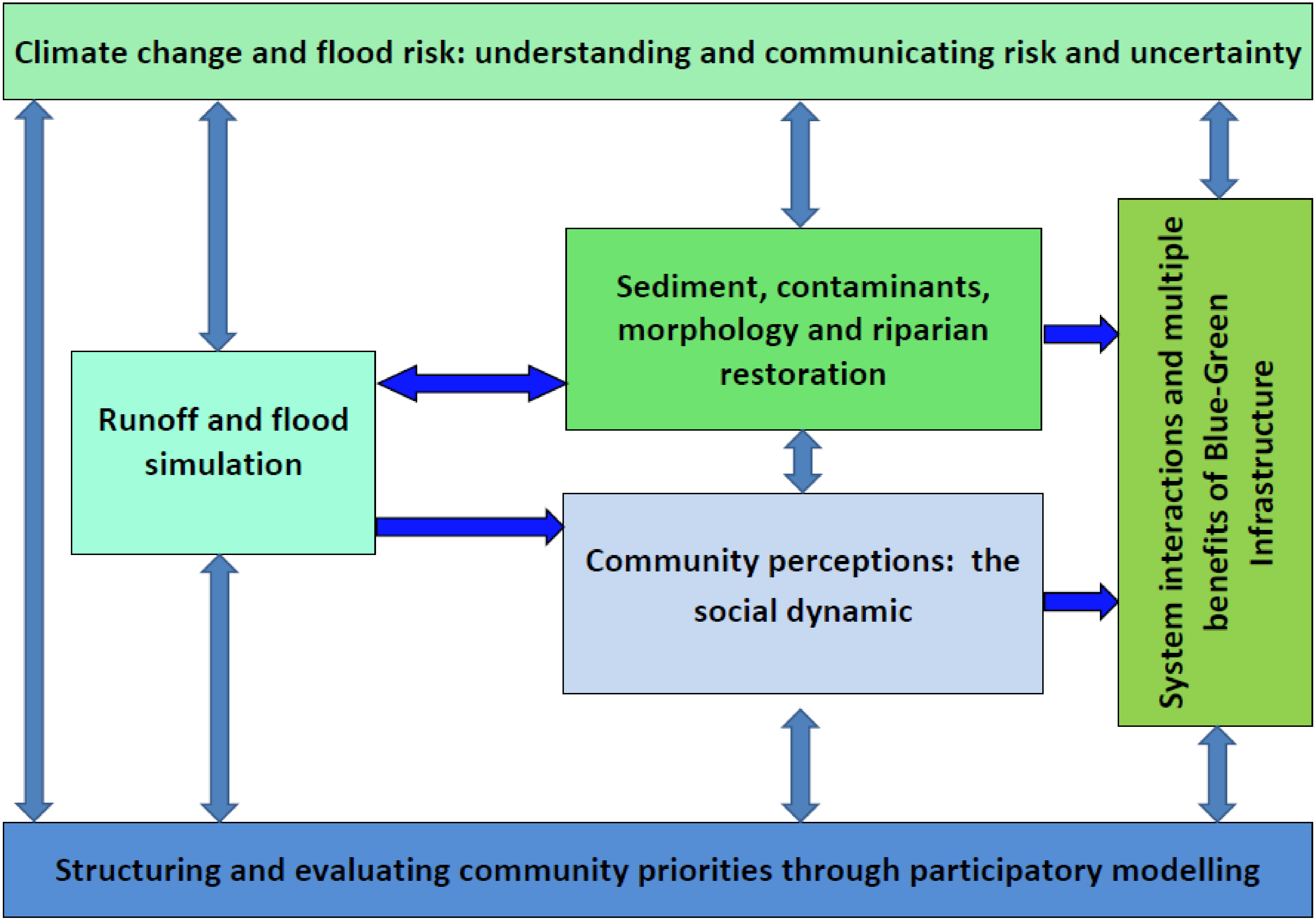
Clean Water For All (CWFA)

