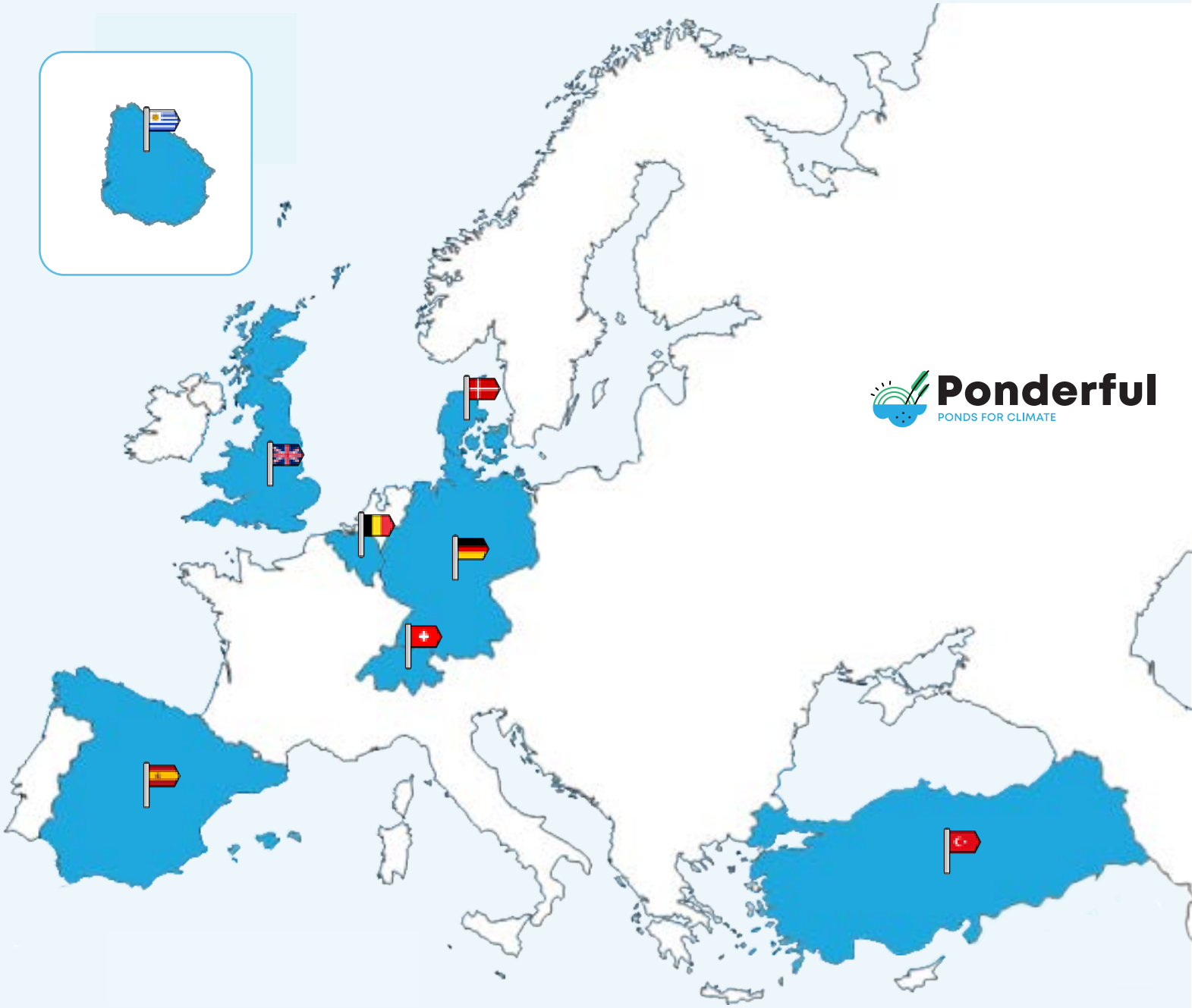

Ponderful
PONDS FOR CLIMATE

NATURE-BASED SOLUTIONS USING PONDS AND PONDSCAPES

16 leaflets (English and local languages) presenting the PONDERFUL Demonstration Sites (DEMO-sites)

European Commission

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

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This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No ID869296

TABLE OF CONTENT :

Ponderful
PONDS FOR CLIMATE

BELGIUM

PONDSCAPE : PIKHAKENDONK

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 pond have been lost from European countries over the past 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

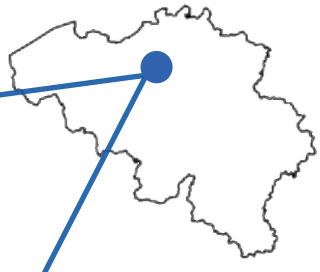
The landscape in Pikhakendonk consists largely of meadows scattered in a dense network of old hawthorn hedges and some forest patches. It contains multiple small ponds, of which several have been recently created as part of a translocation project of Crested newt. The pondscape is a NATURA 2000 area and is internationally recognized for its population of Large pimpernel (*Sanguisorba officinalis*).

Name of the pondscape : Pikhakendonk + Boortmeerbeeksbroek
Name of neighboring large town (in a 30 km radius):
Mechelen (87'000 habitants)
Bioclimatic zone : Atlantic

Dominant land use :
Pondscape - extensive grazing, meadows and forest patches
Surrounding environement - agriculture, urban, grasslands, forest patches

Pondscape area : 5 km^2
Pond : number: 62
density: 12/km^2
surface areas : 10 to 200 m^2
depths : 10 to 55 cm
(some ponds dry during summer period)
ages : 5 to >100 years

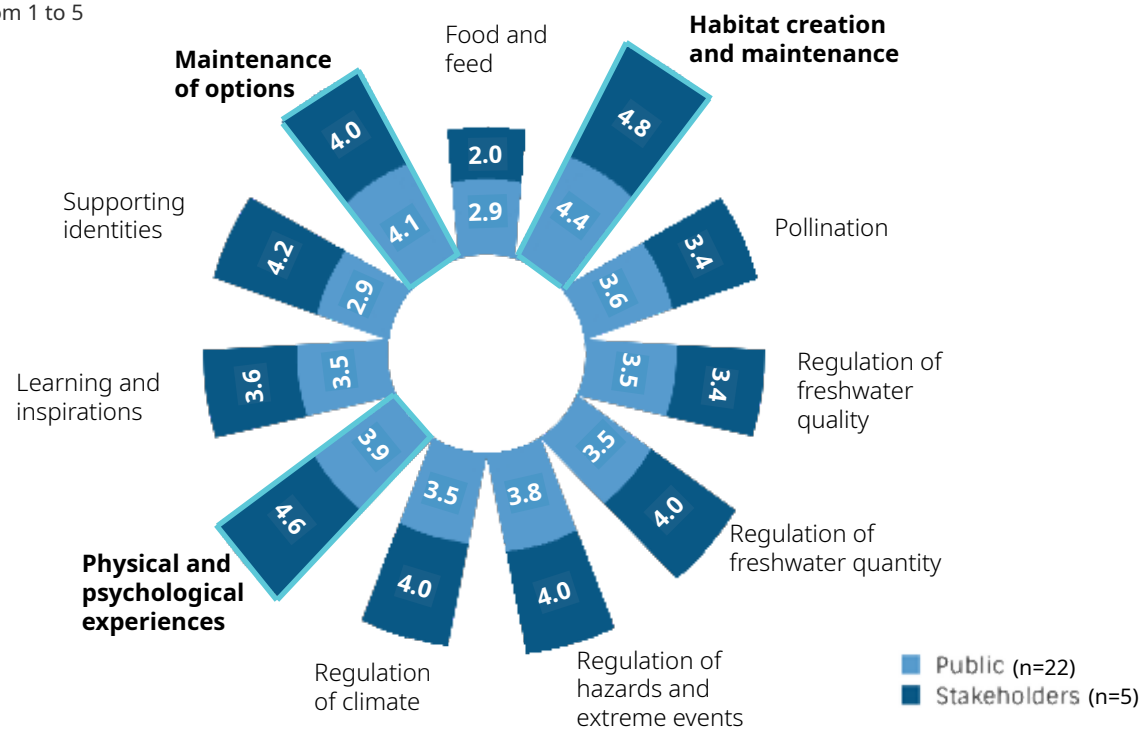
Land owner : Private, Farmers, Natuurpunt (NGO)
Land manager : Farmers and Natuurpunt (NGO)
Public access : 85 % of the area is accessible
Public amenities : gravel roads, walking paths, picnic tables



LOCAL COMMUNITY EXPECTATIONS

The 11 Nature's 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 direct use of these natural areas by people (physical and psychological experiences).

