Overcoming uncertainties and barriers to Blue-Green infrastructure

Dr Emily O'Donnell University of Nottingham

18th February 2016, Newcastle Centre for Life



Research questions

- How does uncertainty in blue-green infrastructure prevent stakeholders (planners, engineers and managers and hence the City) from moving towards a Blue-Green City?
- What are the main barriers that limit action?
- How can we build confidence in blue-green infrastructure to unlock a City's Blue-Green potential?

Service delivery and maintenance

Common perception that uncertainties are greater for blue-green compared to grey infrastructure

Preferences and support for bluegreen Decision makers and urban planners are unsure whether communities and their elected representatives would support greater reliance on blue-green infrastructure



Barriers to sustainable drainage

- Physical science (preconceptions)
- Technical / technological
- Institutional
- Legal / regulatory
- Managerial / organisational
- Political
- Monetary
- Social 'hearts and minds'
- Resistance to change = *institutional inertia*

Technical problems can be overcome and, in most cases, the **economical and social constraints rather than purely hydrological** considerations will influence the final shape of the chosen solution (Niemczynowicz, 1999)



3 minute discussion with the person next to you

> What do you do?

- > What do they do?
- What do you both think are the **biggest barriers** to Blue-Green infrastructure?

Negotiate your top barrier and write on the piece of paper (names optional)



Introducing two case studies

Portland, Oregon, USA

Newcastle, UK



'Grey to Green' initiative (2008-2013) 32,200 new street trees, 867 green street planters, 398 eco-roofs, culvert removal, land acquisition, river and floodplain restoration





SuDS as part of residential developments (NCC, EA, NWL), small scale examples from landowners





Research in Portland, Oregon, identified **biophysical** and socio-political uncertainties

Flood Risk Management

Infrastructure for urban flood risk management

2 Nohad A. Toulan School of Urban Studies and Planning, Portland State University, Portland, OR, USA 3 School of the Environment and Institute for Sustainable Solutions, Portland State University, Portland, OR, USA 4 Centre for the Analysis of Time Series, London School of Economics and Political Science, London, UK

C.R. Thorne¹, E.C. Lawson¹, C. Ozawa², S.L. Hamlin³ and L.A. Smith⁴ 1 School of Geography, University of Nottingham, Nottingham, UK



http://onlinelibrary.wiley.com/doi/10.1111/jfr3.12218/epdf





Socio-political uncertainties, e.g. public preferences, stewardship and equitable delivery of BG assets, have a greater impact on Portland decision making than biophysical uncertainties

http://onlinelibrary.wiley.com/doi/10.1111/jfr3.12 218/epdf



Newcastle research objective

Conduct a series of semi-structured interviews with Newcastle stakeholders (x19) to identifying the challenges and uncertainties that act as barriers to Blue-Green infrastructure

Interview themes:

- 1. Participant experience, knowledge and perception of the benefits of Blue-Green infrastructure
- 2. Ownership and responsibilities for implementing Blue-Green infrastructure
- 3. Identifying barriers to adopting and implementing Blue-Green infrastructure
- 4. How current challenges could be overcome
- 5. Future challenges and opportunities



Interview respondents – *professional informed stakeholders*



- Cabinet Member for Investment and Development
- Director of Investment and Development
- Director of Communities
- Flood Risk Management Principal Engineer
- Planning Department
- Policy and Communications Business Partner



- New Development Manager
- Investment Delivery Team Leader



- Sustainable Places Planning Specialist
- Partnership and Strategic Overview Team Project Manager



- Director of Estate Support Service
- Flood Risk Manager, Estate Support Service



Interview respondents – *professional informed stakeholders*

Consultants

- Senior Scientist (Arup)
- Associate (Mott Macdonald)



Environmental Advisor



Freemen of Newcastle upon Tyne

Chairman of Stewards Committee



The Newcastle upon Tyne Hospitals

Head of Environmental Management

Tyne and Wear Urban Traffic Management Centre

UTMC Specialist



(Newcastle Golf Course)

Environmental Consultant



Themes extracted from transcript analysis

| Benefits of Blue-Green infrastructure | BGI lead Newcas | lers in tle | Overcoming barriers | |
|---|--------------------|--------------------------|------------------------|---|
| Barriers | Engineering | Town Moor | Brunton Park | |
| Competing | knowledge | Historic | Beneficiaries | |
| priorities | | flooding in Newcastle | Responsibilities | 2 |
| low others | Maintenance | | | |
| Derceive Blue- Green nfrastructure | Who should pay | Future concerns | Partnership working | |
| | | | | |



Newcastle barriers to Blue-Green infrastructure

| Barrier sub-category | Number of references |
|---|----------------------|
| Reluctance to support novel/new approaches/change practices | 30 |
| Lack of knowledge, education, awareness | 25 |
| Funding and costs | 22 |
| Ineffective/lack of communication | 19 |
| Issues with partnership working | 14 |
| Maintenance and adoption | 12 |
| Identifying and quantifying /monetising the multiple benefits | 11 |
| Legislation, regulations and governance | 10 |
| Physical science/engineering uncertainties | 8 |
| Behaviours and culture | 7 |
| Institutional capacity and expertise | 6 |
| Responsibilities and ownership | 4 |
| Lack of available space | 4 |
| Political leadership and champions | 4 |
| Future land use and climate | 3 |
| Low priority and/or competing priorities | 3 |
| Negative past experiences | 2 |



Barrier: reluctance to support novel (new) approaches and change practices

"I definitely think that **there's still a traditional approach in place**, and that people aren't thinking about going towards more blue-green technologies"

"We're very early on in the process, in general. These, almost changes of mentality, again going back to that leap of faith, take a while to happen. So, I think it's just- there's almost a lag between this movement being discussed and being understood to it actually being physically implemented"

"Maybe it's even **partly laziness**, maybe it's **easier to design what you know** rather than start trying to push the boundaries and get people to agree to do things differently"





Barrier: lack of knowledge, education and awareness

"Lack of knowledge, it's certainly a concern that's been raised by local authorities, particularly around the adoption of SuDS"

"I think unless an individual has been directly affected by flooding or knows, I don't think a lot of people know about it either and its benefits, they perhaps **see it as just something that's costly and not really relevant**"

"For the blue-green infrastructure, I don't think there's an awareness of it at all"





Barrier: funding and costs

"You can come up with all the ideas and wonderful ways of doing things, but at the end of it all **we've got to find the money to be able to do that**.