A UK+US collaboration

bluegreencities.ac.uk

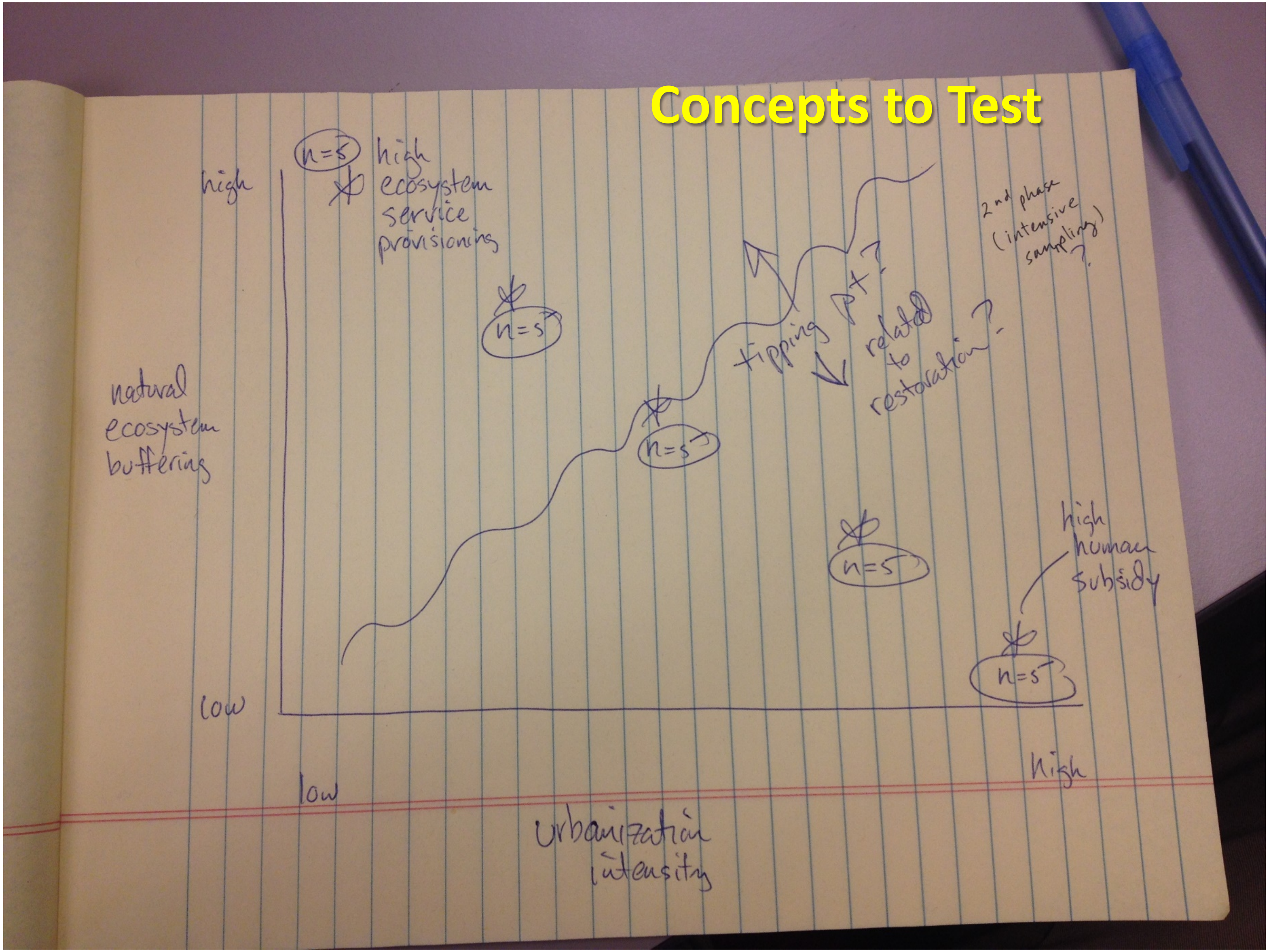

Climate change and flood risk: understanding and communicating risk and uncertainty
Runoff and flood simulation
Sediment, contaminants, morphology and riparian restoration
Community perceptions: the social dynamic
System interactions and multiple benefits of Blue-Green Infrastructure
Structuring and evaluating community priorities through participatory modelling


Our team
SUDS
Ouseburn River basin north of
Newcastle, UK, March 2014

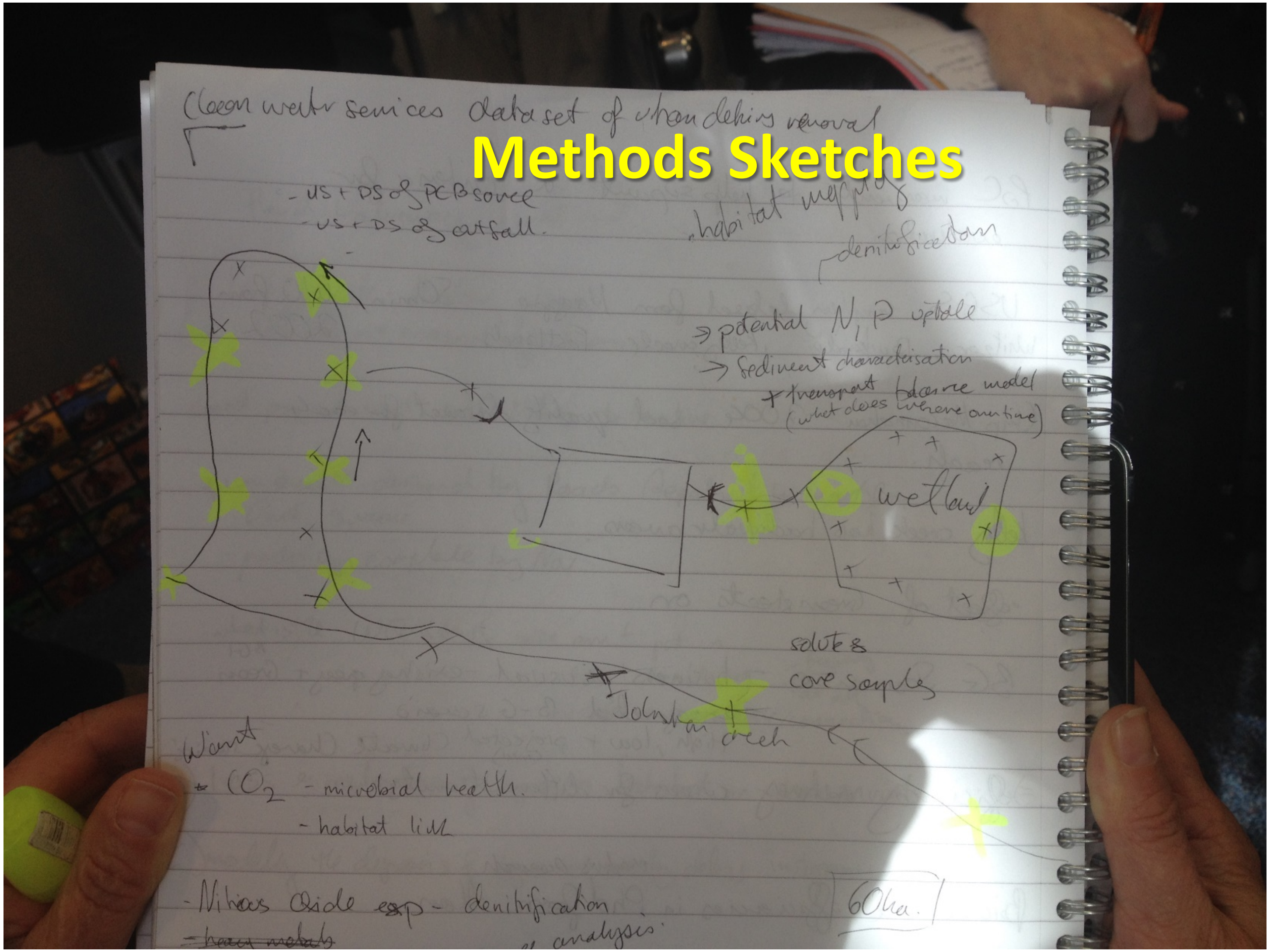
Learning from other cultures and their challenges and successes …

