CASE STUDY

Using data to monitor and evaluate biodiversity progress in planning developments

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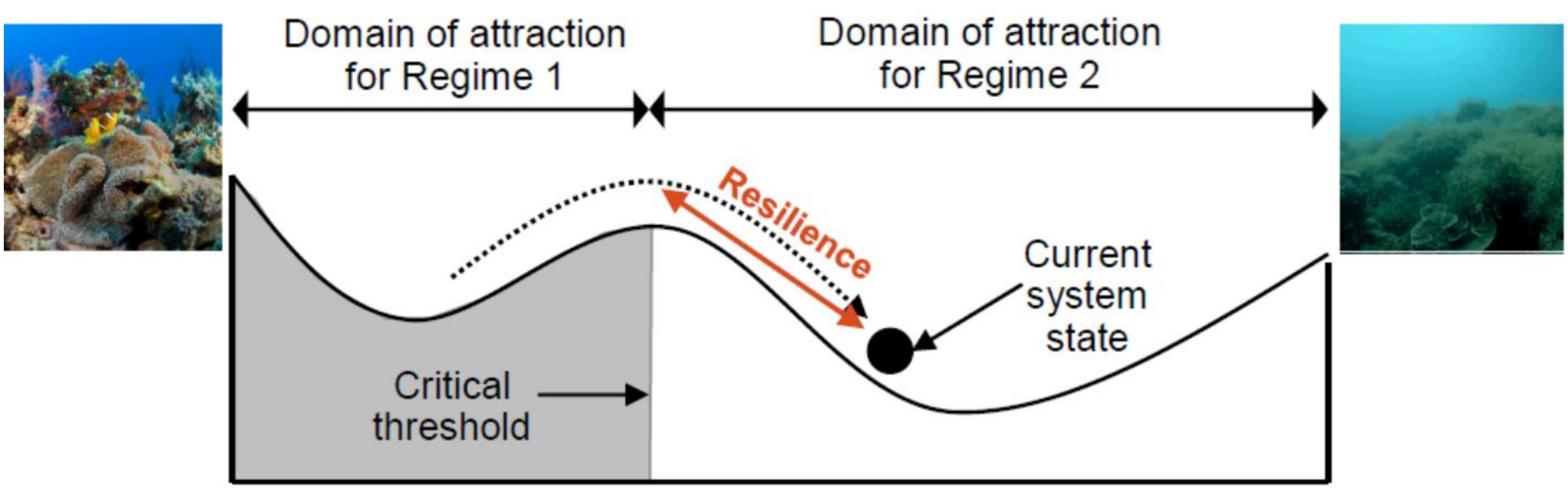
Biodiversity Gain = Biodiversity Crisis



Resilience (in this context)**: Magnitude of change that a system can absorb without undergoing a regime shift**

Biggs et al. In press. Sourcebook in Theoretical Ecology.

Pollinators are declining

- **23 bee and wasp species have gone extinct in the UK since 1850**
- other bee species have declined in half of areas surveyed since the 1980s
- 18 butterfly species extinct in England, many others have declined
- 70% of our commonest moths have declined since 1970s
- 25% of hoverfly species have reduced numbers since the 1980s

(Jeff Ollerton 2019)

Food Security

Pollinated crops:

- Apples, plums, cherries and other orchard fruit
- Potatoes, Tomatoes
- Chilli, peppers
- Peas and beans,
- Pumpkin, melons, squash
- Courgette, cucumber
- Nuts
- Carrots, Celery
- Tea, coffee, chocolate
- oil seed rape, beet
- Brassicas

https://www.apicultural.co.uk/the-foods-that-bees-pollinate#:~:text=Brassicas%20include%20Cabbages%2C%20Mustard%2C%20Oil,Bumble%20Bees%20and%20Osmia%20Bees.

2022 has been a difficult growing year; erratic changes in weather – the threat of **desynchronisation** with pollinators, predators of pests and diseases, and prey for young birds.

