Ponderful
PONDS FOR CLIMATE

UNITED KINGDOM

PONDSCAPE : WATER FRIENDLY FARMING, LEICS

Pond Ecosystems for Resilient Future Landscapes in a Changing Climate

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No ID 869296

WHAT IS A PONDSCAPE ?

DEFINITION

A pondscape is a network of ponds with spatial proximity ("connectedness") and the surrounding landscape matrix.

The boundaries of a pondscape may be determined by physical or ecological settings (a valley, a catchment, a set of ponds in a nature reserve) or even determined by societal or political criteria (urban ponds, provincial or national boundaries).

PRESSURE/THREATS ON PONDS AND PONDSCAPES

50-90% of ponds have been lost from European countries over the last century. Furthermore, ponds are largely neglected in water- and nature-related national and EU policies and strategies, including the EU-WFD.

WHY IS IT IMPORTANT TO PROMOTE THEM ?

BIODIVERSITY ENHANCEMENT

Largely neglected and generally undervalued, ponds are remarkably important for biodiversity conservation. Pondscapes represent biodiversity hotspots.

DISASTER RISK REDUCTION

Ponds and pondscapes play a fundamental role in mitigating flooding and also constitute a water reserve to fight fires.

HUMAN HEALTH

Ponds and pondscapes provide a wide range of co-benefits for human societies such as support for human health and quality of life, spaces for physical activities, or social interaction, but also aesthetic experiences and educational and recreational activities.

CLIMATE CHANGE MITIGATION AND ADAPTATION

Given their abundance and their high productivity, ponds influence markedly the carbon cycle by acting as both carbon sinks and sources.

WATER MANAGEMENT

Pondscapes provide a water reserve that is particularly important in the context of water scarcity. It is particularly useful for watering animals and for irrigation.

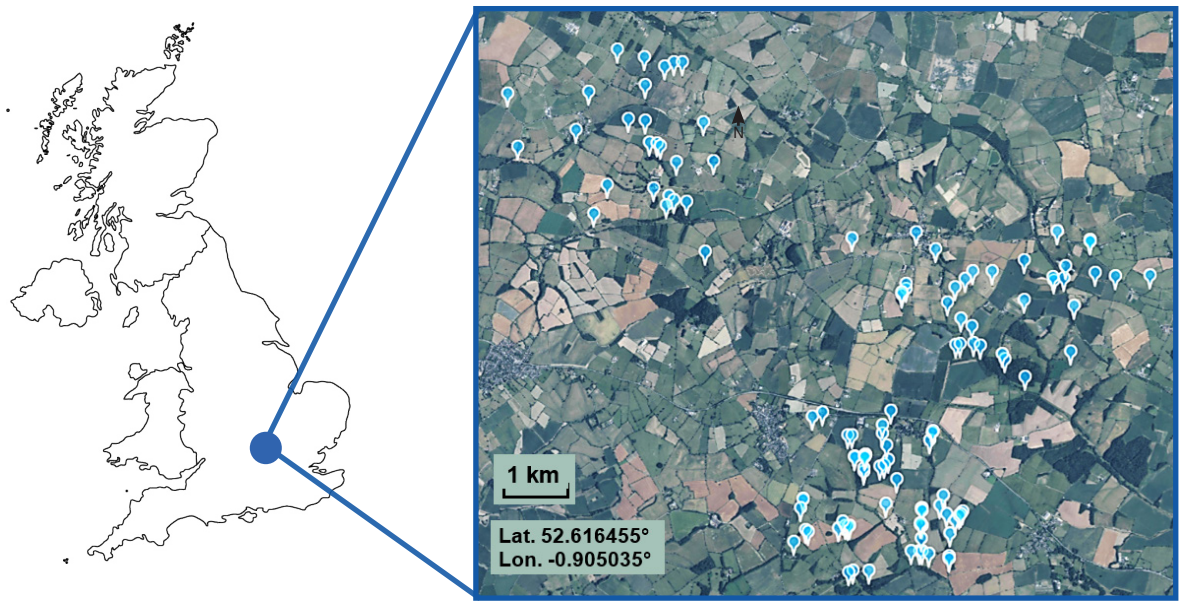
CONTEXT

Name of the pondscape : Water Friendly Farming, Leicestershire
Name of neighboring large town (in a 30 km radius):
Leicester (369'000 habitants)
Bioclimatic zone : Oceanic