Stiffkey Stream in Norfolk

Concepts to Test



Methods Sketches



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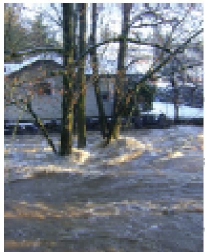
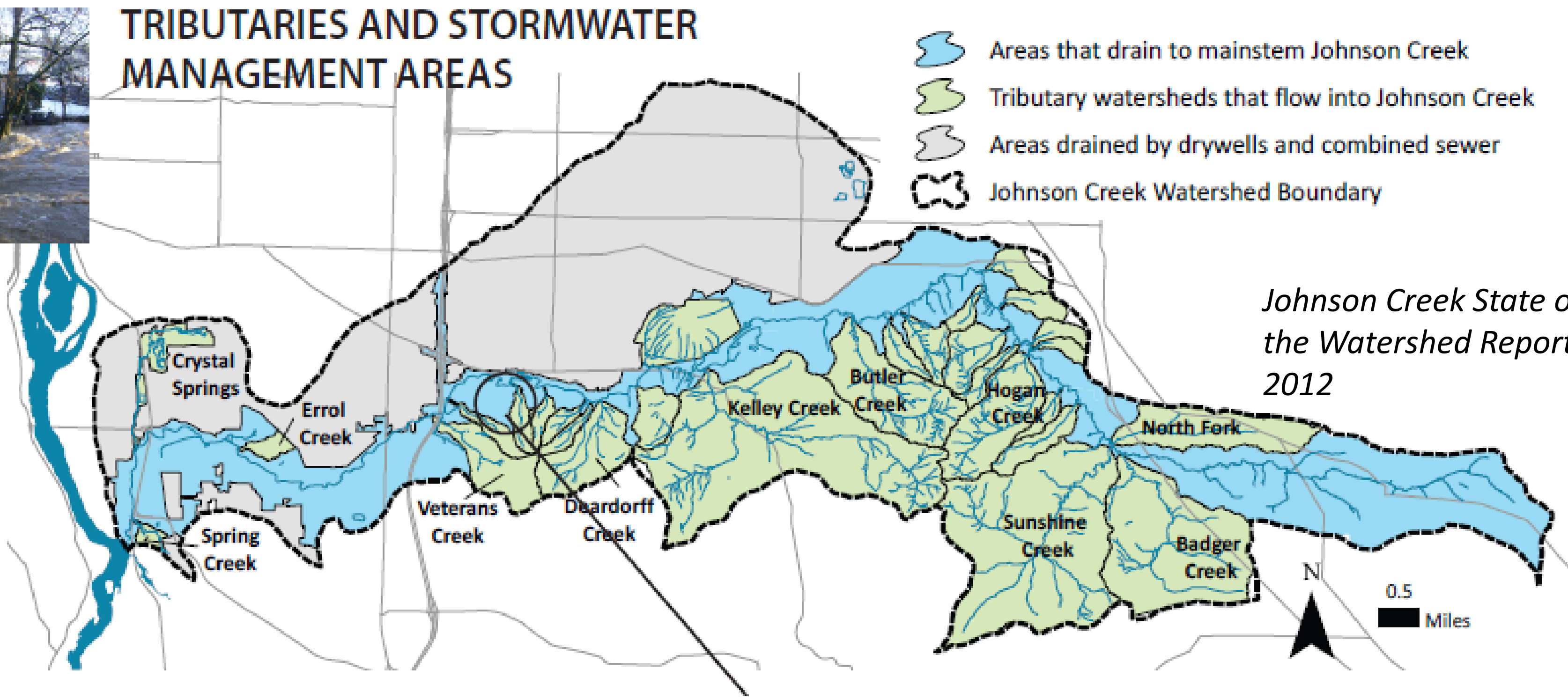
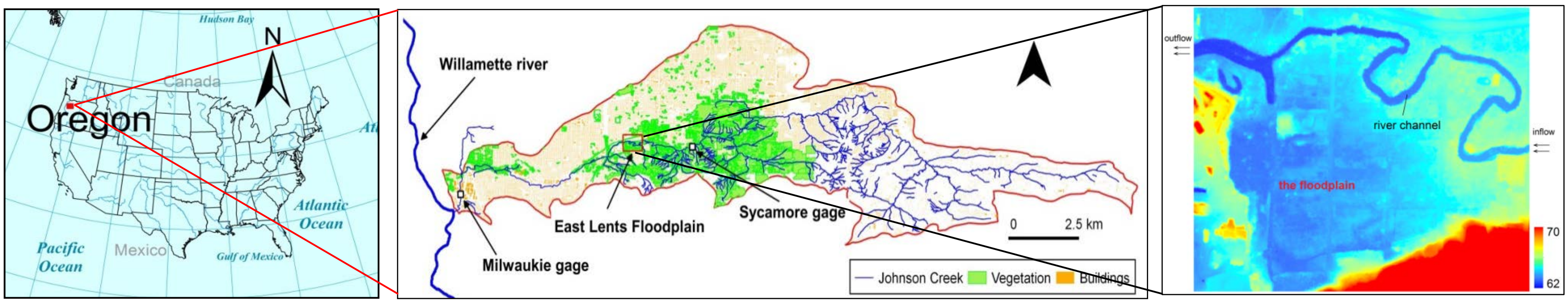
Case Study: Johnson Creek, Portland, OR