LOCAL POLICIES

The landscape in Pikhakendonk largely consists of meadows scattered in a dense network of old hawthorn hedges and some forest patches. Pikhakendonk is internationally recognized for its population of Large pimpernel (*Sanguisorba officinalis*). Because of its overall high nature values, the region is designated as NATURA 2000 area (BE2300044).

The nature conservation NGO 'Natuurpunt' currently manages 74 ha of land for purposes of biodiversity conservation, of which 60 ha are formally designated as nature reserve. The management is directed towards biodiversity conservation in both terrestrial and aquatic habitats, and strongly relies on a local team of volunteers, assisted by professional Natuurpunt employees. Agreements with local farmers are used for mowing vegetation and extensive grazing by cattle. Pikhakendonk contains multiple small ponds, of which several have been recently created as part of a translocation project of Crested newt (*Triturus cristatus*). A number of old ponds and ditches has been restored through dredging and reprofiling of shores to enhance habitat suitability for aquatic communities.

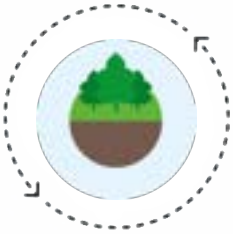
Natuurpunt owns 74 ha of the land in the pondscape, of which 80% is formally designated as nature reserve

74ha

The pondscape is a NATURA 2000 area because of its high international importance (large population of Large pimpernel)

The pondscape hosts a translocated Crested newt population

MAIN CHALLENGES AND OBJECTIVES



BIODIVERSITY ENHANCEMENT

Multiple terrestrial and aquatic organism groups, including Crested newt and Large pimpernel.

HUMAN HEALTH

A place for walking, short hikes and nature observation.

NATURE BASED SOLUTIONS (NBS)

New pond creation and their management are here the Nature-based Solutions put in practice to address the two identified societal challenges.

NEW POND CREATION

2016-2022

Creation of 7 new ponds (approximately 100m^2), primarily aimed at promoting Crested newt

PONDS AND PONDSCAPE MANAGEMENT

- Protection status as Natura 2000
- Fencing a subset of ponds to prevent cattle access
- Pond restoration by deepening existing ponds to increase hydroperiod length (2022)
- Profiling and dividing previously larger pond and ditch into several small ponds
- Increase pond density to enhance habitat connectivity for amphibian populations
- Threatened species translocation (Crested newt)

- Maintenance of trails for walking, biking and hiking
- Creation and maintenance of information boards

NATURE CONTRIBUTIONS TO PEOPLE AND MEASURED INDICATORS

AQUATIC BIODIVERSITY

SPECIES RICHNESS
Aquatic plants : **55**
Amphibians : **7**
(*Bufo bufo, Pelophylax bedriagae, Triturus cristatus, Pelophylax ridibundus/kurtmuelleri, Rana temporaria, Ichthyosaura alpestris, Lissotriton vulgaris vulgaris)*

AMOUNT OF
Conservation priority species (N) : **1**
Species on Habitat Directive Annexes (N)**: 1***
Triturus cristatus (Amphibians)
Invasive alien species (N): **1**

FLAGSHIP SPECIES :

Triturus cristatus

NATURE CONTRIBUTIONS TO PEOPLE AND MEASURED INDICATORS

LEARNING AND INSPIRATION

Number of biodiversity monitoring teams visiting the pondscape. **4**

3 Number of studies on population dynamics of Crested newt (study by INBO and Natuurpunt), and a study on the colonization of newly created ponds by cladocerans (study by KU Leuven).

PHYSICAL AND PSYCHOLOGICAL EXPERIENCE

Number of people visiting the pondscape (leisure, tourism, fishing, nature watching etc.) (nb/year) **109'500**

85% Area inside the pondscape accessible to the public

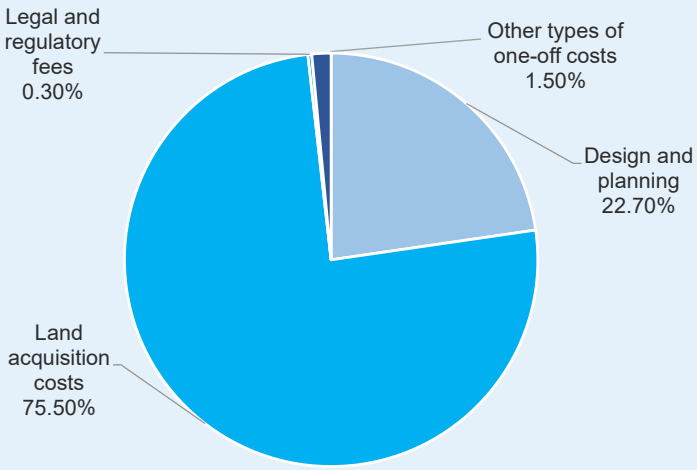
Self-reported satisfaction and well-being (scale 1 to 5) **3.2**

Most popular activities :
hiking (46%), idleness (13%), biking (11%), wildlife observation (11%)

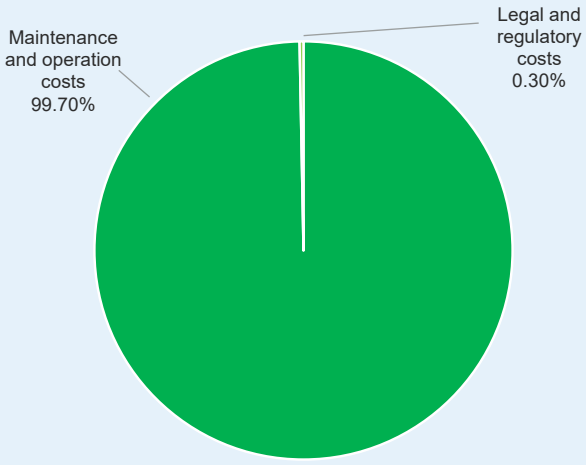
COSTS AND BENEFITS ANALYSIS

OVERALL COSTS ASSESSMENT

SHARE OF COSTS FOR NBS ACTION

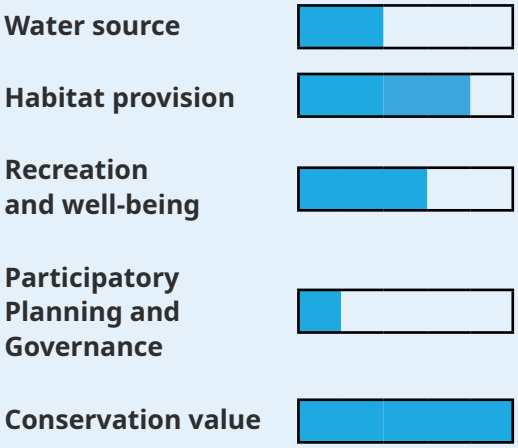


Relative cost of NbS creation measures



Relative cost of ongoing NbS management measures

BENEFITS ASSESSMENT



SUITABLE FINANCE INSTRUMENTS TO REDUCE THE GAP

- 1. Voluntary contributions /donations
- 2. Subsidies
- 3. Grants

REMAINING THREATS

1. Changes in hydrology linked to climate change, which results in shorter hydroperiods that undermine successful amphibian conservation.

