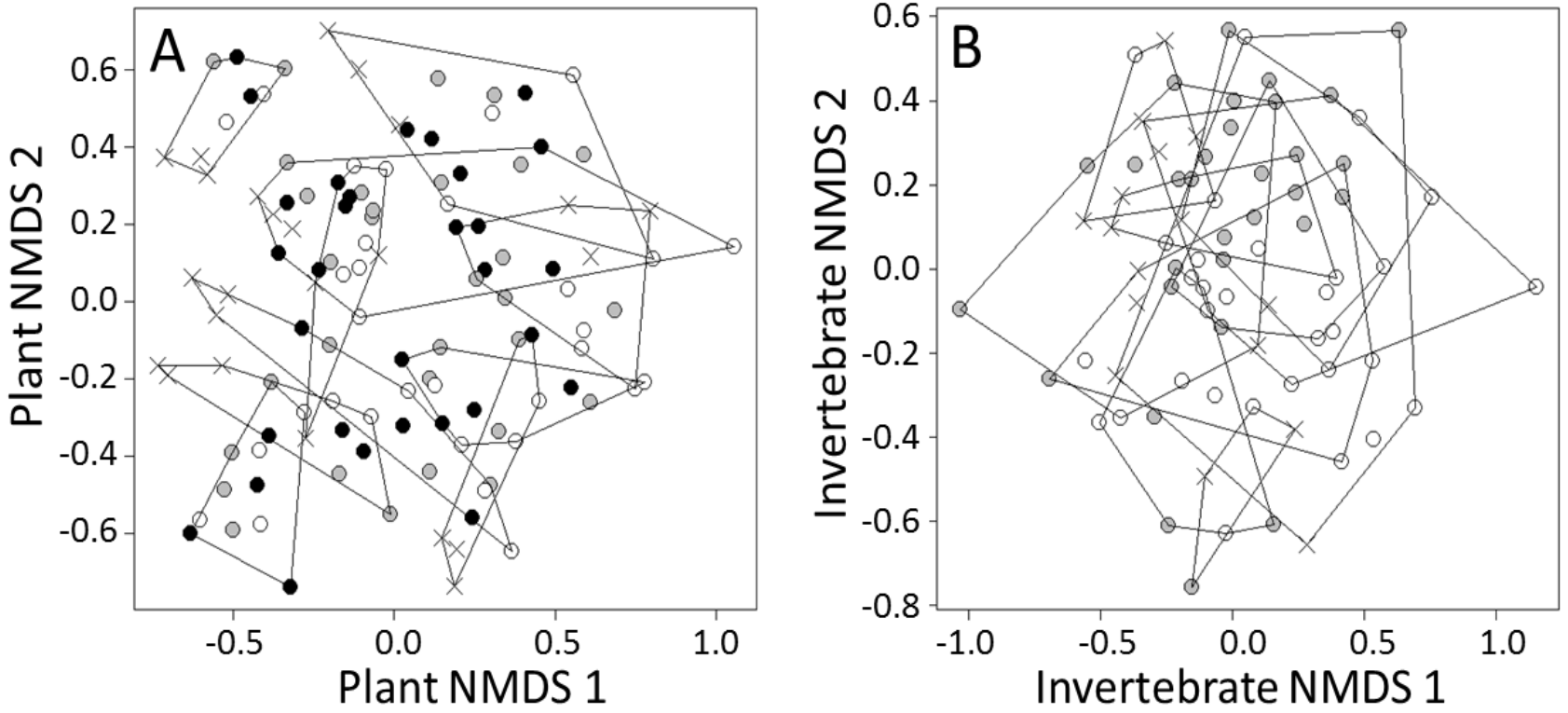




Petrovan, S. and Hassall, C. (in review) Pond network enhancement increases biodiversity and buffers temporal variability in peri-urban aquatic communities, Landscape Ecology.

What about management?