Johnson Creek State of the Watershed Report 2012

Sediment transport modelling in the East Lents floodplain restoration project, Portland, Oregon

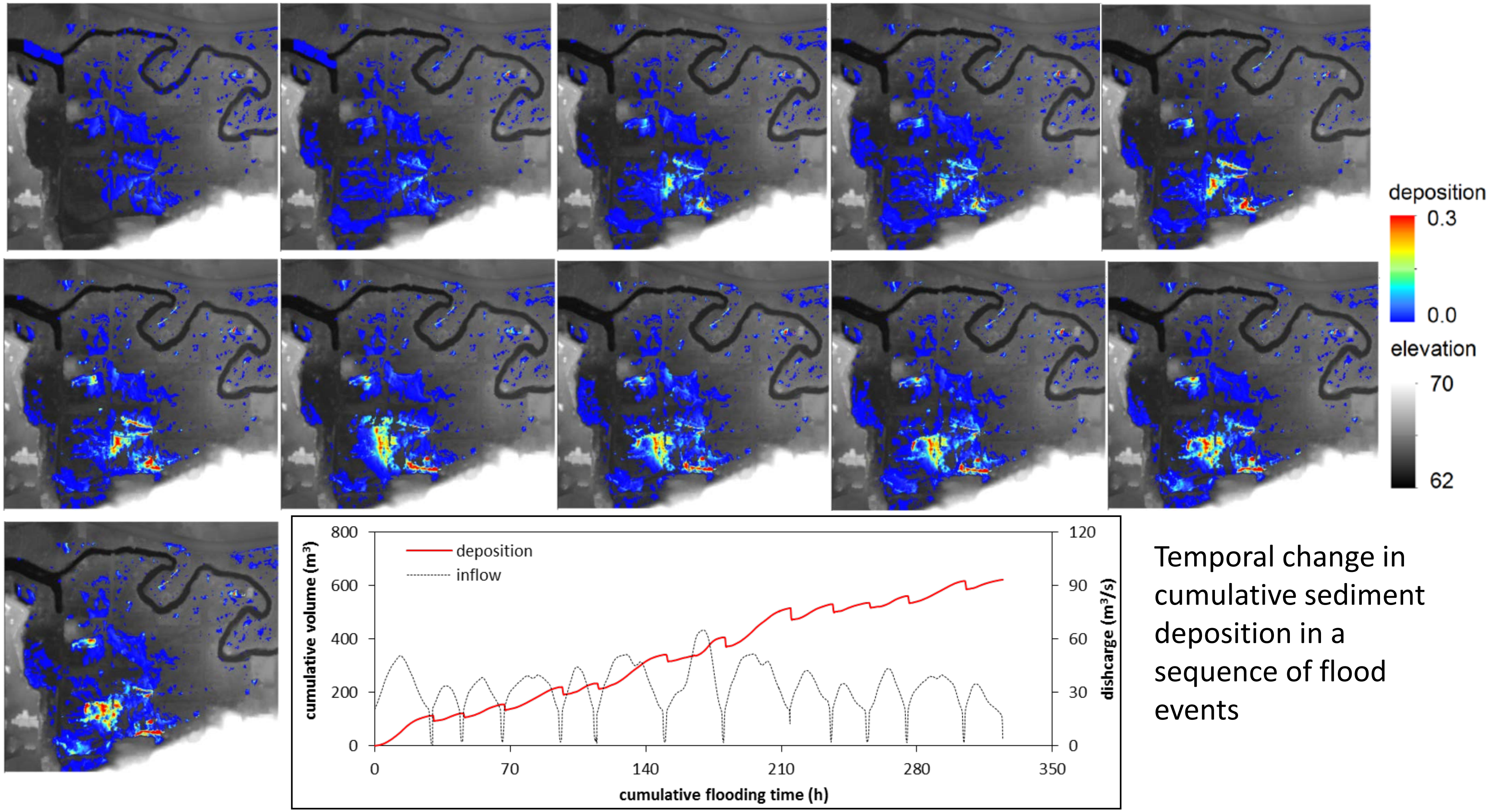


- East Lents floodplain (~28 ha), downstream Johnson Creek
- Flow data sets at Sycamore (USGS – 14211500) gage were used
- Sediment mode: suspended load and washload
- Input SSC was estimated using the derived equation by the (USGS)

$$\log_{10} SSC = 1.024 \log_{10} T + 0.143 \log_{10} Q - 0.419 \qquad \log_{10} T = 0.455 \log_{10} Q + 0.947$$

<u>Aim:</u> to predict sediment deposition in a floodplain during short-term and long-term flood events using a recently updated 2D hydro-morphodynamic model

