THE UNIVERSITY OF NORTHAMPTON
School of Science and Technology

NENE VALLEY
Nature • Improvement • Area
connecting people and nature

Biodiversity and ecosystem services in the Nene Valley

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Nene Valley Nature Improvement Area Project: Objective 5 Summary





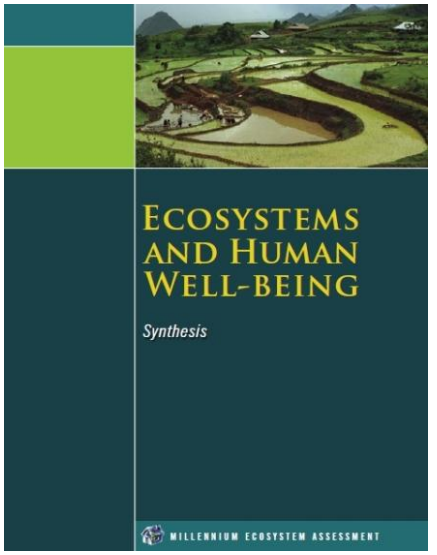


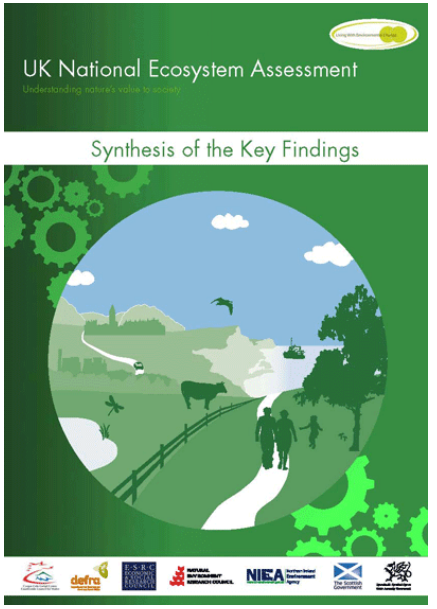


What are ecosystem services?

Ecosystem services are the benefits that people derive from the natural environment

- **Provisioning services -** physical and energetic goods obtained from ecosystems
  e.g. food and fibre
- **Regulatory services -** benefits obtained from ecosystem processes that regulate aspects of the environment
  e.g. air quality, climate and water regulation
- **Cultural services -** non-material benefits people obtain from ecosystems
  e.g. recreation, aesthetic experiences, health and wellbeing
- **Supporting services -** internal processes within ecosystems essential for the production of all other ecosystem services
  e.g. soil formation, primary production, nutrient cycling.





We are examining ecosystem services and the biodiversity that underpins many of these services in relation to the **Nene Valley Nature Improvement Area (NIA).**

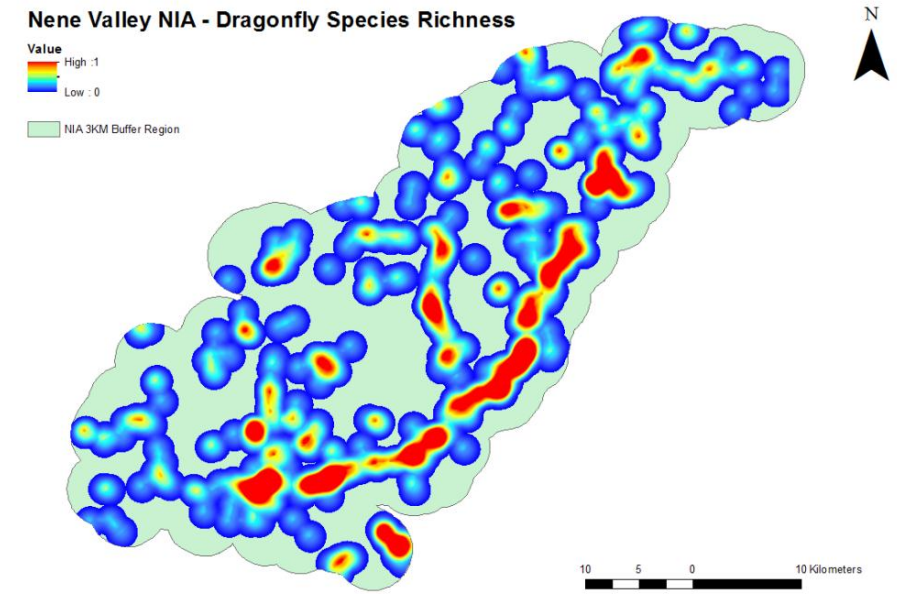
The Nene Valley NIA is a government funded flagship nature conservation initiative to promote landscape-scale conservation across the Nene Valley from Daventry to Peterborough. It is a **partnership** between the University of Northampton, the Wildlife Trust for Bedfordshire, Cambridgeshire and Northamptonshire, Natural England, River Nene Regional Park, Northamptonshire County Council, a number of borough councils, RSPB, and the Environment Agency.