SUCCESS STORY AND TRANSFERABILITY

TRANSLOCATION OF CRESTED NEWT POPULATION

In 2016, an existing population of Crested newt from a close by location (Zennegat, approximately 15 km away) was translocated to the pondscape on demand of the Flemish government in close collaboration with ANB (Agency for Nature and Forests) and INBO (Research Institute for Nature and Forest). The translocation was needed as the original habitat of this Crested newt population will largely disappear due to planned large scale river restoration management actions in the valley of river Dijle (SIGMA-plan Dijle). In addition to the initial translocation of adults from the original population, a scientifically supported breeding program was established by INBO (Research Institute of Nature and Forests). Juveniles (3205 individuals) bred in captivity were released in several ponds in the pondscape over multiple subsequent years (2017-2020).

The population dynamics of the translocated newt population is regularly monitored by INBO and Natuurpunt. At this stage, in 2023, the translocation seems to be successful, as multiple ponds host Crested newt and the newly established population seems to reproduce successfully in multiple ponds in the pondscape. Such NBS is a good example for the translocation of Crested newt to other pondscapes that include suitable habitats that are highly isolated, preventing natural colonization to occur.

ACTIVE AND ONGOING MANAGEMENT OF THE PONDSCAPE

Ongoing management of the pondscape for several decades following a management plan. This management plan successfully enhances both terrestrial and aquatic biodiversity by maintaining key landscape features, such as small-scale grasslands surrounded by hedges and multiple farmland ponds. Management actions involve pond creation, pond restoration, grassland management and periodic cutting back of hedges. Only a fraction of the pondscape is owned and managed by NGO Natuurpunt, but local farmers also contribute to biodiversity management. Natuurpunt applies an active land buying policy to enlarge the total area under strict protection status. Such NBS approach requires continuous funding, which is strongly facilitated by the fact that the region is designated as NATURA 2000 area. The additional formal designation of land as nature reserve also contributes to the long-term protection of biodiversity in the region.

HANDBOOK :

APPENDIX :

PHOTOS CREDITS

Triturus cristatus, p. 5, p.8 © Pieter Jan Alles
Pikhakendonk, cover 2, p.8, back cover © Wim Dirckx

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2024

http://www.ponderful.eu

First page's layout inspired by freepik.com

Ponderful
PONDS FOR CLIMATE

BELGIË

POELENLANDSCHAP : PIKHAKENDONK

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

WAT IS EEN POELENLANDSCHAP ?

DEFINITIE

Een poelenlandschap is een netwerk van ruimtelijk bij elkaar gelegen poelen («verbondenheid») en de omringende landschapsmatrix.

De grenzen van een poelenlandschap kunnen bepaald worden door fysieke of ecologische omgevingen (een vallei, een stroomgebied, een reeks poelen in een natuurreservaat) of bepaald worden door maatschappelijke of politieke criteria (stedelijke poelen, provinciale of nationale grenzen).

DRUK/BEDREIGINGEN OP POELEN EN POELENLANDSCHAPPEN

50-90 % van de poelen in Europese landen zijn in de afgelopen honderd jaar verdwenen. Bovendien worden poelen in belangrijke mate verwaarloosd in huidige water- en natuurgerelateerde nationale en Europese beleidsstrategieën, waaronder ook de EU KRW (Kaderrichtlijn Water).

WAAROM IS HET BELANGRIJK OM ZE TE PROMOTEN?

BIODIVERSITEITSVERBETERING

Poelen zijn belangrijk voor het behoud van de lokale en regionale biodiversiteit. Poelenlandschappen vormen hotspots voor biodiversiteit.

RISICOBEPERKING BIJ RAMPEN

Poelen en poelenlandschappen spelen een belangrijke rol in het beperken van overstromingen en vormen ook een waterreserve tijdens droogte.

MENSELIJKE GEZONDHEID

Poelen en poelenlandschappen bieden een breed scala aan bijkomende voordelen voor de mens en de maatschappij, zoals ondersteuning van de menselijke gezondheid en levenskwaliteit, ruimtes voor fysieke activiteiten of sociale interactie, maar ook esthetische ervaringen en educatieve en recreatieve activiteiten.

BEPERKING VAN EN AANPASSING AAN KLIMAATVERANDERING

Door hun grote aantal en hoge productiviteit hebben poelen een grote invloed op de koolstofcyclus.

WATERBEHEER

Poelenlandschappen kunnen een waterreserve bieden, wat vooral belangrijk is in de context van waterschaarste. Dit is voornamelijk nuttig als bron van drinkwater voor dieren en voor irrigatie.

CONTEXT

Het landschap in Pikhakendonk en Boortmeerbeeksbroek bestaat grotendeels uit weilanden die verspreid liggen in een dicht netwerk van oude meidoornhagen en enkele bosschages. Het bevat meerdere kleine poelen, waarvan er onlangs verschillende zijn aangelegd als onderdeel van een translocatieproject van Kamsalamander (*Triturus cristatus*). Het poelenlandschap is een NATURA 2000-gebied en is internationaal gekend voor zijn populatie Grote pimpernel (*Sanguisorba officinalis*).

Naam van het poelenlandschap : Pikhakendonk + Boortmeerbeeksbroek
Naam van de naburige grote stad (in een straal van 30 km):
Mechelen (87'000 inwoners)
Bioklimatologische zone : Atlantisch

Overheersend landgebruik :
Poelenlandschap- extensieve begrazing, weiden en bospercelen
Omgeving - landbouw, stedelijk gebied, grasland, bospercelen

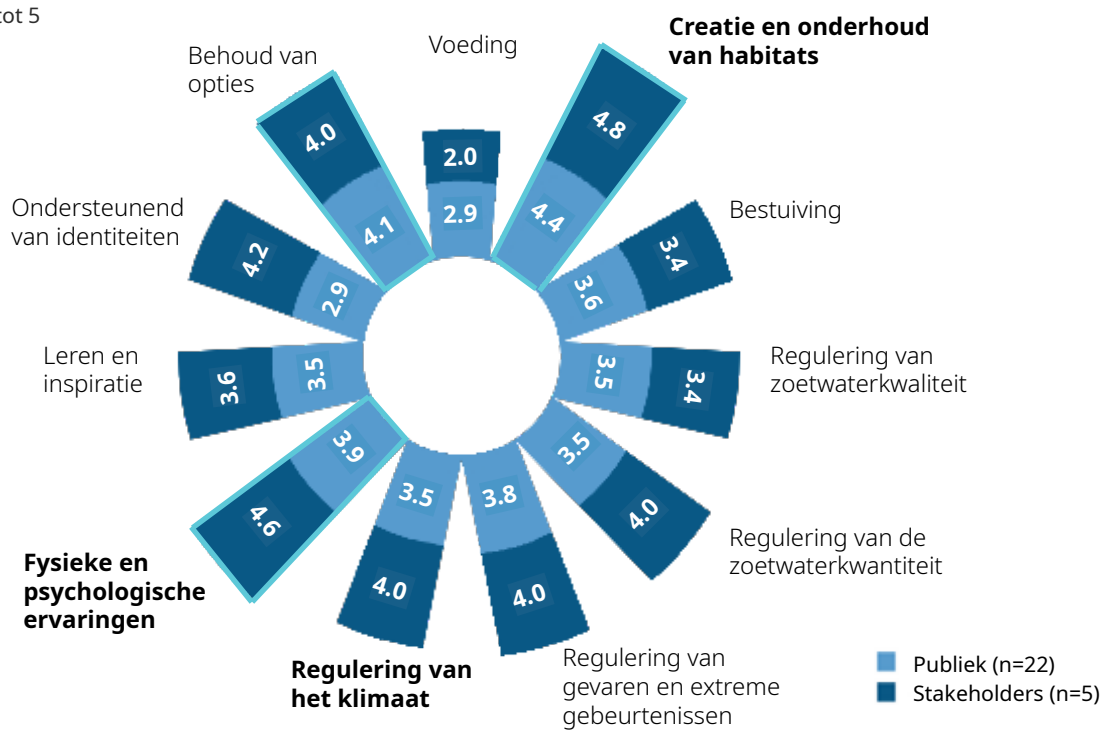
Oppervlakte poelenlandschap : 5 km^2
Poelen: aantal:: 62
dichtheid: 12/km^2
oppervlakten : 10 tot 200 m^2
dieptes : 10 tot 55 cm (sommige poelen vallen droog ti jdens de zomerperiode)
leeftijden : 5 tot >100 years