Sediment deposition in the floodplain during continuous flooding

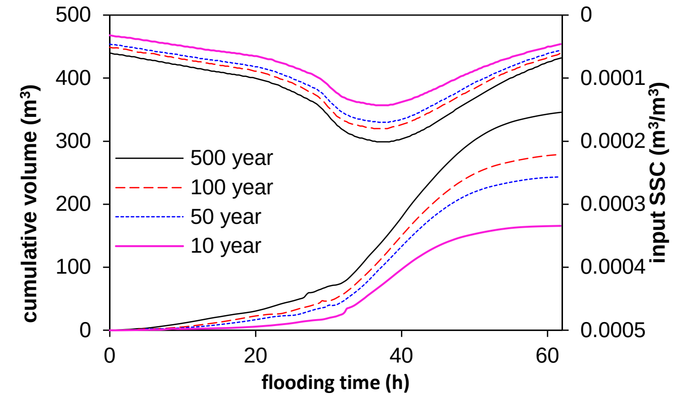


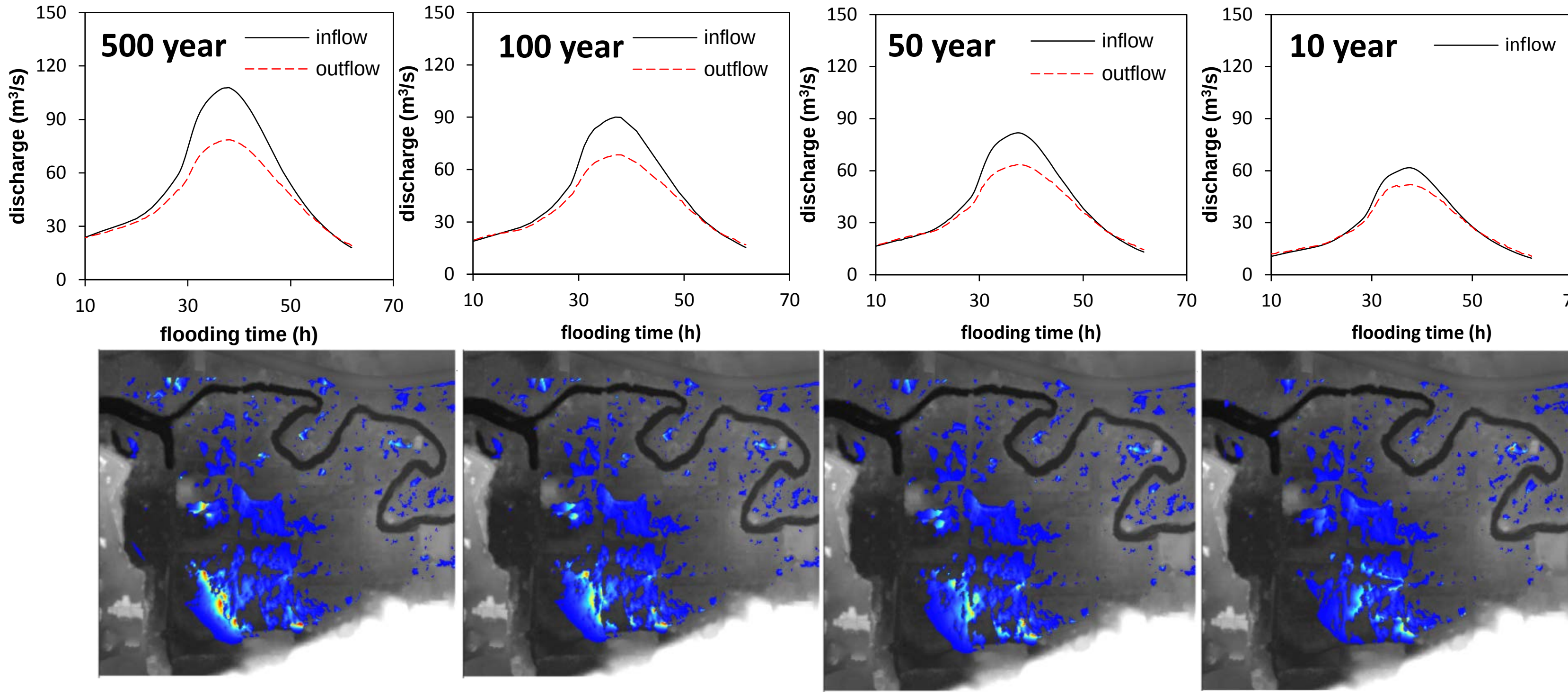
Temporal change in cumulative sediment deposition in a sequence of flood events

- Sediment deposition (volume, depth and cumulative volume) gradually increase as flooding increase
- Deposited sediments are partially re-suspended at the beginning of the next flood in the sequence
- The focus of the deposition moved downstream with the flooding