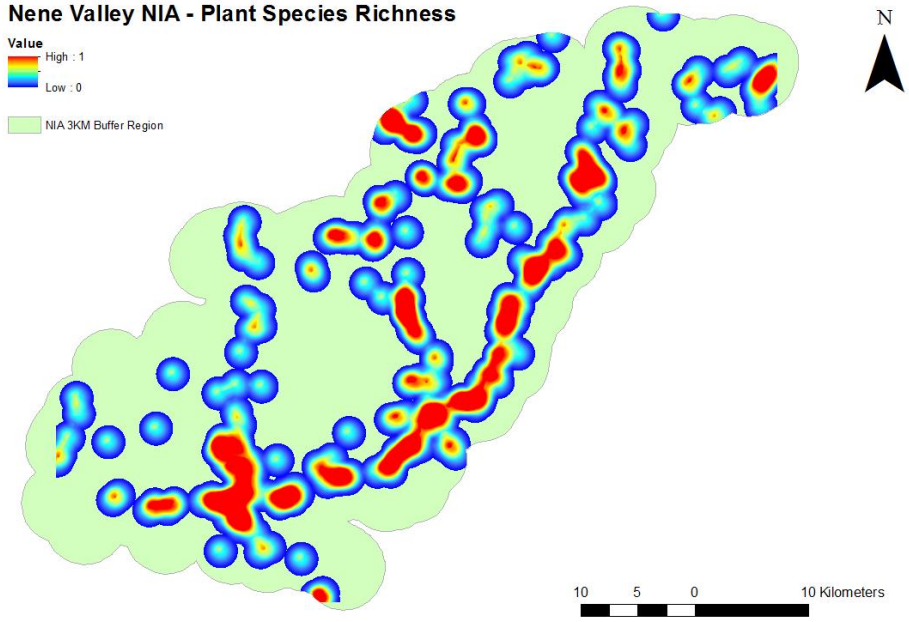
Mapping biodiversity

We mapped biodiversity by utilising existing records for the groups shown in the table below. The number of records was highly variable between groups.

Taxa	Number of records
Plants	43,753
Fish	36,823
Butterflies	75,950
Moths	120,291
Dragonflies	16,444
Bees & wasps	1,615
Hoverflies	4,679
GRAND TOTAL	**299,555**

- Data was collated from all possible sources, pre-processed, converted into species richness for each location, then "hot-spot" maps were produced showing the best locations for each group.
- Biodiversity patterns are being analysed to determine what is driving these patterns and to project patterns across squares with no records.
- Biodiversity also being analysed in relation to the provision of ecosystem services.