We've got to find **a way of making that income stream sustainable** as well. You get lots of things that run for three years, or whatever, and the money runs out and everybody looks at each other and things start to fall into disrepair"

"Is there access to finance that's got a **long enough timescale**, and is engaged long enough, to see the benefits?"



Overcoming barriers

Many of the barriers may be difficult to overcome – systemic and embedded within organisational cultures, practices and processes

(Brown and Farrelly, 2007)



Building confidence in Blue-Green and involving the community

Improving public education and access to information, social learning and community engagement, positive experience of asset performance, changing perception of Blue-Green



Recognising and managing uncertainty in Portland

Climate change uncertainty

Portland's Climate Change Preparation Strategy (Bureau of Planning and Sustainability, 2014)



Future population and economic growth uncertainty

Portland's Comprehensive Plan (Bureau of Planning and Sustainability, 2011)





Newcastle strategies to overcome barriers

| Overcoming barrier sub-category | Number of references | |
|---|----------------------|--|
| Promote multifunctional space and (assessing) multiple benefits | 28 | |
| Improve education, awareness-raising, community engagement, communication | 27 | |
| Partnership working (from the project outset) | 20 | |
| Change legislation, regulations, industry standards, planning guidelines | 17 | |
| Exemplars | 15 | |
| Change cultures and behaviours | 14 | |
| Alternative (sustainable) funding mechanisms | 10 | |
| BG champions and enthusiasts | 7 | |
| Better data, improved scientific understanding | 8 | |
| Support from high-level stakeholders (key decision makers) | 4 | |
| Use BG that is suitable for local environment | 3 | |
| Design BG to be low maintenance | 1 | |



Promotion of multifunctional space and identification and assessment (and quantification) of the multiple benefits

"Then if it is **similar in cost**, but you can **highlight all these other benefits** that **link** with our sustainability strategy, our air quality improvements, then straight away they would be happy to **sign it off** as a project"

"They [SuDS] don't necessarily have to be inundated with water the whole time. They could **potentially be designed to just be functional during a time of floods**, so they can perform those sort of **dual functions**."



CIRIA Benefits of SuDS Tool (BeST) and Blue-Green Cities Multiple Benefit Toolbox



http://www.ciria.org/News/CIRIA_news2/New-tool-assesses-the-benefits-of-SuDS.aspx

http://www.bluegreencities.ac.uk/bluegreencities/publications/multiple-benefit-toolbox.aspx





Improving education, awareness raising, community engagement and communication

Placing emphasis on **decision makers**

"I think educating decision makers specifically because it's quite a new concept and none of the policy documentation that is their guide to decision making really pushes that"

and communities to take action

"If the community get together and run the initiative themselves it's got far more power than the council going down wagging our finger at people saying you should have water butts down here"





Improving education, awareness raising, community engagement and communication – Greening Wingrove





New Vertical Veg Street demonstration project using sustainable drainage

Images from www.greeningwingrove.org.uk





Partnership working (from outset)

""I think the politics has to catch up; the legislation has to catch up. I think it's all right turning round and saying that people should work together. There are some barriers that other people may have in working together, and the **legislation should be there to allow us to work together**"

Recent examples of successful partnership working between NWL, NCC and EA

"One of the things we've [Newcastle City Council] been quite successful in recent years about is getting support from our partners, Northumbrian Water and the Environment Agency in terms of **collectively working together** so that we all know what we're investing in"



2 minute discussion with the person next to you

Which strategy for overcoming the barriers would make the most impact?

> Negotiate and write on the piece of paper

Concluding remarks



- Widespread adoption of bluegreen infrastructure is limited due to scientific uncertainty regarding hydrologic performance and lack of confidence in political/public acceptability
- Socio-political barriers >> biophysical
- A reluctance to support novel/new approaches and change practices = biggest barrier in Newcastle dataset
- Lack of education and awareness, and funding = key barriers



Concluding remarks

- Strategies to overcome the barriers to Blue-Green infrastructure generally focus on socio-political aspects; changes in culture and behaviour, improved education and better partnership working to deliver projects that can meet multiple objectives
- However, a concerted effort should be made to reduce some of the biophysical uncertainties through better data and improved scientific understanding
- Barriers are inter-dependent and so strategies to overcome them should not be mutually exclusive
- > Decision makers, practitioners, professionals and communities all have a role of play
- Long term thinking is needed it is not enough to just build a scheme/exemplar, active engagement with residents and decision makers is needed in order to change behaviours and increase acceptance
- Promotion of multifunctional space and identification and assessment (and quantification) of the multiple benefits will be key to helping Newcastle overcome the barriers to Blue-Green infrastructure



Thank you for your attention, any questions?

<u>Acknowledgement</u>

The research reported in this presentation is being conducted as part of the Blue-Green Cities Research Consortium with support from the:

- Engineering and Physical Sciences Research Council
- Northern Ireland Rivers Agency
- Environment Agency
- National Science Foundation
- City of Portland Bureau of Environmental Services



bluegreencities.ac.uk









EPSRC Grant EP/K013661/1