Event-scale deposition in the floodplain

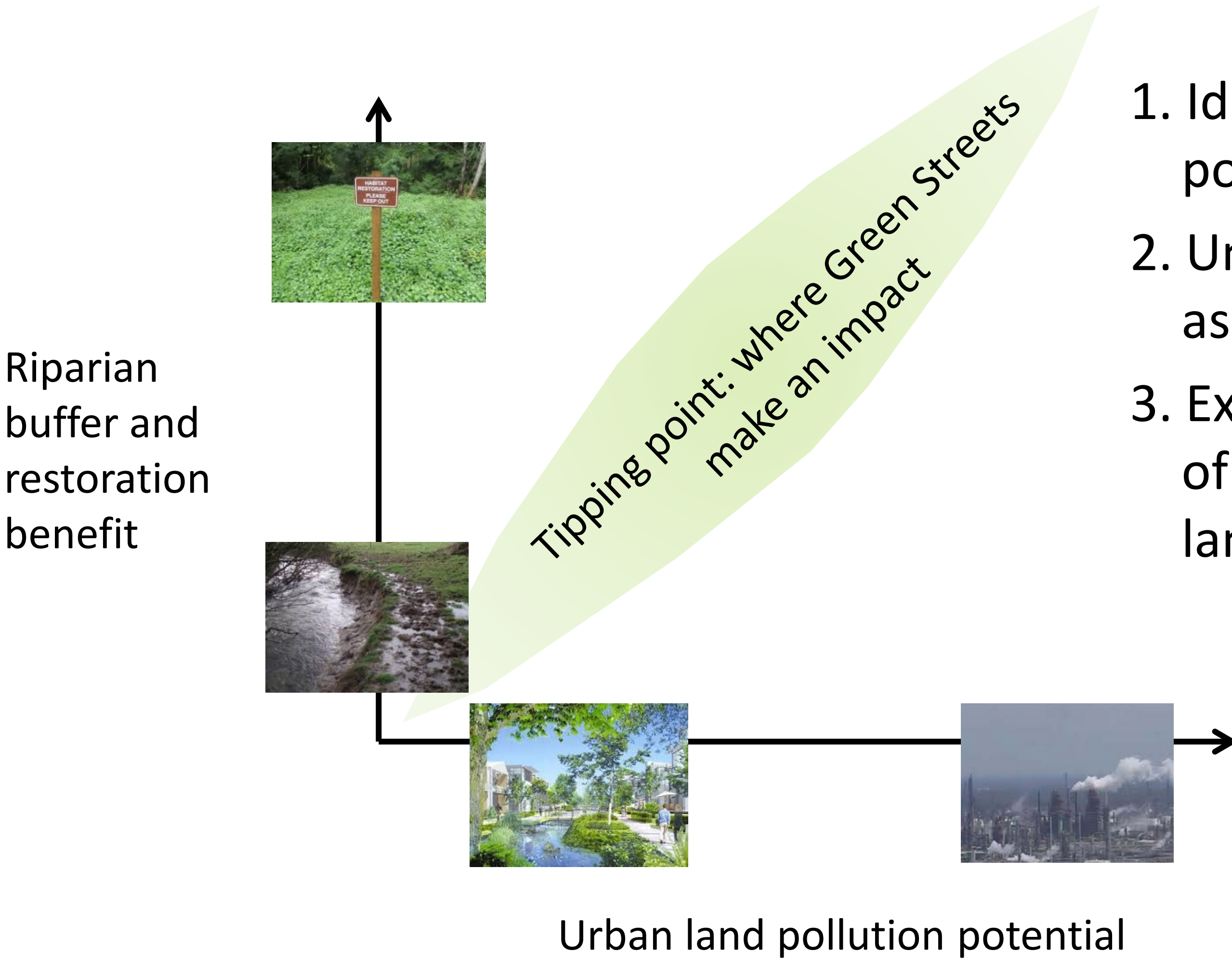
- The reduction of the flood peak is more significant for a bigger flood
- 20% - 25% of the total input sediments is deposited in the floodplain
- More deposition occurs during the recession climb of the hydrograph



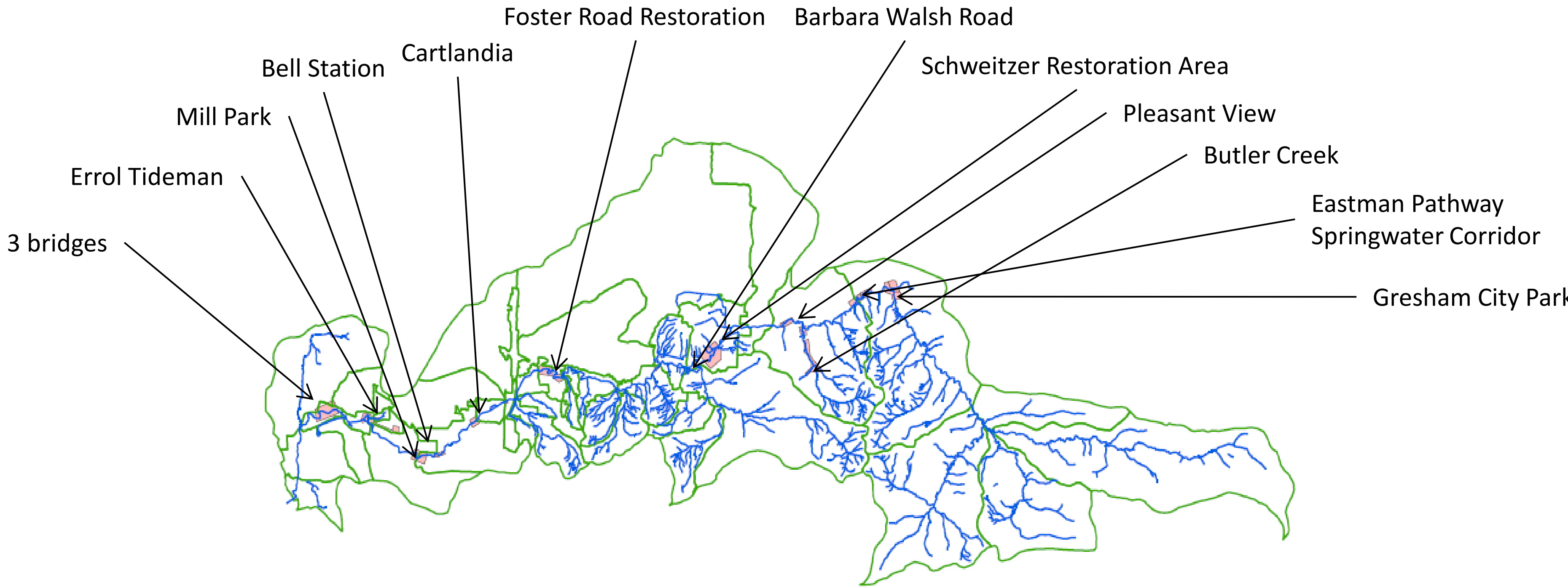


Flow discharge at the inlet and outlet of the river (*row above*), Final cumulative sediment deposition in the floodplain for the floods of 500 year, 100 year, 50 year, and 10 year (*row below*)