United Nations Ecosystem Services

- resilience to Climate Change

Nature benefits to mankind through:

- **Supporting services** – soil organisms, pollination
- **Regulation** of flood risk, pollution and remediation of impacts,
- **Provision** of goods, materials, food and water
- **Cultural values** of place, health and well being, historic, belonging

Biodiversity and Ecosystem Health

Biodiversity is not just about a long list of plants and animals. The concept of Biodiversity include:

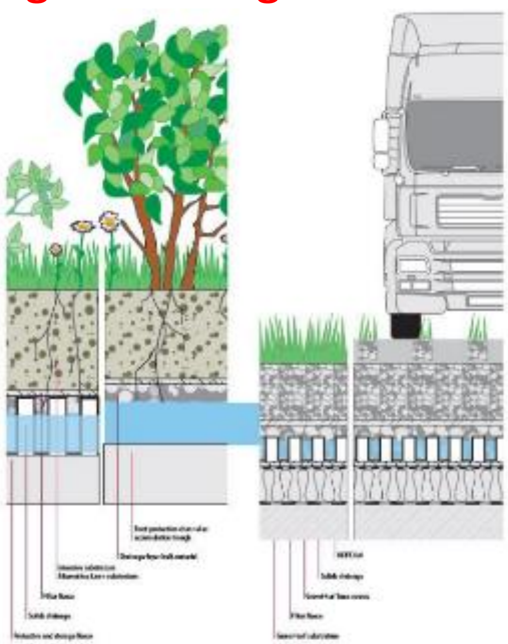
- Ecosystems type (wetland, pond, woodland)
- Habitat structure (marsh, swamp, wet woodland)
- Complex interactions between species (food webs, pollinators, dispersers)
- Geochemical pathways (calcium rich, acidic)
- Genetic diversity (local type, endemic species)

Healthy Ecosystems usually mean bio-diverse systems

Working with nature

Resilience is dependent the function and maintenance of biodiversity, the diversity biotic and abiotic interactions, nutrient cycling and production (Royal Society 2009)

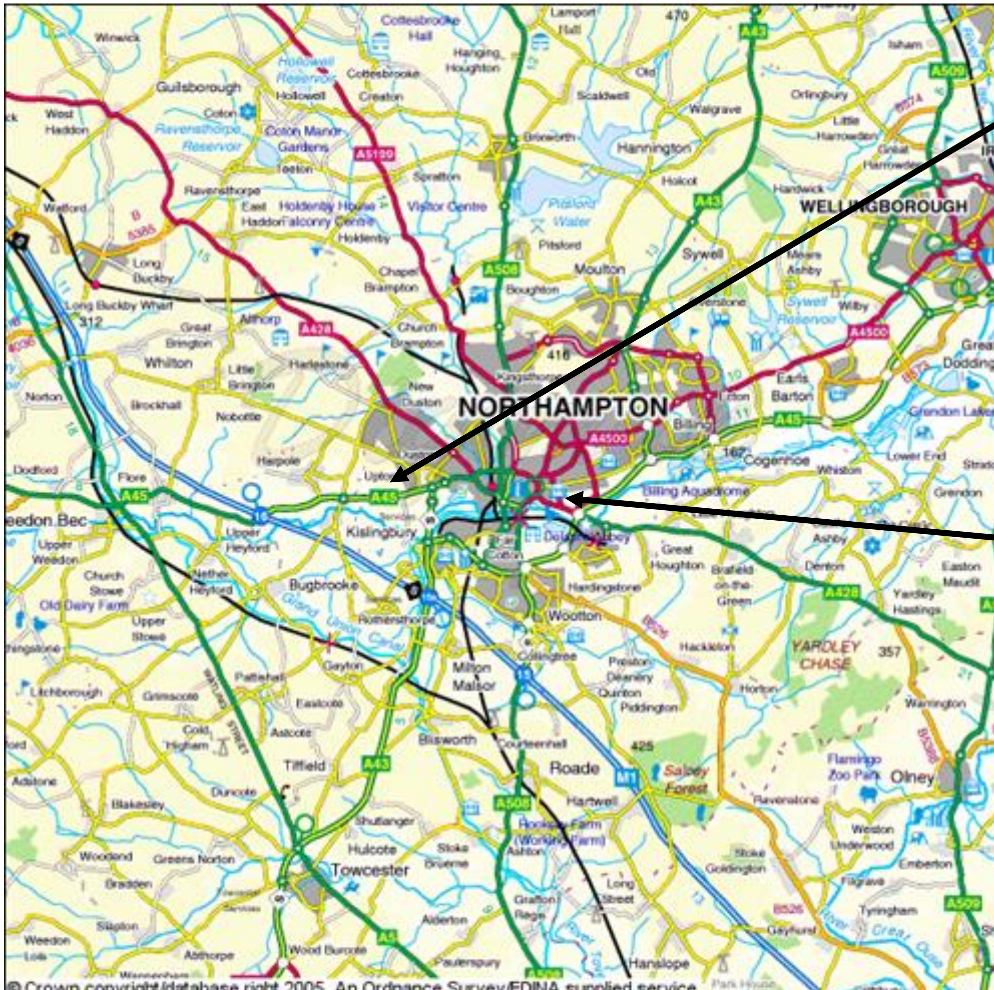
We need to urgently integrate our resilience with biodiversity gain, monitoring and ecological management.