Landeigenaar: Particulieren, Boeren, Natuurpunt (NGO voor natuurbehoud)
Landbeheerder : Boeren en Natuurpunt
Openbare toegankelijkheid : ongeveer 85% van het gebied is toegankelijk
Openbare voorzieningen : grindwegen, wandelpaden, picknicktafels

VERWACHTINGEN VAN DE LOKALE GEMEENSCHAP

De 11 Natuurbijdragen aan mensen (NCP's)

Schaal: score van 1 tot 5



De verwachtingen berusten vooral op (i) het aanbieden van habitats voor biodiversiteit en (ii) het directe gebruik van deze natuurgebieden door mensen (fysieke en psychologische ervaringen).

LOKAAL BELEID

Het landschap bestaat grotendeels uit weilanden die verspreid liggen in een dicht netwerk van oude meidoornhagen en enkele bosschages. Pikhakendonk staat internationaal bekend om zijn populatie Grote pimpernel (*Sanguisorba officinalis*). Vanwege de hoge natuurwaarden is het gebied aangeduid als NATURA 2000-gebied (BE2300044).

De natuurbeschermings-NGO Natuurpunt beheert momenteel 74 ha voor het behoud van biodiversiteit, waarvan 60 ha formeel als natuurreservaat is erkend. Het beheer is gericht op het behoud van biodiversiteit in zowel terrestrische als aquatische habitats en steunt sterk op een team van lokale vrijwilligers dat bijgestaan wordt door professionele Natuurpunt-medewerkers. Overeenkomsten met lokale boeren worden gebruikt voor het maaien van vegetatie en extensieve begrazing door vee. Het landschap bevat meerdere poelen, waarvan er verschillende recent werden aangelegd in het kader van een translocatieproject van de Kamsalamander (*Triturus cristatus*). Een aantal oude poelen en sloten is hersteld door uitbaggering en herprofilering van de oevers om de geschiktheid van de habitat voor aquatische gemeenschappen te verbeteren.

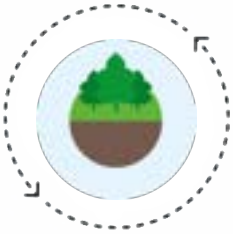
- Natuurpunt bezit 74 ha van de gronden in het poelenlandschap, waarvan 80% formeel is aangeduid als natuurreservaat

74ha

- Het poelenlandschap is een NATURA 2000-gebied vanwege het grote internationale belang (grote populatie Grote pimpernel)

- Het poelenlandschap herbergt een getransloceerde Kamsalamander-populatie

BELANGRIJKSTE UITDAGINGEN EN DOELSTELLINGEN



BIODIVERSITEITS-VERBETERING

Meerdere groepen terrestrische en aquatische organismen, inclusief Kamsalamander en Grote pimpernel

GEZONDHEID VAN DE MENS

Een plek om te wandelen, korte trektochten te maken en de natuur te observeren

NBS

Het aanleggen van nieuwe poelen en het beheer van bestaande poelen zijn hier de op de natuur gebaseerde oplossingen die in de praktijk worden gebracht om de twee geïdentificeerde maatschappelijke uitdagingen aan te pakken.

NIEUWE POEL AANLEGGEN

2016-2022

Aanleg van 7 nieuwe poelen (ongeveer 100 m^2), voornamelijk gericht op de bevordering van de kamsalamander

BEHEER VAN POELEN EN POELENLANDSCHAP

- Beschermingsstatus als Natura 2000
- Een aantal poelen omheinen zodat vee er geen toegang toe heeft.
- Poelherstel door het verdiepen van bestaande poelen om de hydroperiode te verlengen (2022)
- herprofilering en verdelen van voormalige vijver en oude sloot in meerdere kleine poelen
- Verhogen van de dichtheid aan poelen om de connectiviteit tussen habitats voor amfibieën te verbeteren
- translocatie bedreigde soort (Kamsalamander)

- Onderhoud van wandel- en fietspaden
- Opstellen en onderhouden van informatieborden

NCP'S EN GEMETEN INDICATOREN

AQUATISCHE BIODIVERSITEIT

SOORTENRIJKDOM
Waterplanten : **55**
Amfibieën : **7**
(*Bufo bufo, Pelophylax bedriagae, Triturus cristatus, Pelophylax ridibundus/kurtmuelleri, Rana temporaria, Ichthyosaura alpestris, Lissotriton vulgaris vulgaris)*

HOEVEELHEID
Prioritaire instandhoudingssoorten (N) : **1**
Soorten op Habitatrichtlijnbijlagen (N)**: 1***
*Triturus cristatus (*amfibieën)
Invasieve uitheemse soorten (N)**: 1**

VLAGGENSCHIPSOORTEN :

Triturus cristatus

NCP'S EN GEMETEN INDICATOREN

LEREN EN INSPIREREN

Aantal biodiversiteitsmonitoringteams die het poelenlandchap bezoeken. **4**

3 Aantal studies naar populatiedynamiek van Kamsalamander (studie van INBO en Natuurpunt), en een studie naar de kolonisatie van nieuw aangelegde poelen door cladoceren (studie van KU Leuven).

FYSIEKE EN PSYCHOLOGISCHE ERVARING

Aantal mensen dat het poelenlandschap bezoekt (vrije tijd, toerisme, vissen, natuurobservatie, etc.) (bezoeken/jaar) **109'500**

85% Gebied binnen het poelenlandschap dat toegankelijk is voor het publiek

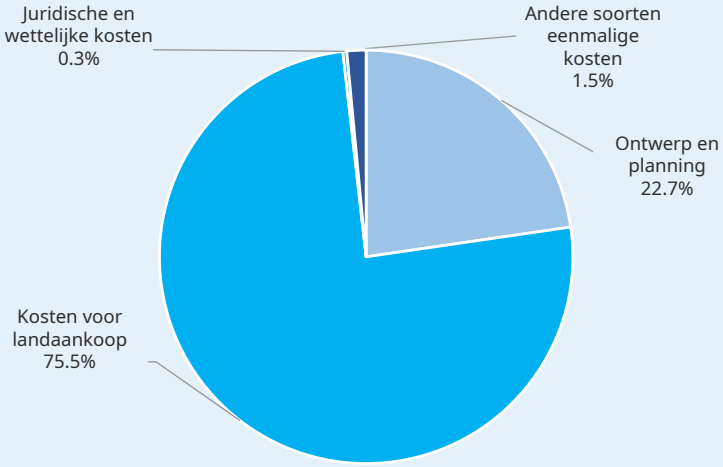
Zelfgerapporteerde tevredenheid en welzijn (schaal 1 tot 5) **3.2**