Mapping ecosystem services

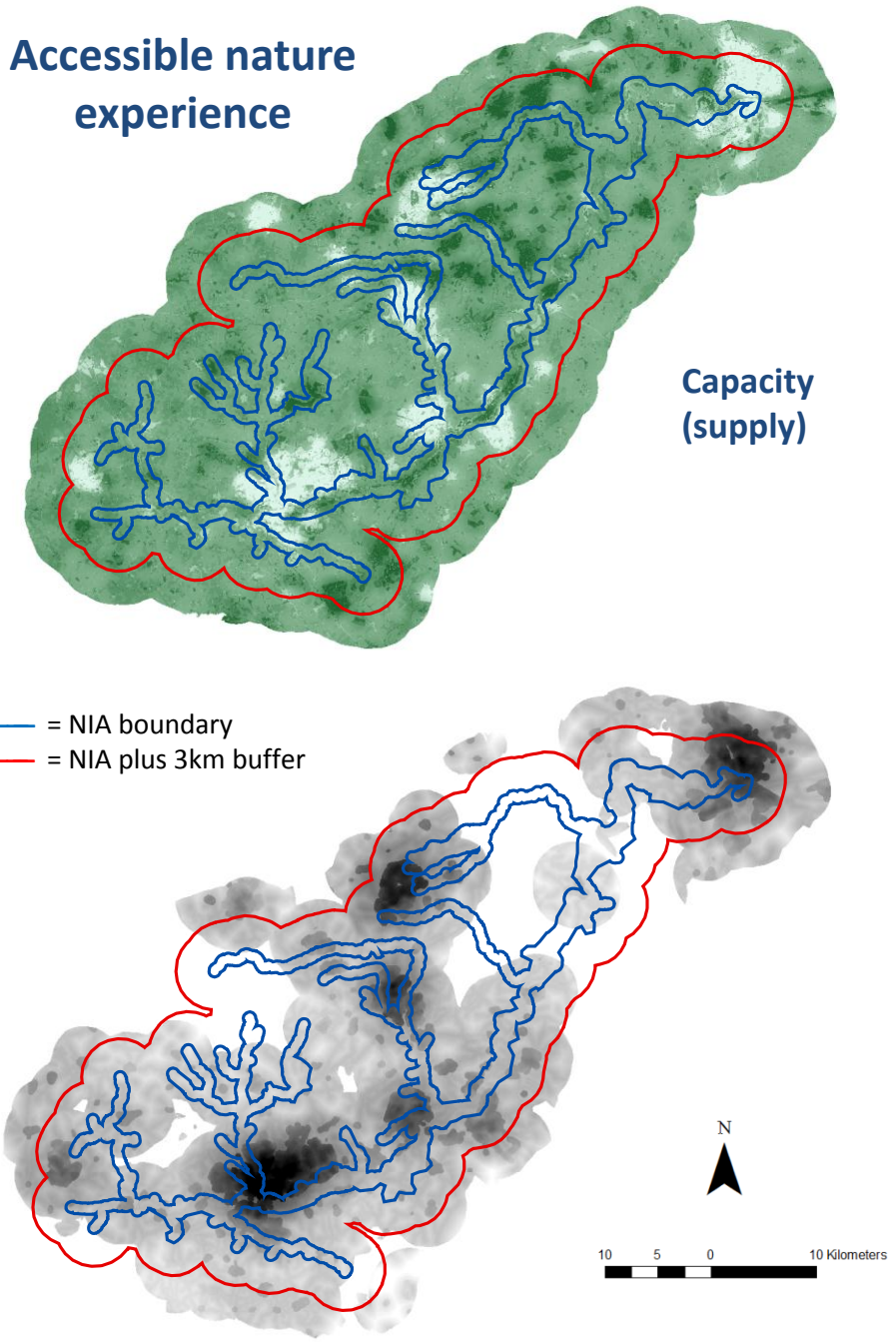
The following ecosystem services are being mapped:

1. Carbon storage
2. Local climate regulation
3. Pollination
4. Noise regulation
5. Water purification
6. Air purification
7. Accessible nature experience
8. Aesthetics (visual amenity)
9. Wildlife watching
10. Food provision
11. Timber

For each ecosystem service, we are producing maps showing supply (capacity), demand, and ecosystem service flows (highlighting benefiting areas and gaps).

Public participatory mapping

A new website was built to engage members of the public and to encourage them to map the parts of the Nene Valley that they value – the cultural ecosystem services.



Monetary valuation of ecosystem services

Ecosystem service valuation	Nene Valley NIA	Nene Valley NIA plus 3 km buffer	Upper Nene Valley Gravel Pits SSSI
Natural capital stocks:			
Carbon stocks (tonnes of C)	3.50M	14.97M	80,000
Increase in carbon stock due to NIA:	1784 tonnes of carbon, valued at £39,300		
Annual flow of ecosystem services:			
Carbon sequestration	£ 67,800	£ 388,000	£ 2,410
Pollination	£ 1,901,000	£ 7,764,000	£ 59,800
Recreational visits	£116,700,000	£178,200,000	£10,850,000
Overall annual value of ES flow	**£118,700,000**	**£186,300,000**	**£10,910,000**
Overall annual value of ES flow per hectare	**£2,862 per ha**	**£1,096 per ha**	**£7,895 per ha**