Berlin Senate for Urban Development (2010)

Sustainable Urban Drainage Systems: [SUDS} at Upton, Northampton

Monitoring planning decisions?



Upton Meadows:

Part of a 44ha 6,000 home urban extension to the west of Northampton (Local Plan 1997).

University of Northampton:

Waterside University Campus (2018)

River Nene Nature Improvement Area (NIA)

Species Protection Area (SPA)

Monitoring the western urban extension to Northampton (2003-2017)

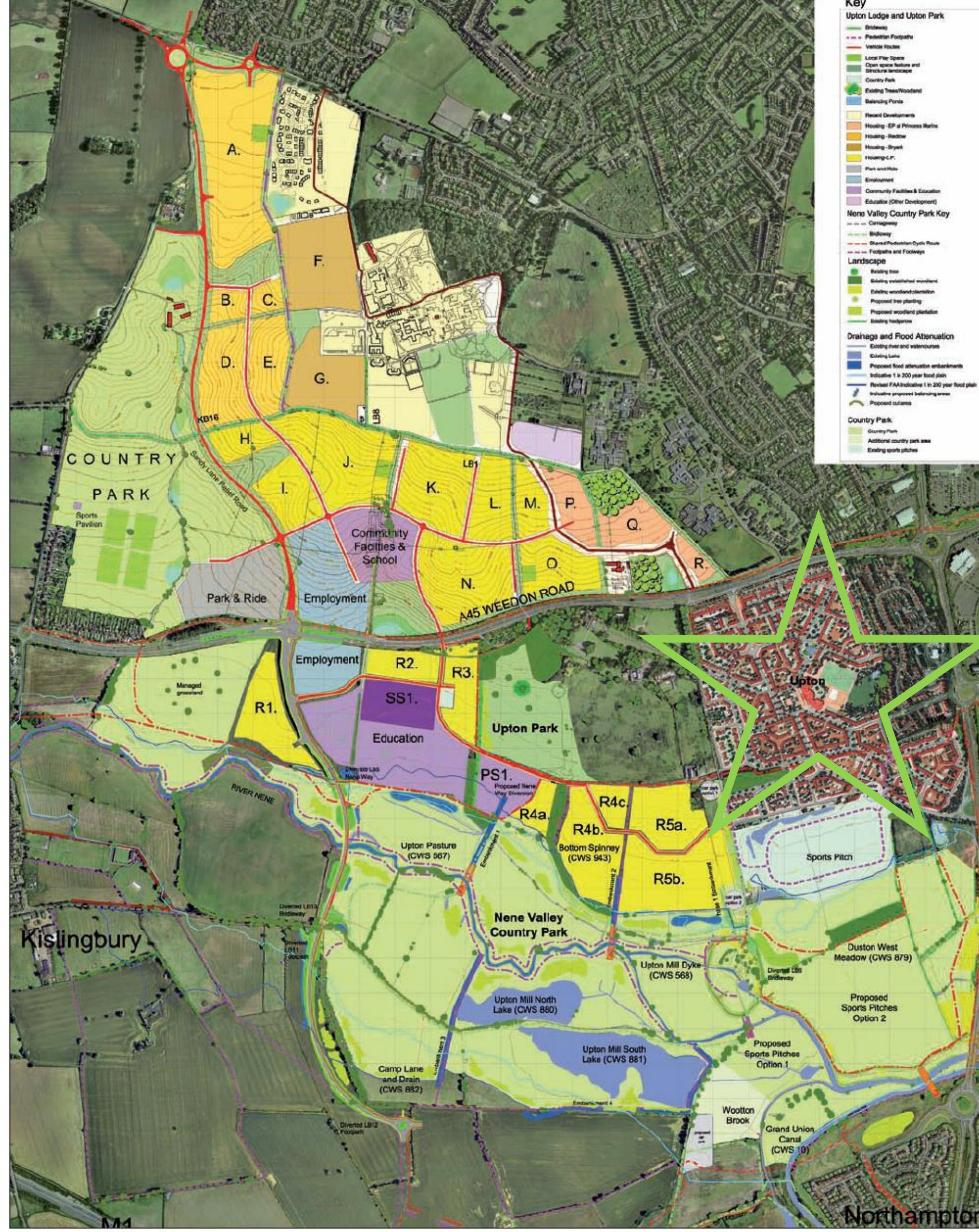
Including:

SUDS

Flood retention schemes

County Park

Environmental Stewardship



Plan 5 - The SWD

English Partnerships
Northamptonshire County Council
REDROW HOMES
Halcrow

Sustainable Urban Drainage Systems (SUDS)

at Upton Meadows

Example of a SUDS retention pond ecological development

Oct 2003

Sept 2004

Typha latifolia has naturally colonised
– sometimes referred to as an invasive species but it has a SUDS function

Aug 2005

Phragmites australis is naturally colonising – Reed Buntings

May 2010

Phragmites australis has naturally colonised and out-competed *Typha*

Sept 2022

SUDS can provide natural elements (green fingers) into new development within a short timescale

SUDS can consist of healthy ecosystems: enjoyable green space

SUDS can add resilience for climate change with cooling, water recharge, pollution control and carbon capture

Common type	Family	2006	2007
True Fly larvae			
Mosquitoes and Gnats	Culicidae	275	21
Biting midges	Ceratopogonidae	4	16
Biting midges	Dixidae	88	1
Non-biting midge	Chironomidae	33	266
Owl midge	Psychodidae		1
Fly larvae	Sciomyzidae		2
Alderfly	Sialidae		20
Soldier fly	Stratiomyidae		2
Cranefly	Tipulidae		153
Total		400	482

Perceptions of risk?

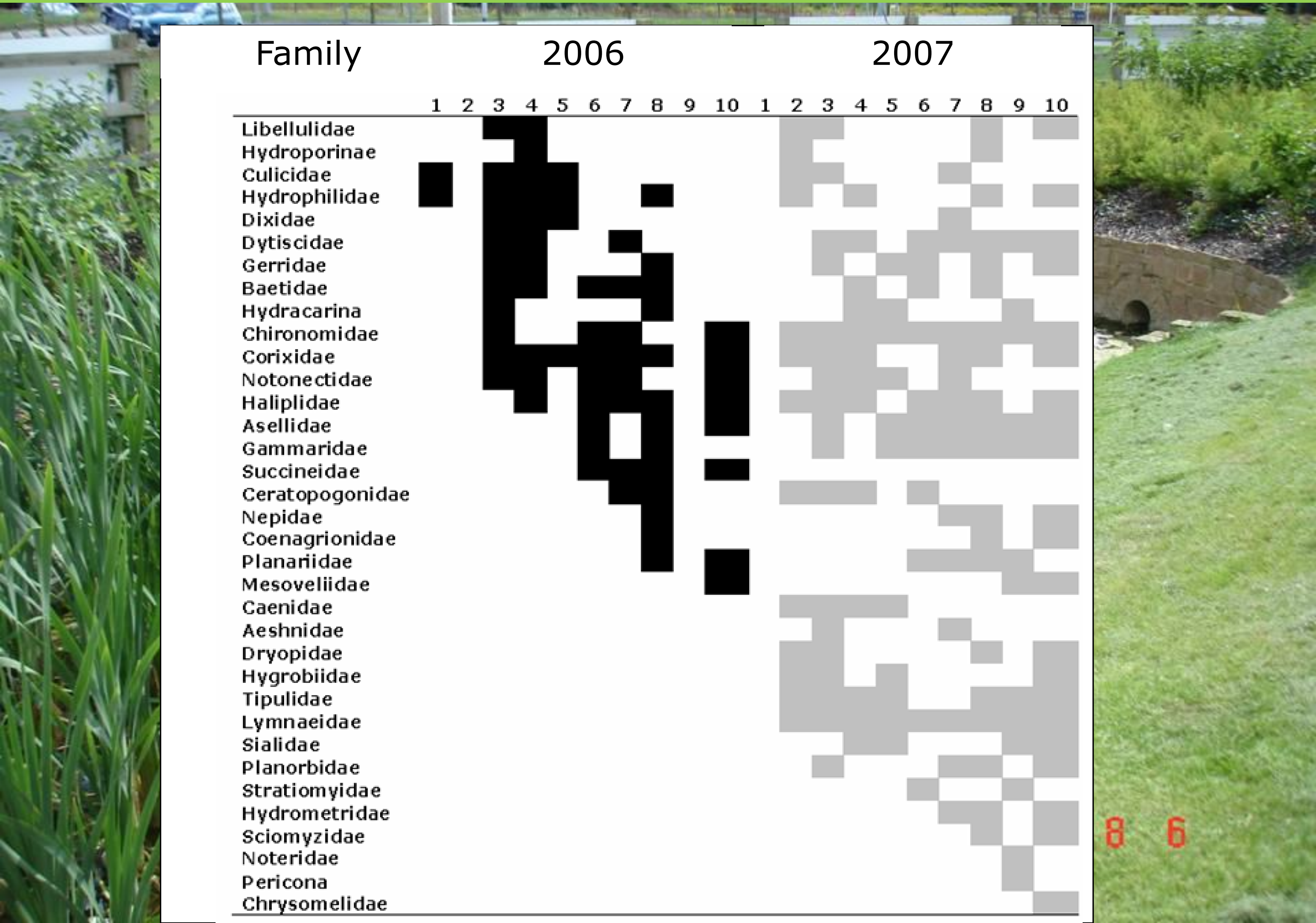
Standing stagnant water?