Dominant land use :
Pondscape - agriculture
Surrounding environment - agriculture

Pondscape area : 30 km²
Pond : number: 123
density: 4/km²
surface areas : 15 m² to 19'000 m²
depths : 0.25 to 2.5 m
ages : 1 to 200+ years

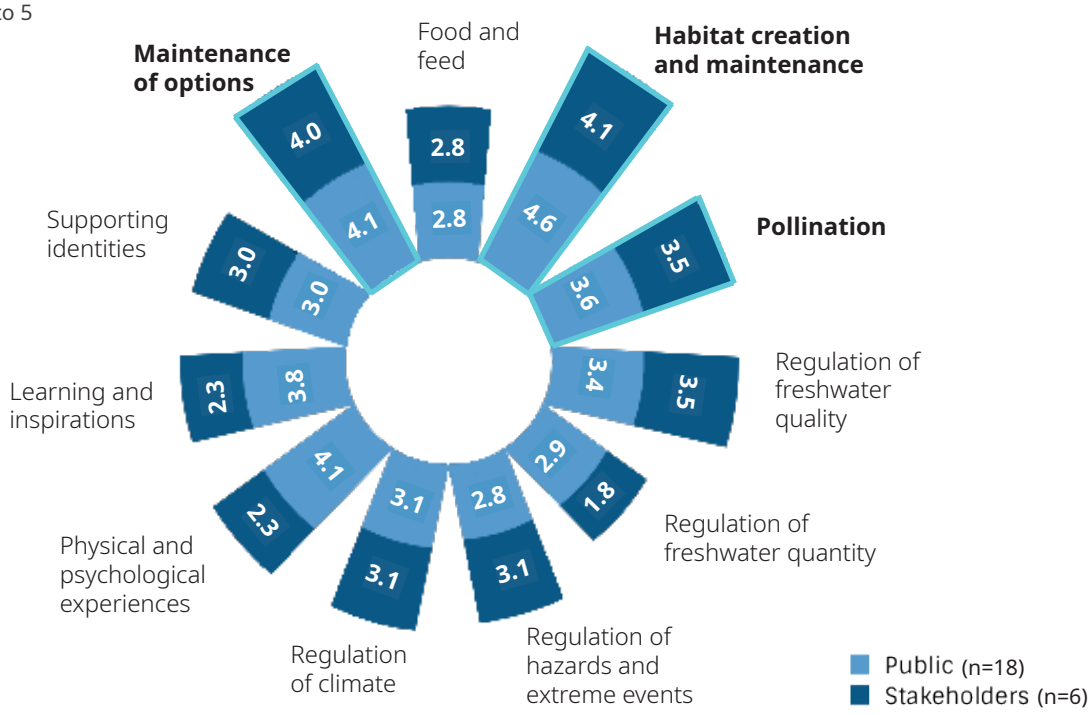
Land owner : Around 30 Landowners
Land manager : At least 30 land managers, most are also landowners
Public access : Around 1 % of the area is accessible
Public amenities : A network of footpaths



LOCAL COMMUNITY EXPECTATIONS

The 11 Nature-contribution to people (NCPs)

Scale : scores from 1 to 5



The expectations rely mainly on: (i) the provision of habitats for biodiversity and (ii) the maintenance of options which relates to ensuring that the habitats and species are resilient.