X = control ponds, ○ = 2012, ◉ = 2013, ● = 2015



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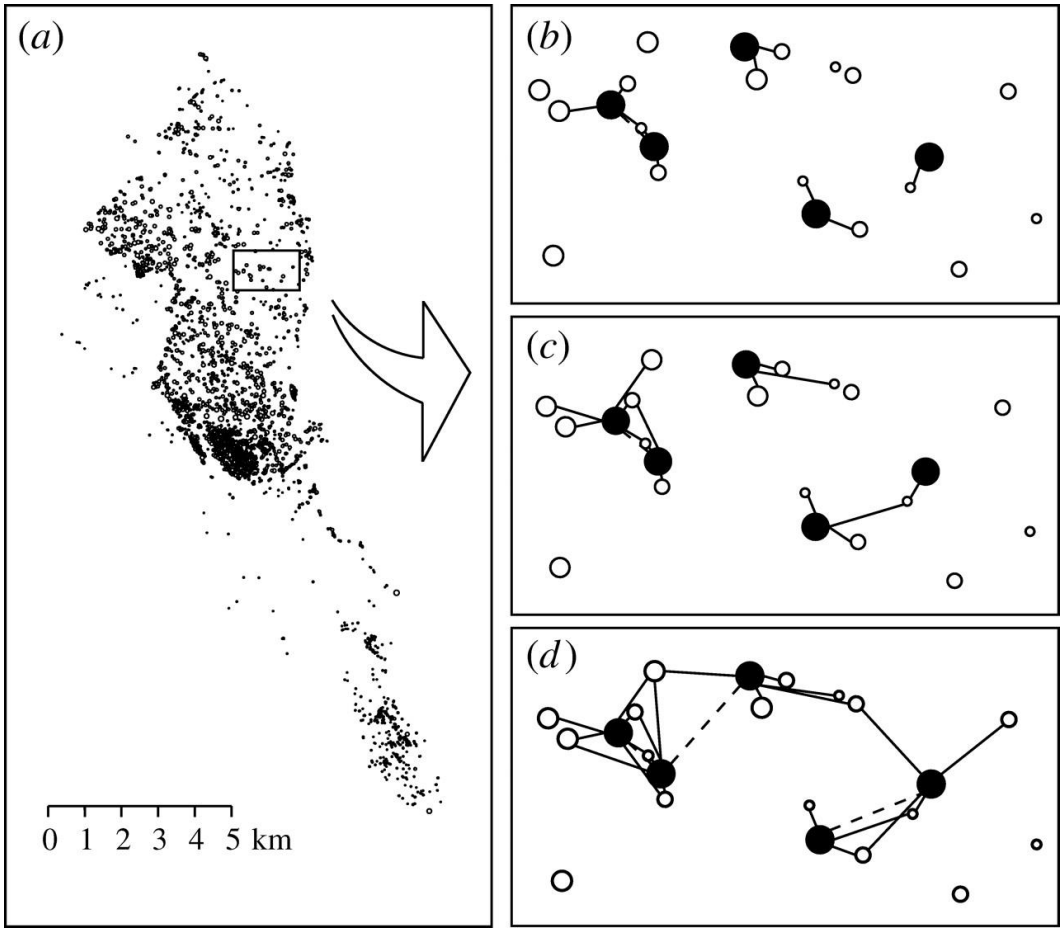

Fortuna et al (2006) Proceedings B

Still missing the link between:

1. Ecology
2. Network theory
3. Conservation biology
4. Landscape planning

Ponds (especially in urban areas) are a great model system for these kinds of questions

Take Home Messages

Regardless of function, urban freshwaters seem to promote aquatic biodiversity

The diversity of urban freshwaters may be key, so diversity must be conserved

Biodiversity persists despite conflicting management priorities

Easy-wins are possible (revegetation, strategic pond creation, reduce pollution)

Empirical, evidence-based approach needed with consistent, long-term data


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8 August 2014 Last updated at 16:14

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North London to host 'Europe's biggest urban wetlands'

The combined Walthamstow reservoirs will create Europe's largest wetlands, it is claimed

Ten reservoirs in north London will be transformed into Europe's biggest urban wetlands, it is claimed, thanks to a lottery grant.

Related Stories

Hassall, C., Gledhill, D., Hill, M., Biggs, J. (in press) Urban ponds: ecology, management, and policy. In: *Urban Landscape Ecology*, eds Francis, R., Milligan, J. Routledge, London.

Acknowledgements

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