Observed predators within swales

– development of healthy ecosystems

- Water beetles
- Dragonflies and damselflies
- Water boatmen
- Toads, frogs and newts
- Fish – Nine and ten spined stickleback
- Bats (*Pipistrel pipstrel*)
- Birds

Dispersal - river catchment : connectivity



SUDS Natural Landscaping

Ponds, wetland and wet-grassland areas

Design and topography, natural colonization, diversity of habitats

= low maintenance effort and cost?

Temporary & semi permanent wetlands

Red List Status

Grey Partridge (a family)
Reed bunting
Skylark

☹ Amber status

Snipe
Lapwing (nesting?)
Grey/white Wagtail
House Martins (large flock)
Greylag Geese
Fieldfare
Redwing
Mistle Thrush

Little ringed plover (nesting)
Common Mallard
Starlings
Canada Geese

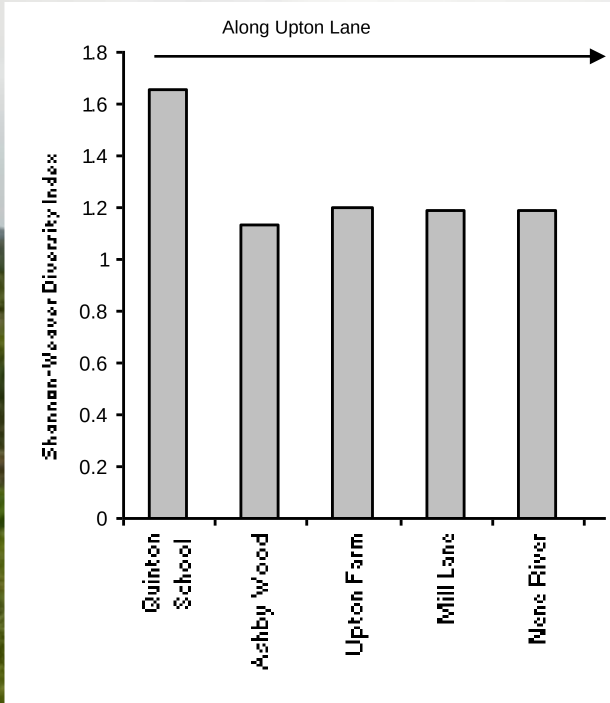
BTO The population status of Birds in the UK 2002-2007.

Grass snake (Richard Wilson)