LOCAL POLICIES

In this agricultural pondscape, Ponderful research has shown that around 25 ponds qualify as UK Priority Habitats. These ponds have some statutory protection: they can still be destroyed by development, but new ponds need to be created in compensation. Two ponds in this Pondscape are also located in nature reserves and have strong statutory protection.

Landowners carry out typical freshwater management. Over the last decade this has included: pond management, pond creation, infilling and draining ponds, dredging ditches, managing trees next to streams and draining small fens. In 2013, as part of the Water Friendly Farming project, an additional 60 new ponds were created for conservation and to provide ecosystem services.

In general, the UK's policy framework does not protect the high-quality ponds in agricultural landscapes effectively, because few are recognised. However, in this Pondscape, the Water Friendly Farming project has meant that Priority Ponds receive greater recognition amongst landowners as well statutory protection through recognition as priority habitats.

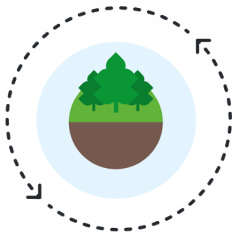
1.5% of the 3,000 ha pondscape is protected for nature conservation as Sites of Scientific Interest (access is restricted, except for public footpaths).

1.5%

Protected areas cover 48.3 ha. They are mainly designated woodlands (in varying condition). They also contain tufa springs and small fens which are not routinely assessed.

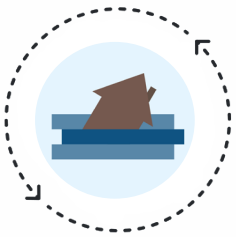
48.3ha

MAIN CHALLENGES AND OBJECTIVES



BIODIVERSITY ENHANCEMENT

Critical for maintaining aquatic biodiversity across the whole region.



DISASTER MITIGATION

Buffer the water flow which reduces the risk of flooding in downstream areas.

WATER MANAGEMENT

Provides drinking water for stock.

HUMAN HEALTH

Recreation and enjoyment for many landowners who love their ponds. Use for fishing, shooting and dog training by owners, friends and neighbors.

NATURE BASED SOLUTIONS (NBS)

New clean-water ponds were created to provide high quality biodiversity habitats. Other ponds and pools were made to store floodwater and intercept agricultural pollutants. Existing shaded and silted-up ponds of low biodiversity value were managed to benefit wildlife

NEW POND CREATION

2010-2013

Baseline monitoring of biodiversity assessed annually in all waterbodies (ponds, streams ditches).

2013-2014

Creation of 60 ponds for wildlife, pollution interception and floodwater storage.

2014-2016

Restoration and management of 6 ponds for wildlife.

PONDS AND PONDSCAPE MANAGEMENT

- Creation of clean water ponds for wildlife.
- Silt dredged from in-filled ponds .
- Trees removed from heavily shaded ponds.
- Threatened plant species translocated to new ponds.
- Woody debris dams added to streams.

- Creation of flood-storage ponds.
- 32 leaky dams installed across streams.
- Ponds created to intercept sediments and pollutants.
- Stream fencing to reduce sediment from grazing animals.
- Reedbed sewage treatment plant refurbished.
- 17 domestic sewage septic tanks emptied.
- Farmyard dirty water runoff mitigation undertaken.

NATURE CONTRIBUTIONS TO PEOPLE AND MEASURED INDICATORS

AQUATIC BIODIVERSITY

SPECIES RICHNESS
Aquatic plants : **98 (in 2023)**
Amphibians : **4**

AMOUNT OF
Conservation priority species (N) : **5**
Orange Foxtail (*Alopecurus aequalis*), Water whorl-grass (*Catabrosa aquatica*), Common Toad (*Bufo bufo*), Ragged Robin (*Silene flos-cuculi*), Water Vole (*Arvicola amphibius*)
Translocated regionally threatened species (N): **5**
Invasive alien species (N) : **1, potentially 3 alien duckweed species**

CONTRIBUTION TO REGIONAL RICHNESS :
(richness across the pondscape area)

0% 95% **100%**

FLAGSHIP SPECIES :


Alopecurus aequalis


Catabrosa aquatica


Bufo bufo


Silene flos-cuculi

HABITAT CREATION AND MAINTENANCE

Increase in the area of standing water created by adding new ponds. This creates new habitats for freshwater species threatened by climate change.