Populairste activiteiten :
wandelen (46%), luieren (13%), fietsen (11%), natuur observeren (11%)

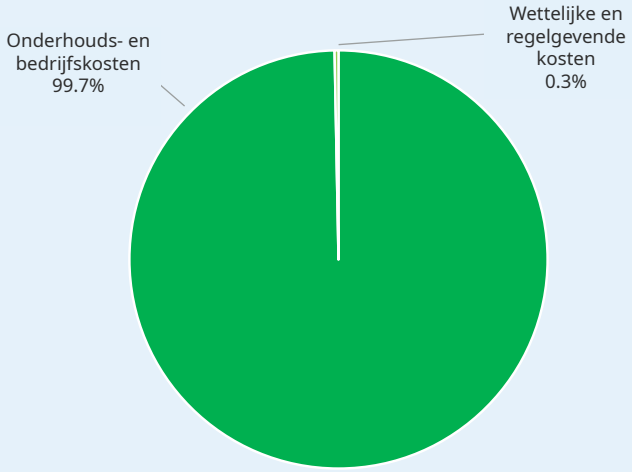
KOSTEN- EN BATENANALYSE

TOTALE KOSTENEVALUATIE

AANDEEL IN DE KOSTEN VOOR NBS-ACTIE

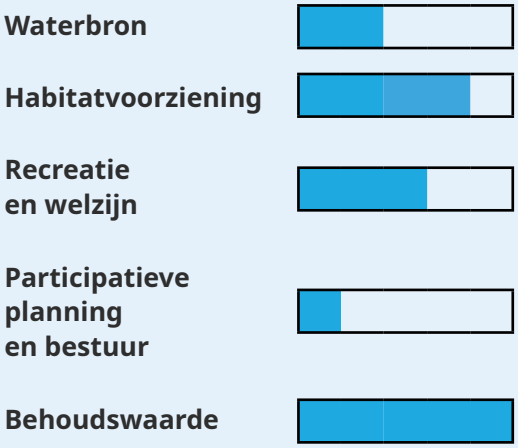


Relatieve kosten van maatregelen voor het creëren van NBS



Relatieve kosten van lopende NBS-beheermaatregelen

BEOORDELING VAN DE VOORDELEN



GESCHIKTE FINANCIERINGS-INSTRUMENTEN OM DE KLOOF TE VERKLEINEN

- ☑ **1. Vrijwillige bijdragen/donaties**
- ☑ **2. Subsidies**

RESTERENDE BEDREIGINGEN

1. Veranderingen in de hydrologie als gevolg van klimaatverandering die resulteren in kortere hydroperiode die een succesvol behoud van amfibieën ondermijnen.

SUCCESVERHAAL EN OVERDRAAGBAARHEID

TRANSLOCATIE VAN KAMSALAMANDERPOPULATIE

In 2016 werd een bestaande populatie Kamsalamanders van een nabije locatie (Zennegat, op ongeveer 15 km afstand) op vraag van de Vlaamse overheid in nauwe samenwerking met ANB (Agentschap voor Natuur en Bos) en INBO (Onderzoeksinstituut voor Natuur en Bos) getransporteerd naar het poelenlandschap. De translocatie was nodig omdat de oorspronkelijke habitat van deze Kamsalamanderpopulatie grotendeels zal verdwijnen door geplande grootschalige rivierherstelacties in de vallei van de Dijle (SIGMA-plan Dijle).

Naast de initiële translocatie van volwassen dieren uit de oorspronkelijke populatie, werd een wetenschappelijk ondersteund kweekprogramma opgezet door INBO. In gevangenschap gekweekte jonge exemplaren (3205 individuen) werden uitgezet in verschillende poelen in het poelenlandschap gedurende meerdere opeenvolgende jaren (2017-2020). De populatiedynamiek van de getransloceerde salamanderpopulatie wordt regelmatig opgevolgd door INBO en Natuurpunt. In 2023 lijkt de translocatie succesvol te zijn, aangezien meerdere poelen Kamsalamander herbergen en de nieuw gevestigde populatie zich succesvol lijkt voort te planten in meerdere poelen in het poelenlandschap. Deze NBS is een goed voorbeeld voor de translocatie van kamsalamander naar andere poelenlandchappen met geschikte habitats die sterk geïsoleerd zijn, waardoor natuurlijke kolonisatie niet mogelijk is.

ACTIEF EN DOORLOPEND BEHEER VAN HET POELENLANDSCHAP

Het beheer van het poelenlandschap gedurende meerdere decennia volgens een beheerplan. Dit beheerplan verbetert met succes zowel de terrestrische als aquatische biodiversiteit door belangrijke landschapskenmerken, zoals kleinschalige graslanden omgeven door heggen en meerdere poelen, te behouden. Het beheer bestaat uit het aanleggen van poelen, poelherstel, graslandbeheer en het periodiek afzetten van heggen. Slechts een fractie van het poelenlandschap is eigenldom van en beheerd door NGO Natuurpunt, maar ook lokale boeren dragen bij tot het biodiversiteitsbeheer. Natuurpunt voert een actief landaankoopbeleid om de totale oppervlakte onder strikte beschermingsstatus te vergroten. Een dergelijke NBS-aanpak vereist voortdurende financiering, wat mogelijk is doordat het landschap NATURA 2000-gebied is. De bijkomende formele erkenning van percelen als natuurreservaat draagt ook bij tot de langetermijnbescherming van de biodiversiteit in de regio.

HANDBOOK :

APPENDIX :

FOTOCREDITS

Triturus cristatus, p.5 image 1, p.8 image 1 © Pieter Jan Alles
Pikhakendonk, cover 2, back cover © Wim Dirckx

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2024

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Ponderful
PONDS FOR CLIMATE

BELGIUM

PONDSCAPE : GROTE GETEVALLEI

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 pond have been lost from European countries over the past 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

The Grote Getevallei is one of the last large open spaces in Flanders. The pondscape has largely been preserved from intensive agriculture and extensive urbanization. Villages historically developed along the drier valley edges, while the wet valley was used as pasture and hay land. Hedges, including hawthorn, were used as natural fencing for livestock. For agricultural purposes, the valley was drained deeper and deeper by digging ditches and later by underground drains. Where groundwater did not reach ground level, cattle drinking pools were created. Locally, these small landscape elements still form the basic structure of the landscape that can be found on the valley slopes to this day. Moreover, the pondscape is characterized by a unique biodiversity.

Name of the pondscape : Grote Getevallei
Name of neighboring large town (in a 30 km radius):
Tienen (36'000 habitants)
Bioclimatic zone : Atlantic

Dominant land use :
Pondscape - Flower-rich grasslands, small landscape elements consisting of hedgerows, ditches and pools, shrubs, native deciduous forests and agricultural plots
Surrounding environement - agriculture, grasslands and small forest patches