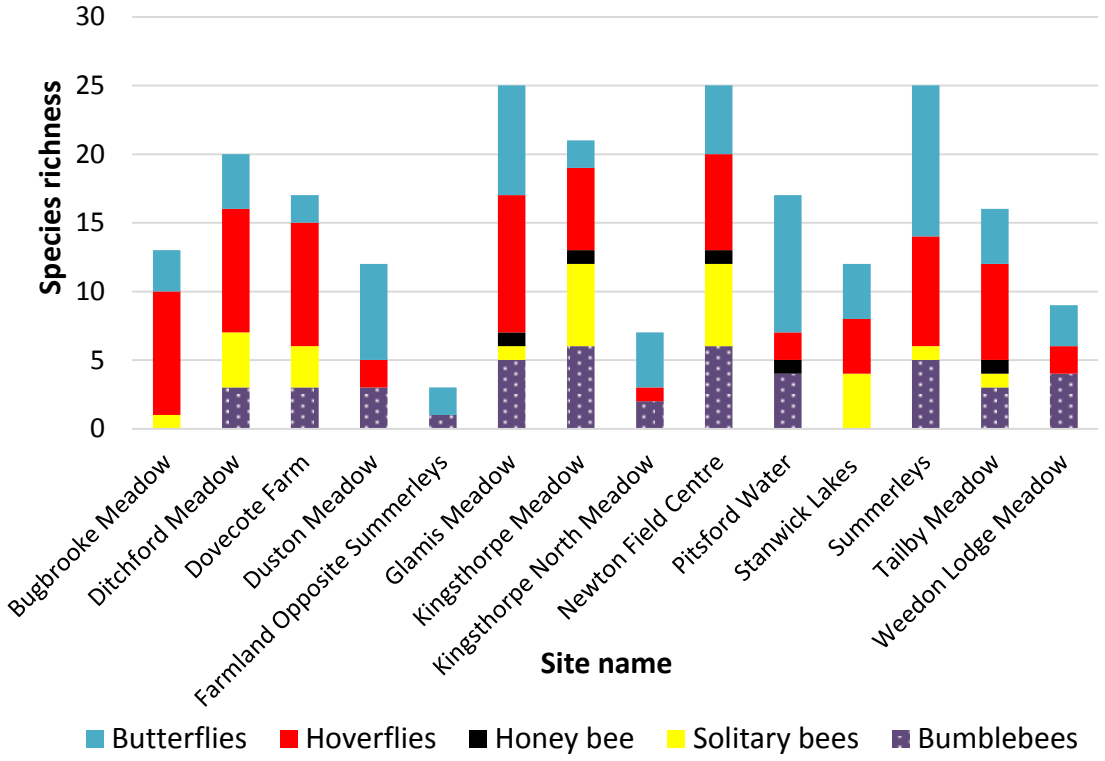
We have assessed that ecosystem services in the Nene Valley NIA are valued at £118.7M each year, with the vast majority of this derived from the value of recreational visits. On average, each hectare of land delivers £2,862 of services per year.

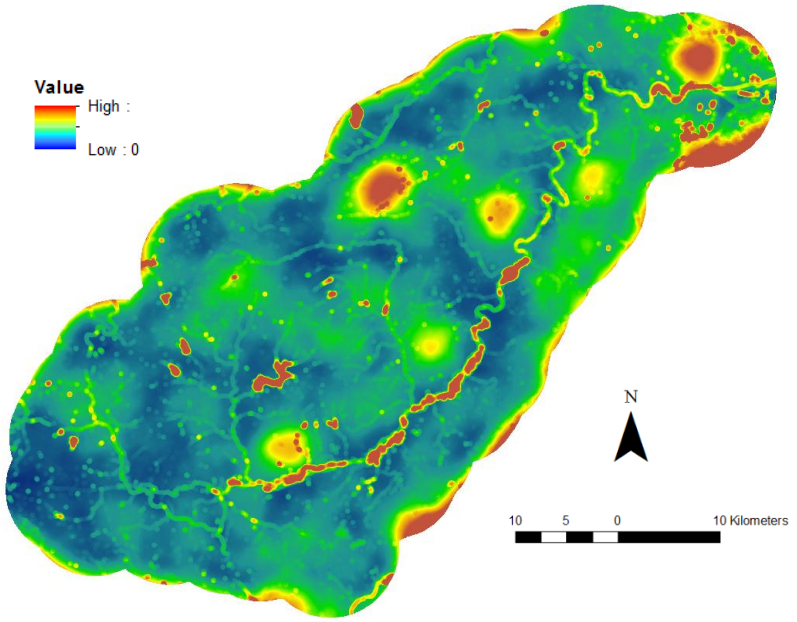
This assessment includes only a few of the services that we could value; soaking up carbon dioxide, pollination of crops and orchard fruits, and the money spent on recreational visits. The value of all ecosystem services will be considerably higher.