33%

64%

Reduction in between-water-body distance achieved by adding new ponds. This helps freshwater species move across the landscape (creating stepping-stones), as climate conditions change.

NATURE CONTRIBUTIONS TO PEOPLE AND MEASURED INDICATORS

HABITAT CREATION AND MAINTENANCE

20 New clean water ponds for wildlife made in areas where they will receive few pollutants.

14 Number of regionally uncommon species that colonised new clean water ponds within 10 years

13 New populations of plant species previously close to local extinction now established in new ponds.

85% Increase in the number of priority ponds present in the region after new ponds were added

REGULATION OF WATER QUANTITY

5'000m³ Flood storage capacity added by creating new ponds to reduce the likelihood of downstream flooding. Catchment modelling suggests that we would need to increase this by roughly six-fold to around about 30,000 m3 storage to reduce peak river flows by 15-20%.

8 Number of new ponds created to store floodwater. Over 30 additional ponds created as multi-functional features to intercept pollutants and store flood water.

REGULATION OF FRESHWATER

23 Number of ponds created by bunding ditches and streams with earth to intercept silt and nutrients draining from agricultural fields.

8 Number of additional interception ponds created to take polluted run-off from field drains and stream overflows.

LEARNING AND INSPIRATION

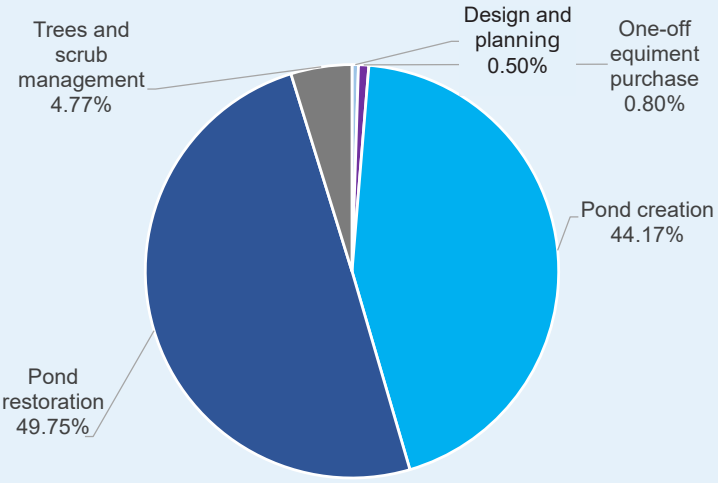
5 Number of groups of professional staff (demonstration visits and training for NGO practitioners, and government bodies e.g. Natural England, Environment Agency (some visits are only partly linked to ponds).

11 Number of studies for acquisition of knowledge (since 2010). Studies by NGOs, Environment Agency, Universities (flood and pollution modelling), students (University of York, Sheffield University) and industry (pesticide research).

