Structure

• Project Background
• Reconciliation ecology
• Background to river restoration
• The Tidal Thames case study
• Conclusions from the Thames
• Broad conclusions
Thames21 and Project Habitat

- To determine the biodiversity of the Tidal River Thames through central London
- To determine the potential for habitat improvement (reconciliation) along the river given the limitations of the location
Reconciliation Ecology

- An acceptance that humans will not give up habitat means that we have to find ways of reconciling societal services with biodiversity and ecosystem services

Rosenzweig, 2003
Urban River Restoration

- Restoration is defined as returning a system to the pre-disturbance state
- Majority of schemes are in suburban areas rather than densely populated areas and include: re-madering and adding riffles and pool sequences
  - Little research on heavily urbanized rivers
- Most work termed ‘restoration’ is in fact more akin to rehabilitation or reconciliation particularly the case in heavily urbanized systems
- In heavily urbanized situations new techniques need to be found
- Reconciliation ecology gives a framework for developing new techniques whilst not being constrained by “restoration”
River Thames

Tidal Thames Foreshore
Walls vs. Foreshore

Preliminary surveys

Species Richness

Wall material

Mann-Whitney (p<0.01)

Francis and Hoggart (2008) Restoration Ecology
16(3): 373-381
The role of habitat heterogeneity

Summary

• Within-site – wall surface materials influence plant and invert diversity, mainly stone, brick and fractures

• Wall materials just part of the story, and vary widely – fractures essentially represent increased surface heterogeneity/complexity and sheltered microsites for establishment and growth

• Increase in habitat complexity can increase diversity of both plants and invertebrates

See Francis and Hoggart (2009) & Hoggart et al. (2012)
Comparing Potential vs expressed diversity Methodology

1) Landscape surveys of plant species along the embankment walls of the upper tidal Thames (~32km) = expressed biodiversity

2) Survey of Seed banks: germination trials to determine species ‘stored’ in the system = potential biodiversity

- sediments, coir seed traps and drift nets
Coir Rolls

SEEDS
100 + species 7000+ individuals

PLANTS
20+ species 400+ individuals most common species was *Oenanthe crocata*

INVERTEBRATES
23 species 1200+ individuals most common *Oligochaetes* and *Orchestia cavimana*

∴ Coir has the potential to trap seeds and act as habitat for inverts
Comparison between potential vs expressed biodiversity

In total 169 different species were found, of those species:

- 47% of all species are found within the seed banks
- 29% of species are found in both the seeds and the vegetation
- 24% of all species found only in the vegetation

∴ Potential increase in diversity is 89%

- This similarity is low compared to other studies
Comparison between Plant and Seed Ecological Attributes

- More wetland species found in the seedbank
- More grassland seeds found on the walls - likely to be upper walls
- Ruderal strategy most common in the seed banks, may reflect species that dominate in the seedbank
- Competitors most common on the walls
- Long term persistent seeds most common in seed banks - indicating a possible bias in the sampling
Living wall design

• To be mounted between high water and mean high water – zone identified as having the most vegetation
• Concrete and sheet piling walls only
• Will not damage the integrity of the wall
• Funded by Crown Estates
• Potential to be incorporated into any embanked river
Conclusions From the Tidal Thames

1) Walls are dominated by synurbic species, modifications could improve the number of riparian species

2) The potential diversity is greater than the current expressed diversity. ∴ modifications could improve diversity

3) Coir rolls do trap seeds and allow germination. ∴ green wall technology has the potential to improve diversity
Broad scale Conclusions

• Human influence in riverine, estuarine and marine habitats is increasing
  – Reconciliation ecology offers a framework for supporting both the needs of society and ecology
• In both the riverine and marine environment increasing habitat heterogeneity can increase diversity
• Ecological engineering is more developed in the marine environment and less so in the riverine environment
  – Techniques developed in the marine environment could be incorporated into the riverine environment
• Both retrofitted and enhancements during the construction phase should be considered in riverine as well as marine environments
Thank you
Questions

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References
Hoggart et al. (2012) *Urban Ecosystems* 15: 327-346