Examining the influence of land use and riparian restoration on stream health and water quality



1. Identify the tipping points
2. Undertake outfall assessment pilot study
3. Examine effectiveness of sub-catchment land use and management



1. Laboratory analysis

- Reach modification and habitat scoring
- 17 heavy metal analyses
- CO_2 respiration analysis
- Denitrification potential Phosphorus conc.
- Organic matter content

2. Analysis

- Trend and correlation of heavy metals, microbial respiration, habitat value and modification
- PCA of habitats and heavy metals
- Spatial analysis of habitats, heavy metals, CO2 and denitrification potential

18 Reaches
181 Samples
45 Outfalls

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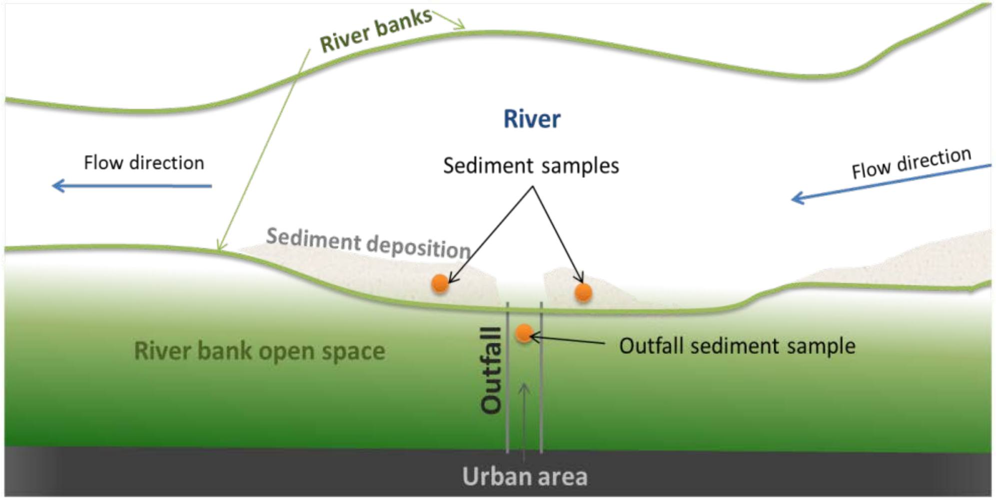
Blue-Green infrastructure for water quality improvements

Catchment composition influence on the urban heavy metal pollution of urban waterways

- There is a link between land use, catchment composition and stormwater outfall pollutant concentration
- Empirical description of catchment composition drivers of sediment pollutant concentration

Setback stormwater outfall functionality as a SuDS asset

- Setbacks improve Ni, Ca, Mg, Na, Zn, Cu, K and P urban sediment concentration
- They function as a water treatment measure – SuDS
- Strong relationship between river reach pollutant concentration and setback



Delivering green streets: an exploration of perceptions and behaviours over time

Aim: To explore the multiple perceived benefits (and costs) of adopting a 'blue-green' approach to flood risk management and whether perceptions change over time (resident interviews)

Key findings:

- Discontent over paying for green streets
- Loss of parking perceived as significant disadvantage by some
- Increased green space and traffic calming appreciated by many residents
- Low awareness and understanding of purpose and function of green streets (and maintenance requirements, beyond not littering)
- Some dissatisfaction with plant choice in green streets
    - Partly due to misunderstanding function, but also aesthetics and safety factors
- No observable opinion change over time
- Portland would benefit from public consultation on what public wanted *before* installation (e.g. trees), and from more public engagement and consultation re. awareness-raising and adjustments. This should be on-going due to changes in occupancy.