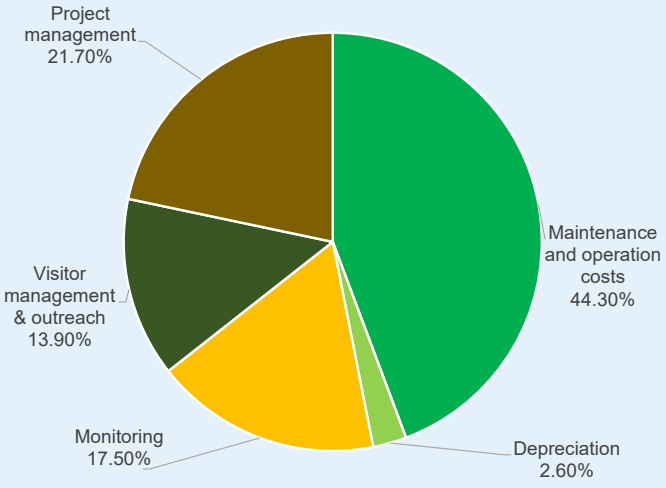
COSTS AND BENEFITS ANALYSIS

OVERALL COSTS ASSESSMENT

SHARE OF COSTS FOR NBS ACTION

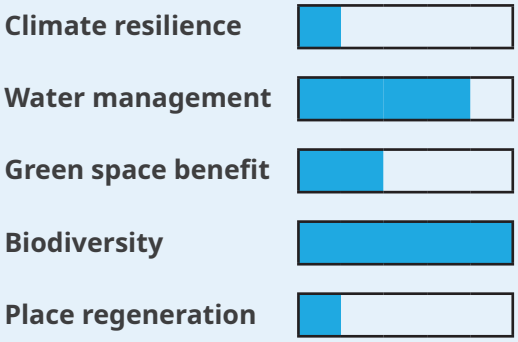


Relative cost of NbS creation measures



Relative cost of ongoing NbS management measures

BENEFITS ASSESSMENT



SUITABLE FINANCE INSTRUMENTS TO REDUCE THE GAP

- ✅ 1. Income instruments
- ✅ 2. Voluntary contributions /donations
- ✅ 3. Tradable rights/permits and payment for ecosystem services
- ✅ 4. Subsidies
- ✅ 5. Grants

FUNDING GAP ASSESSMENT

REMAINING THREATS

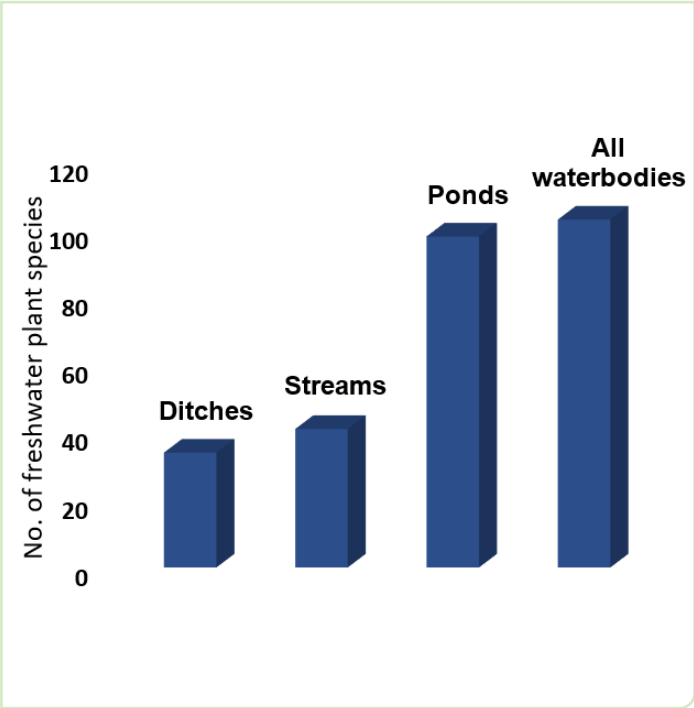
These agricultural ponds face a wide variety of threats. Foremost are:

1. Agricultural pollution which degrades most ponds. This also means that remaining clean-water ponds are isolated, and less able to recolonise if their rare species go extinct.

2. Lack of cattle grazing leading to rapid increases in tree cover and pond infill rates. Both reduce the biodiversity of ponds that were traditionally grazed.

3. Some evidence suggests that ponds are losing species as they dry up, vegetate-up or have greater duckweed cover due to climate-accelerated heating and drought.