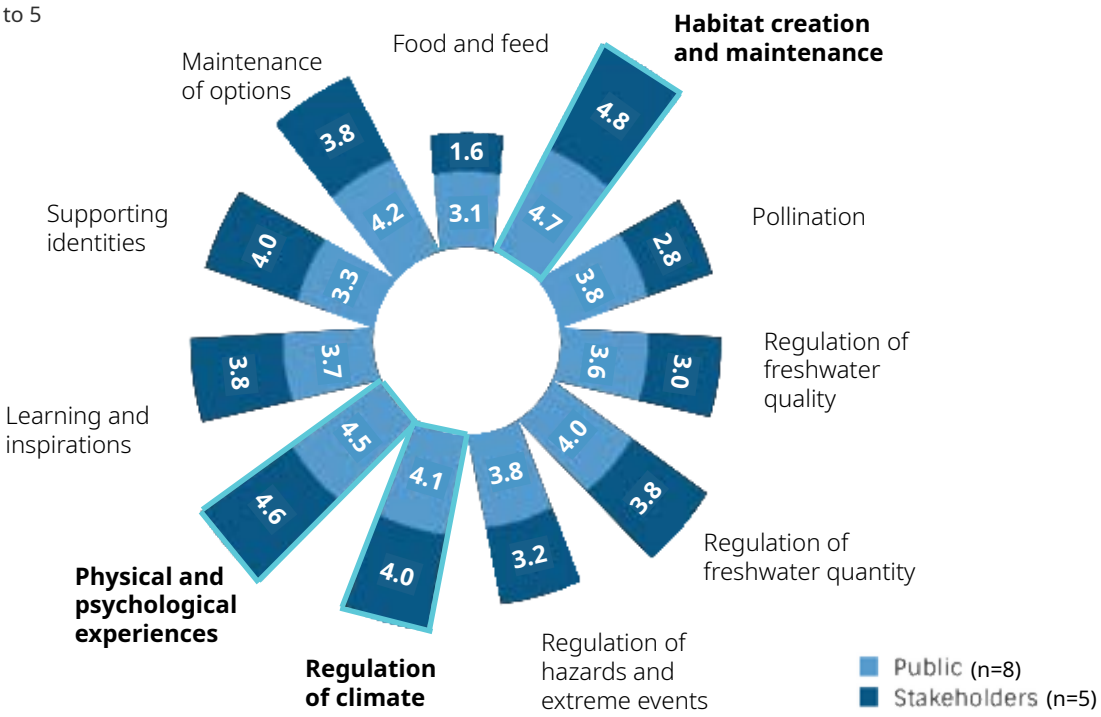
Pondscape area : 4.79 km^2
Pond : number: 41
density: 9/km^2
surface areas : 10 to 207 m^2
depths : 11 to 76 cm
ages : 5 to >100 years

Land owner : Province Vlaams-Brabant, Natuurpunt (NGO), private landowners (farmers)
Land manager : Natuurpunt (NGO) and farmers
Public access : 60 % of the area is accessible
Public amenities : hiking trails, cycling routes, pic-nic spots, camping site and hides for nature observation

LOCAL COMMUNITY EXPECTATIONS

The 11 Nature's 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 direct use of these natural areas by people (physical and psychological experiences).

LOCAL POLICIES

The pondscape 'Grote Getevallei' comprises a variety of landscape characteristics that result in high biological diversity. Pond creation and pond restoration have contributed to the creation of suitable habitats for amphibians, including the Crested newt (*Triturus cristatus*). Most land is privately owned and used for multiple purposes, including farming. The province of Flemish Brabant and Natuurpunt owns land designated as nature reserve and is managed as such. In parallel, Natuurpunt is actively obtaining additional land in the region to ensure long term protection status and enlarge the area with focus on nature and biodiversity conservation, including strengthening biodiversity, restoring eco-hydrology and nature experience. In addition, Natuurpunt has agreements with local farmers. Farmers can use the grasslands under specific conditions, and implement management measures such as mowing or grazing.
Detailed management is largely done by teams of local volunteers, while more drastic management measures are carried out by a professional team of Natuurpunt. The management includes maintenance of terrestrial habitats (grasslands and hedgerows), periodic pond restoration (dredging, mowing shoreline vegetation), the creation of new ponds, and the creation of overwintering habitats for amphibians. In the 'Getevallei' from Hoegaarden to Geetbets and Landen, Natuurpunt now manages almost 1000ha, of which just over 250ha in the 'Grote Getevallei' between Tienen and Zoutleeuw.

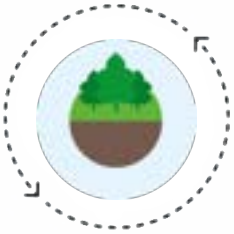
>239 ha of the pondscape is protected and managed by NGO Natuurpunt

>239ha

Targeted management resulted in a stable population of Crested newt

The pondscape provides reproduction habitat for Aquatic shrew (*Neomys fodiens*), Red-backed shrike (*Lanius collurio*), Cloverleaf shrike (*Cyaniris semiargus*), Grassland shrike (*Carabus monilis*), Rusty-brown cut-throat (*Elater ferrugineus*), Broad orchid (*Dactylorhiza majalis*) and Waxwort (*Hygrocybe obrussea*), among others.

MAIN CHALLENGES AND OBJECTIVES



BIODIVERSITY ENHANCEMENT

Multiple aquatic and terrestrial organism groups, including amphibians, birds and plants.

HUMAN HEALTH

A place for walking, hiking, nature observation.

WATER MANAGEMENT

Improved infiltration and retention of water in the valley and commitment to integrated water management

NATURE BASED SOLUTIONS (NBS)

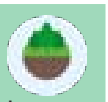
New pond creation and their management are here the Nature-based Solutions put in practice to address the three identified societal challenges.

NEW POND CREATION

1997-2018

Creation of multiple small farmland ponds (approx.; 100m^2), primarily aimed at the conservation of Crested newt

PONDS AND PONDSCAPE MANAGEMENT



- Pond restoration and management (dredging, mowing shore vegetation)
- Maintaining small landscape elements (hedges, small woody plots that serve as overwintering habitats for amphibians)
- Increasing water retention and preventing underground drainage

- Creation and maintenance of hiking trails, cycling routes and nature observation points
- Creation of small camping site and “natural” playing zone for children
- Inspiring activities such as guided walks, management excursions, opportunity to participate in monitoring of Crested newt,...

- Not yet operational, but there is an increasing awareness for the buffering capacity against droughts and floods. The general idea is to slow down the drainage of water in the region so that the pondscape as a whole can buffer water for a longer time and as such prevent flooding downstream in the valley

NATURE CONTRIBUTIONS TO PEOPLE AND MEASURED INDICATORS

AQUATIC BIODIVERSITY

SPECIES RICHNESS
Aquatic plants : **59**
Amphibians : **8**
(*Pelophylax lessonae/kl. Esculentus/bergeri/ kl. Hispanicus; Pelophylax bedriagae; Triturus cristatus; Pelophylax ridibundus/kurtmuelleri; Rana temporaria; Bufo bufo; Ichthyosaura alpestris; Lissotriton vulgaris vulgaris)*

AMOUNT OF
Conservation priority species (N) : **1**
Species on Habitat Directive Annexes (N)**: 1***
Triturus cristatus (Amphibians)
Invasive alien species (N): **1**

FLAGSHIP SPECIES :

Triturus cristatus

NATURE CONTRIBUTIONS TO PEOPLE AND MEASURED INDICATORS

REGULATION OF CLIMATE

Capacity of annual carbon storage in ponds (by primary production, by organic matter accumulation) (tons CO_2 e/ pondscape/year)

2.43t

1.05t

Carbon accumulation rate (tons of CO_2 e/pondscape/ year)

PHYSICAL AND PSYCHOLOGICAL EXPERIENCE

Number of people visiting the pondscape (leisure, tourism, fishing, nature watching etc.) (nb/year)

47'000

60%

Area inside the pondscape accessible to the public

Self-reported satisfaction and well-being (scale 1 to 5)

3.8

Most popular activities :
hiking (23%), biking (16%) and wildlife observation (13%)