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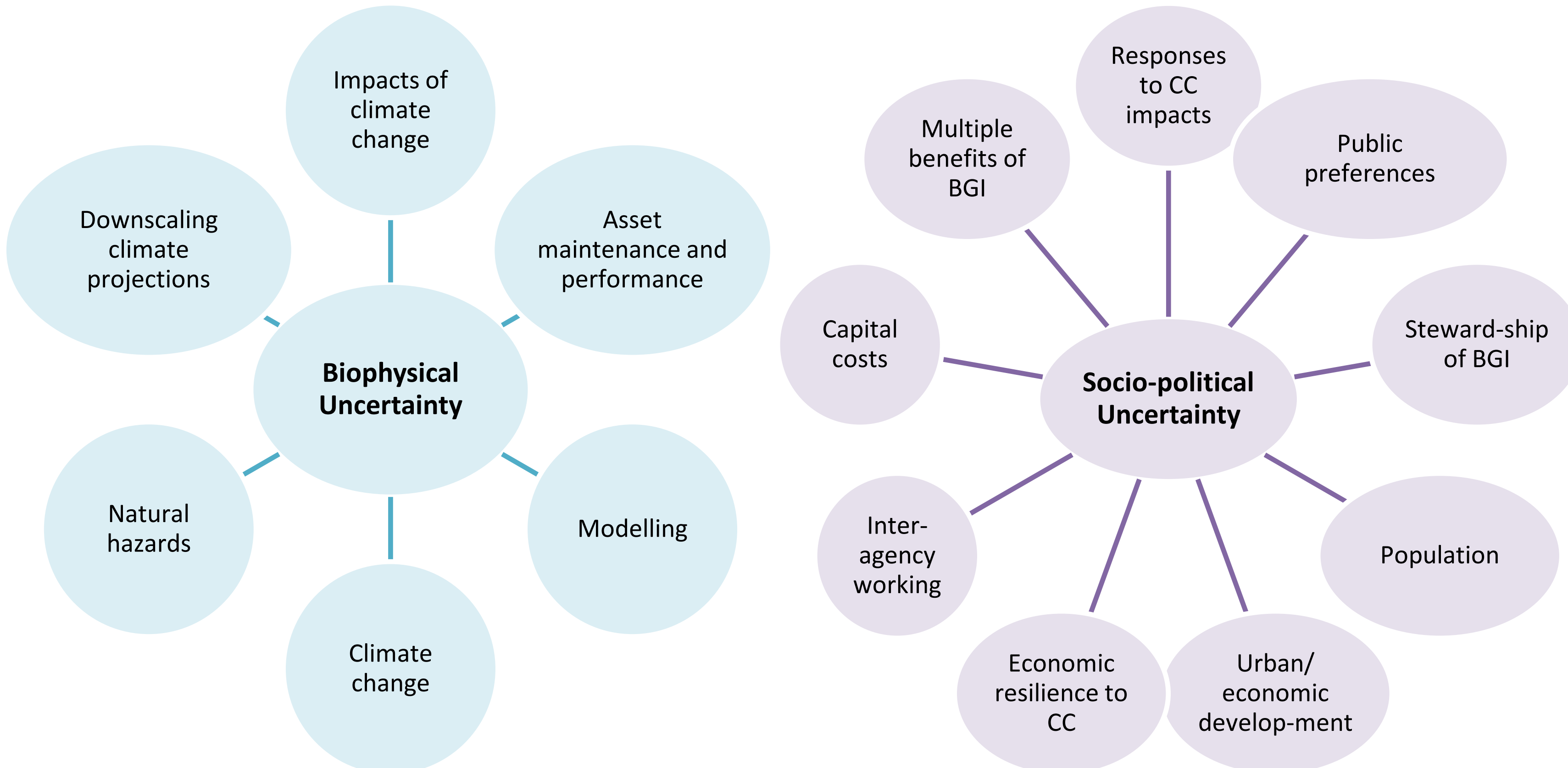
Understanding and overcoming **uncertainty** and **lack of confidence** as **barriers** to wide adoption of blue-green infrastructure for urban flood risk management



- ***Socio-political uncertainties***, notably public preferences, stewardship and equitable delivery of blue-green infrastructure assets, ***appear to have a greater impact*** on decision making in Portland than the biophysical uncertainties





CWFA outputs; dissemination event in Ningbo, China, 15-18th June 2015

Portland, Oregon

Blue-Green Cities are working with:

Portland State UNIVERSITY

Johnson Creek Watershed Council

REED COLLEGE

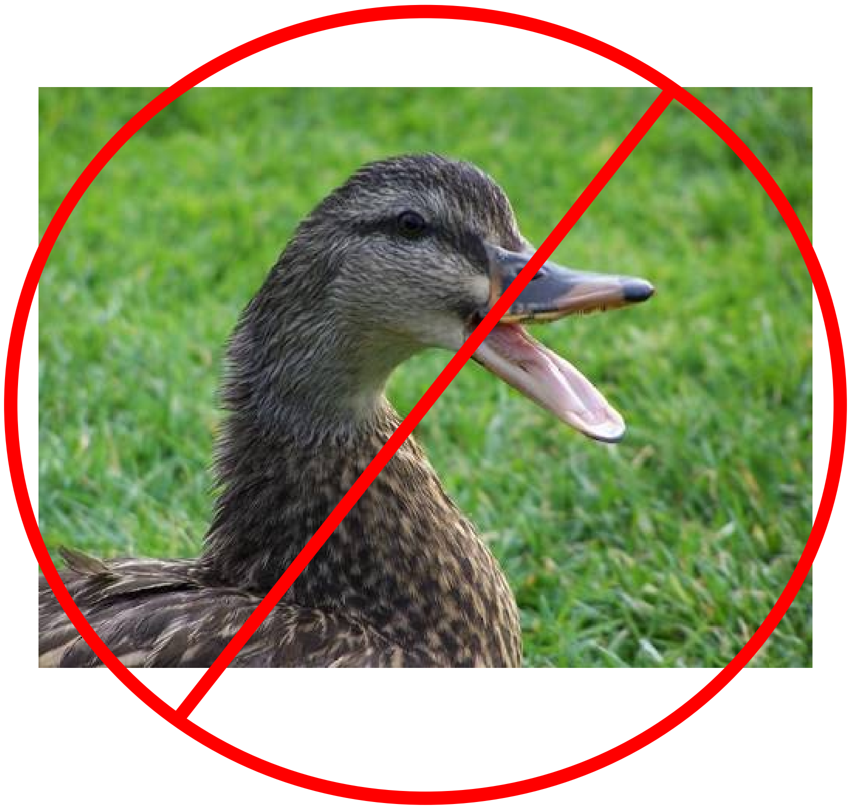
CITY OF PORTLAND OREGON 1851

ENVIRONMENTAL SERVICES CITY OF PORTLAND

Ningbo, China

Blue-Green Cities are working with Ningbo academics James Griffiths, David Higgitt, Faith Chan and Odette Paramor





Put a cork in it my feathered friend ☺

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