SUCCESS STORY AND TRANSFERABILITY



PONDS IN AGRICULTURAL AREAS ARE VITAL FOR BIODIVERSITY

Ponderful research showed that ponds are vital for maintaining freshwater biodiversity in this agricultural region, when assessed using aquatic plants. Across the 30 km2 area, surveys of all waterbodies (streams, flushes, ditches, ponds) showed that almost all (95%) of the region's wetland plants were found in ponds, compared to 33% in ditches and 40% in streams. If all ponds were lost, more than half of the wetland plant species (56%) would be lost from the area.

These findings highlight how important it is to maintain networks of agricultural ponds if we are to retain freshwater biodiversity in countryside areas.

CLEAN WATER PONDS ADD BIODIVERSITY

Twenty new clean water ponds were created in 2013 by the Water Friendly Farming Project. These new ponds have proved to be exceptionally important for regional freshwater biodiversity. Ten years after their creation the clean water ponds supported 7 regionally rare species, including 5 that are not present in any other waterbodies. Overall, these ponds increased the wetland plant richness in their catchment by 12% and regionally rare species by 66%.

The critical factors for creating the clean water ponds were: (i) ensuring that the land around the ponds was not polluted: the best ponds were surrounded by unimproved grazed grassland or woodland (ii) making sure that the ponds did not have a stream or drain inflow, since these usually bring pollutants and silt into ponds.

These results emphasize the great value of creating new clean water ponds and the need to disseminate information about how to make them.

SUCCESS STORY AND TRANSFERABILITY

THE BIODIVERSITY VALUE OF PONDS USED FOR NUTRIENT TREATMENT AND WATER STORAGE

Around 40 ponds and pools were created to store floodwater and intercept agricultural pollutants. There is a common expectation that these ponds will also contribute to biodiversity – but do they? Ponderful survey results show that after 10 years these ponds did have an interesting value although it this was more limited than unpolluted ponds: they increased catchment richness by 3% and did not support any regionally rare species. Flood storage ponds generally had richer plant communities than pollution interception ponds.

The implication from these findings is that ponds ecosystem services can contribute to support regional freshwater biodiversity. However, they are not as valuable as clean water ponds, and it is important that these waterbodies are not seen as a panacea.

HOW DOES POND MANAGEMENT AFFECTS BIODIVERSITY?

Restoring ponds (by dredging and reducing tree shade) generally had a positive effect on freshwater plant biodiversity. Data from the four most extensively managed ponds showed that 5 to 9 years after management, plant richness had typically doubled (increase of 54%). The managed ponds also supported 4 regionally rare species that were not present before management, one of these was not present in other waterbodies.

The findings show that it can be important to manage ponds. It may become more so as climate heating increases the rate at which ponds dry and become filled with vegetation.

THE IMPORTANCE OF LANDOWNER RELATIONSHIPS

In this agricultural landscape all the land is privately owned. Landowners have generally been extremely accommodating towards adding measures, including clean water ponds and pollution interception ponds on their land. A key reason for this is that one of the main partners in the Water Friendly Farming project is a locally based NGO (Game and Wildlife Conservation Trust: Allerton Project) that has been established in the region for many years. This organisation has a good reputation and relationship with many landowners in the region and has worked on previous projects with some.

The Water Friendly Farming project also has a principle of hiring local contractors (some also local landowners) to undertake the capital works for the project. This helps cement relationships and ensures that funding stays within the local economy.

HANDBOOK :

APPENDIX :

FURTHER INFORMATION

(a) a link to the WFF project on Freshwater Habitats Trust's website :
https://freshwaterhabitats.org.uk/projects/water-friendly-farming/
(b) a link to one of the main WFF reports
https://freshwaterhabitats.b-cdn.net/app/uploads/2023/08/Water-Friendly-Farming-Report-2014-compressed_1.pdf

AUTHORS

Williams P., Biggs J.

2024

http://www.ponderful.eu

Ponderful
PONDS FOR CLIMATE