Landscape-scale habitat requirements of insect pollinators

A PhD project, linked to the main NIA project, is examining the landscape-scale habitat requirements of insect pollinators in the Nene Valley NIA. The overall aim is to produce a series of habitat suitability models that can be used for planning scenarios, conservation planning and further scientific study. To achieve this:

- 14 field sites were surveyed for bees, butterflies and hoverflies from April – September 2013. The number of species recorded for each group at each site are shown below:





- 10 landscape-scale factors were selected for analysis, based on the scientific literature, and maps created in GIS.
- The results of the field surveys were analysed to determine possible relationships between the landscape factors and the diversity and abundance of pollinators.
- A habitat suitability model was created for each insect group based on this analysis. The habitat suitability map for butterflies is shown above.
- The models are being tested and refined using new data collected during fieldwork in 2015.

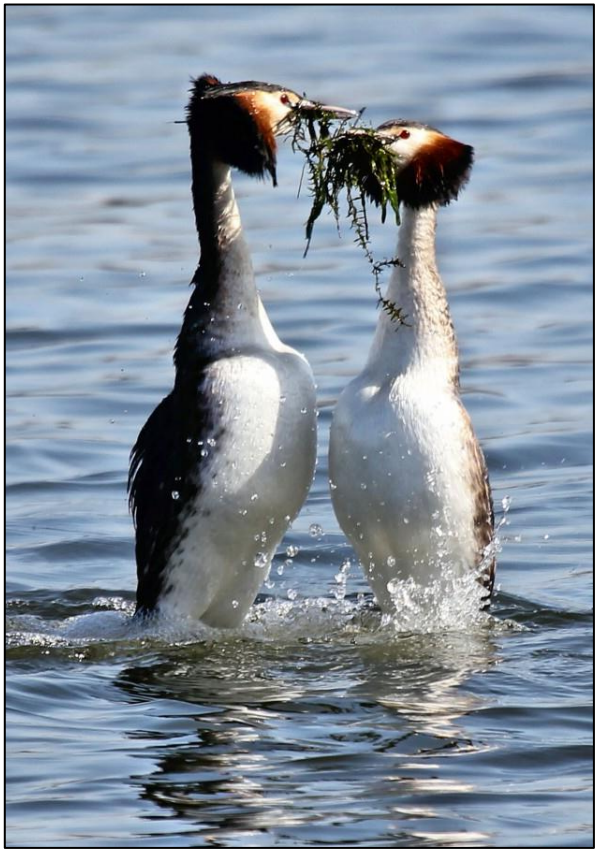
Enhancing nature conservation

We are currently using the maps and models of ecosystem services and biodiversity to examine:

- The **links between biodiversity and ecosystem services**, and to locate land which is delivering many different services
- **Trade-offs and synergies** between different services and management practices
- **Targeting** areas to conserve and areas to manage better or differently
- **Scenario modelling**
- Ecosystem markets and **Payments for Ecosystem Services (PES)** schemes, whereby ecosystem service beneficiaries pay providers to produce those services

Working with the planning system:

- We are working with local planning authorities to embed ecosystem services into planning policies, such as the new **North Northamptonshire Joint Core Strategy.**
- We are writing an **introduction to ecosystem services** for planners and developers.



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Images- cover: Sunset over Irthlingborough Lakes and Meadows (John Abbott).

P2: Nene Valley landscape (John Abbott), winter on the River Nene, near Oundle (Carol MacIntyre-Jones), recreation in Nene Park, Peterborough (Chris Porsz), experiencing nature (Chris Porsz), volunteer work party (Wildlife Trust BCN), bumblebee (Lisa Rowley), comma butterfly (David Harris), golden plovers flying (Jamie Cooper), oystercatcher (Victor Penn).

P6: High Wood in Northamptonshire (John Abbott), pollination in a Northampton garden (Jeff Ollerton), recreation in Nene Park, Peterborough (Chris Porsz).

P8: Great crested grebes (Victor Penn)