LEARNING AND INSPIRATION

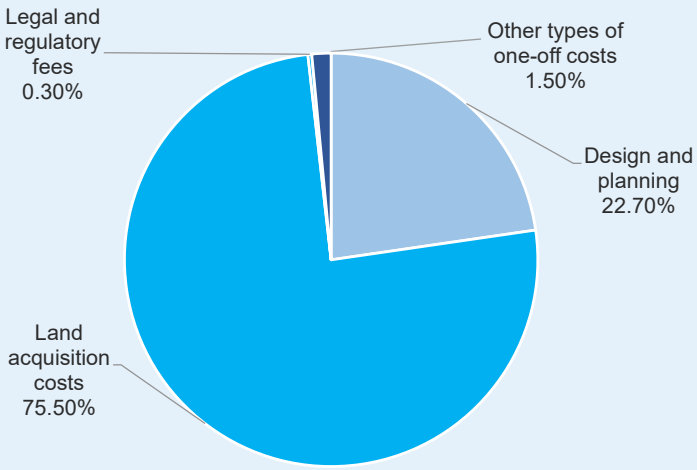
>20

(nb/year). Various scientific studies by Natuurpunt, KU Leuven, INBO, and/or SCK-CEN on biodiversity, ecology and ecohydrology. Regular biodiversity monitoring (Natuurpunt), study on greenhouse gas emissions from pools (KU Leuven), many guided nature walks and excursions (mainly organized by the local management team of Natuurpunt Linter and Zoutleeuw).

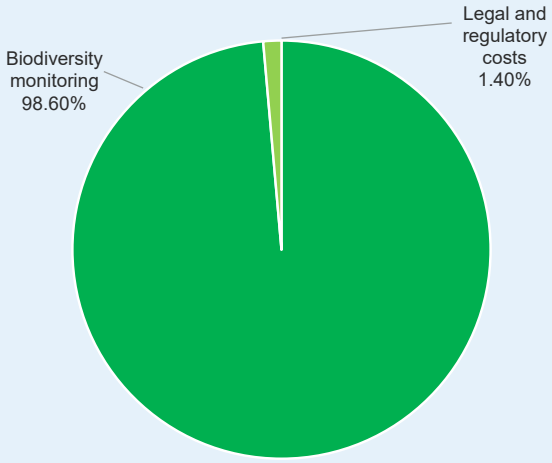
COSTS AND BENEFITS ANALYSIS

OVERALL COSTS ASSESSMENT

SHARE OF COSTS FOR NBS ACTION

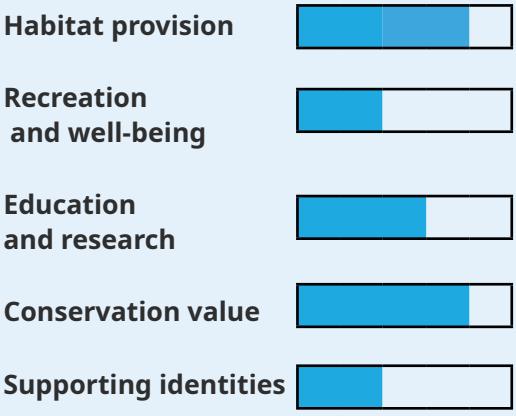


Relative cost of NbS creation measures



Relative cost of ongoing NbS management measures

BENEFITS ASSESSMENT



SUITABLE FINANCE INSTRUMENTS TO REDUCE THE GAP

- 1. Voluntary contributions /donations
- 2. Subsidies
- 3. Grants

REMAINING THREATS

1. Intensive agriculture, especially erosion and the influx of fertilizers and pesticides, is a problem for water quality and reproduction of Crested newts.

2. Infrastructural works (additional paving of roads, increase in built-up area, more intensive drainage through water management infrastructure, etc.) put pressure on water resources and on aquatic habitats. For example, an increase in nutrient loading is expected in the watercourses flowing through the pondscape.

3. Climate change resulting in shorter hydroperiods that prevent long term conservation of amphibian populations.

4. Ill-considered reforestation of valuable cultural-historical landscapes.

SUCCESS STORY AND TRANSFERABILITY

ACTIVE BIODIVERSITY CONSERVATION MANAGEMENT OF THE PONDSCAPE

There has been an ongoing and highly effective biodiversity conservation management in the pondscape for several decades. The main actor with respect to nature conservation in the region is NGO Natuurpunt. The current management is largely organized by a team of local volunteers that is supported by professionals from Natuurpunt. Natuurpunt owns land in the region that is protected by designation as nature reserve. Nature reserves are managed following an approved management plan. In addition, Natuurpunt works closely with other actors in the region to enhance nature protection. Natuurpunt also strives to further expand the area of nature reserve by acquiring additional land.

The management targets both terrestrial and aquatic biodiversity, and largely focusses on the maintenance of historical landscape elements such flower-rich grasslands, hedges, farmland ponds and semi-natural forest patches. Over the past decades, several (>20) small farmland ponds have been created to enhance aquatic habitat availability and connectivity. Existing ponds are periodically managed by dredging and cutting back edge vegetation. The long-lasting management efforts have proved to be successful in conserving biodiversity in the region, most notably the long term maintenance of a large population of Crested newt.

HANDBOOK :

APPENDIX :

PHOTOS CREDITS

Triturus cristatus, cover1, p.5 © Pieter Jan Alles
Gete vallei, cover2&3, p.2, p.6, p.8 and backcover © Pieter Jan Alles

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POELENLANDSCHAP : GROTE GETEVALLEI

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WAT IS EEN POELENLANSCHAP ?

DEFINITIE

Een poelenlanschap is een netwerk van ruimtelijk bij elkaar gelegen poelen («verbondenheid») en de omringende landschapsmatrix.

De grenzen van een poelenlanschap kunnen bepaald worden door fysieke of ecologische omgevingen (een vallei, een stroomgebied, een reeks poelen in een natuurreservaat) of bepaald worden door maatschappelijke of politieke criteria (stedelijke poelen, provinciale of nationale grenzen).

DRUK/BEDREIGINGEN OP POELEN EN POELENLANDSCHAPPEN

50-90 % van de poelen in Europese landen zijn in de afgelopen honderd jaar verdwenen. Bovendien worden poelen in belangrijke mate verwaarloosd in huidige water- en natuurgerelateerde nationale en Europese beleidsstrategieën, waaronder ook de EU KRW (Kaderrichtlijn Water).

WAAROM IS HET BELANGRIJK OM ZE TE PROMOTEN?

BIODIVERSITEITSVERBETERING

Poelen zijn belangrijk voor het behoud van de lokale en regionale biodiversiteit. Poelenlandschappen vormen hotspots voor biodiversiteit.

RISICOBEPERKING BIJ RAMPEN

Poelen en poelenlandschappen spelen een belangrijke rol in het beperken van overstromingen en vormen ook een waterreserve tijdens droogte.

MENSELIJKE GEZONDHEID

Poelen en poelenlandschappen bieden een breed scala aan bijkomende voordelen voor de mens en de maatschappij, zoals ondersteuning van de menselijke gezondheid en levenskwaliteit, ruimtes voor fysieke activiteiten of sociale interactie, maar ook esthetische ervaringen en educatieve en recreatieve activiteiten.

BEPERKING VAN EN AANPASSING AAN KLIMAATVERANDERING

Door hun grote aantal en hoge productiviteit hebben poelen een grote invloed op de koolstofcyclus.

WATERBEHEER

Poelenlandschappen kunnen een waterreserve bieden, wat vooral belangrijk is in de context van waterschaarste. Dit is voornamelijk nuttig als bron van drinkwater voor dieren en voor irrigatie.