13 species of Odonata have been found in larvae and adult form

Movement of Bat populations

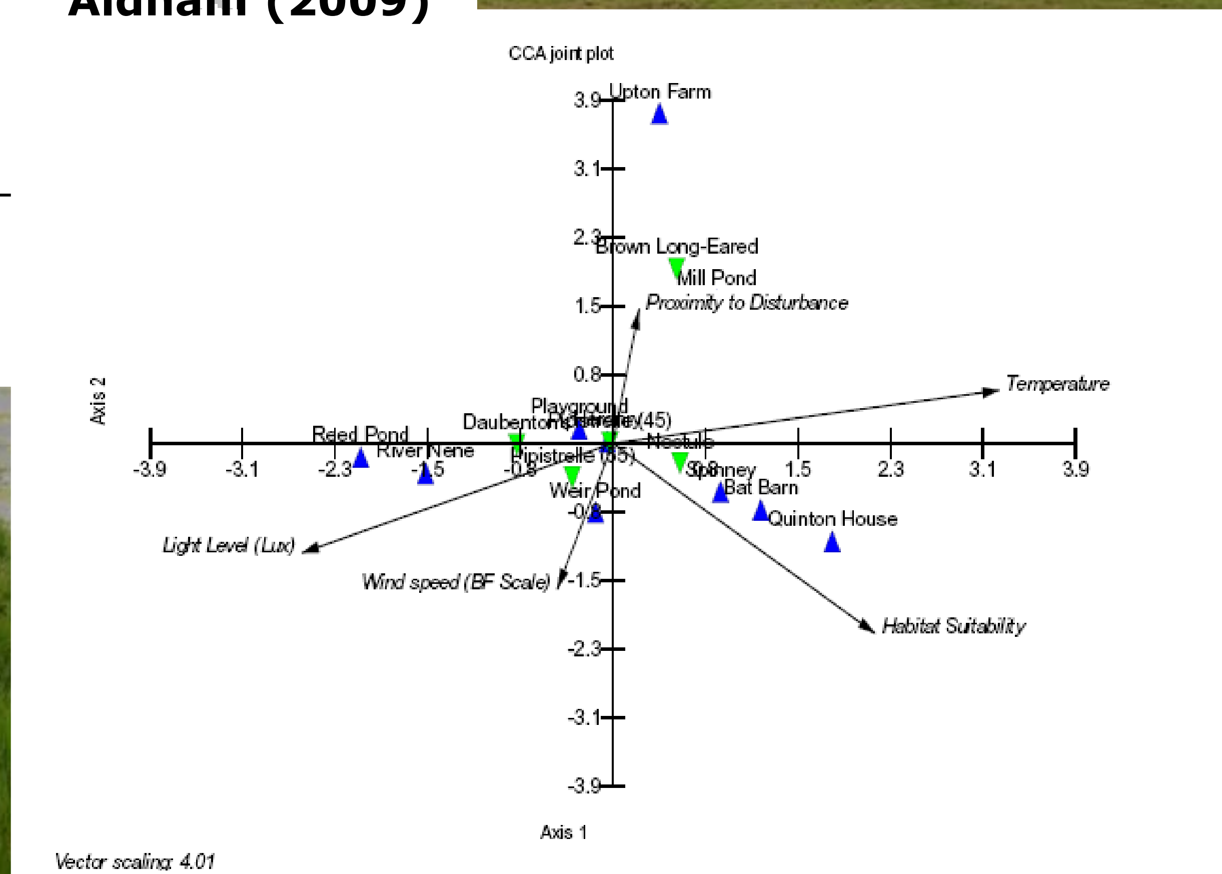
Langley (2006)



Upton Construction Site

2008 – no sig. diff

Aldham (2009)



Bat species detected
Brown long eared
Common pipistrelle
Soprano pipistrelle
Daubenton's
Noctule

Who is in Charge?

Some ACTIONS in creating and maintaining green spaces and improving natural areas are required; by duty of care, duty to collaborate and legal requirements (e.g. Protected species).

But other actions can be disconnected or missed opportunities

- .GOV & LA land holdings
- Land ownership – Pension pots, Commercial investments?
- Statutory duties – Flood Risk Management?
- Community engagement – common land?
- Contracted Private Companies/ Developers?
- Community Trusts?
- Parish Councils?
- Us – driveways, Astro-turf, block paving

Monitoring Management plans

Native species planting

University of Northampton
Faculty of Arts, Science & Technology

2018 to present

Innovative design

- Green roofs
- Biomass district heating
- Willow whips and Pollards
- Species rich meadow turf
- Wildflower seeding
- RHS flowers for pollinators
- Native species trees and shrubs
- Rough areas for longer grasses
- Wetland depressions
- New hedgerow planting
- Fruit trees

UON Project Awesome: Staff and Student engagement

- Otter x 2 (2022)
- Hedgehogs t(+2 releases)
- Bats
- 29 species of bird
- 23 species of native bees
- 150 species of plants
- New record for a rare species

  - Small-Flowered Catchfly, thought extinct in the County 170 years ago (Brien Laney 2018)

- It is OK to be untidy!

Education for land managers

multiple values - multifunction

We need future generations of Ecologists and well paid Jobs in Biodiversity Net Gain