CONTEXT

De Grote Getevallei is één van de laatste grote open ruimtes in Vlaanderen. Het poelenlandschap bleef grotendeels bewaard van intensieve landbouw en verregaande verstedelijking. Dorpen ontwikkelden zich historisch langs de drogere valleiranden, terwijl de natte valleigronden gebruikt werden als weide en hooiland. Hagen, met onder meer meidoorn, werden gebruikt als natuurlijke afrasteringen voor het vee. De vallei werd omwille van landbouwdoeleinden alsmaar dieper gedraineerd door het graven van leigrachten en sloten en later via ondergronds drainages. Waar het grondwater niet tot het maaiveld raakte werden veedrinkpoelen aangelegd. Deze kleine landschapselementen vormen lokaal nog steeds de basisstructuur van het bocagelandschap dat tot vandaag op de valleiflanken terug te vinden is. Bovendien wordt de Grote Getevallei gekenmerkt door een unieke biodiversiteit.

Naam van het poelenlandschap : Grote Getevallei
Naam van de naburige grote stad (in een straal van 30 km):
Tienen (36'000 inwoners)
Bioklimatologische zone : Atlantisch

Overheersend landgebruik :
Poelenlandschap - Bloemrijke graslanden, kleine landschapselementen bestaande uit heggen, sloten en poelen, vochtige ruigtes, inheemse loofbossen en landbouwpercelen
Omgeving - overwegend akkerbouw, laagstamteelt, graslanden en kleine bospercelen

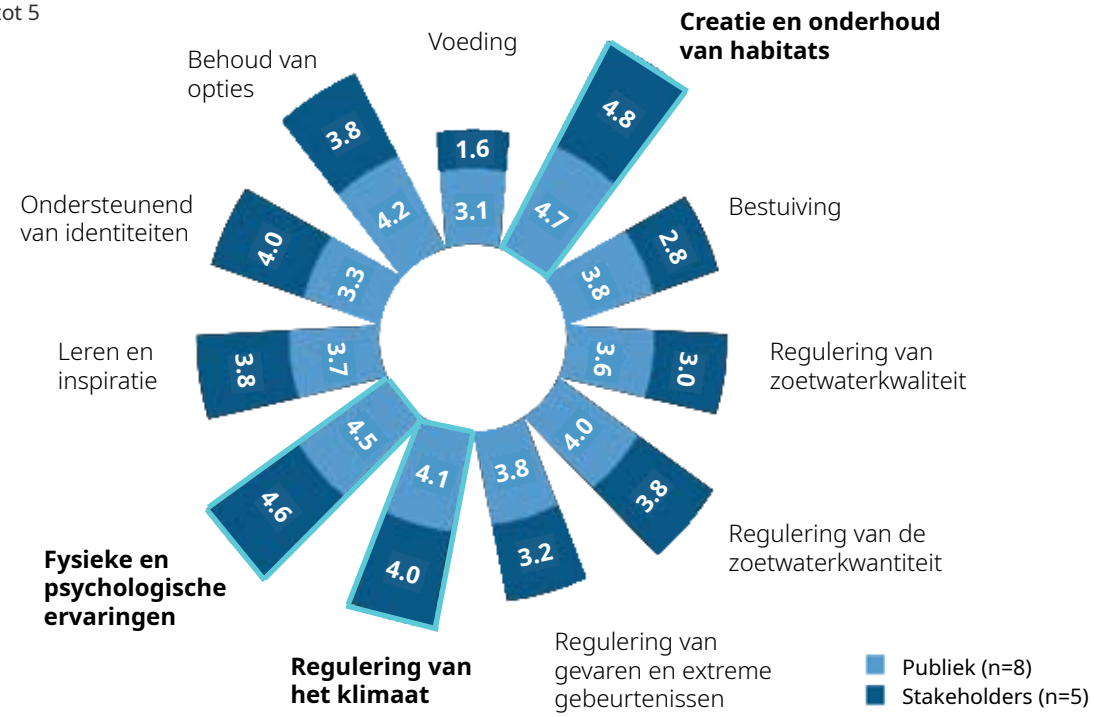
Oppervlakte poelenlandschap : 4.79 km^2
Poelen: antaal :41
dichtheid: 9/km^2
oppervlakten : 10 tot 207 m^2
dieptes : 11 tot 76 cm
leeftijden : 5 tot >100 years

Landeigenaar: provincie Vlaams-Brabant, Natuurpunt (NGO) en particuliere landeigenaren
Landbeheerder : Natuurpunt (NGO) en boeren
Openbare toegankelijkheid : ongeveer 60 % van het gebied is toegankelijk
Openbare voorzieningen : wandelpaden, fietsroutes, picknickplaatsen, paalkampeerzone en een uitkijktoren voor natuurobservatie

VERWACHTINGEN VAN DE LOKALE GEMEENSCHAP

De 11 Natuurbijdragen aan mensen (NCP's)

Schaal: score van 1 tot 5



De verwachtingen berusten vooral op (i) het aanbieden van habitats voor biodiversiteit en (ii) het directe gebruik van de gebieden door mensen (fysieke en psychologische ervaringen).

LOKAAL BELEID

Het poelenlandschap 'Grote Getevallei' omvat een verscheidenheid aan landschapskenmerken die resulteren in een hoge biologische diversiteit. Het aanleggen en herstellen van poelen heeft bijgedragen tot het creëren van geschikt voortplantingshabitat voor amfibieën, waaronder de Kamsalamander (*Triturus cristatus*). De gronden zijn grotendeels privébezit en kennen doorgaans een multifunctioneel gebruik. Provincie Vlaams-Brabant en Natuurpunt zijn eigenaar van meerdere percelen die als natuurreservaat zijn erkend en dusdanig worden beheerd. Parallel verwerft Natuurpunt actief bijkomende percelen in de regio om de beschermingsstatus op lange termijn te garanderen en het gebied uit te breiden met de focus op natuurbescherming, incl. versterking van biodiversiteit, herstel van ecohydrologie en natuurbeleving. In functie van multifunctioneel medegebruik sluit Natuurpunt gebruiksovereenkomsten af met lokale landbouwers. Zij mogen de graslanden onder voorwaarden gebruiken, en voeren beheermaatregelen zoals maaien of begrazing uit. Het detailbeheer gebeurt grotendeels door beheerteams van lokale vrijwilligers, terwijl meer ingrijpende beheermaatregelen worden uitgevoerd door een professionele beheerploeg. Dit omvat detailbeheer van bloemrijke graslanden en heggen, periodiek poelenherstel zoals maaien van de oevervegetatie of gefaseerde slibruiming, de aanleg van nieuwe poelen en het creëren van overwinteringshabitat voor amfibieën. In de Getevallei van Hoegaarden tot Geetbets en Landen beheert Natuurpunt ondertussen bijna 1000ha, waarvan iets meer dan 250ha in de vallei van de Grote Gete tussen Tienen en Zoutleeuw.

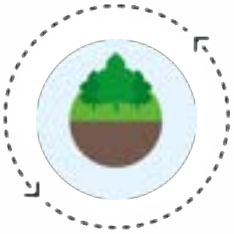
->239 ha van het poelenlandschap wordt beschermd en beheerd door NGO Natuurpunt

>239ha

-Gericht beheer resulteerde in een stabiele populatie van de Kamsalamander

-Het poelenlandschap biedt voortplantingshabitat voor ondermeer Waterspitsmuis (*Neomys fodiens*), Grauwe klauwier (*Lanius collurio*), Klaverblauwtje (*Cyaniris semiargus*), Graslandschallenbijter (*Carabus monilis*), Roestbruine kniptor (*Elater ferrugineus*), Brede orchis (*Dactylorhiza majalis*) en Wantsenwasplaat (*Hygrocybe obrussea*)

BELANGRIJKSTE UITDAGINGEN EN DOELSTELLINGEN



BIODIVERSITEITS-VERBETERING

Meerdere aquatische en terrestrische organismegroepen, waaronder amfibieën, vogels en planten.

GEZONDHEID VAN DE MENS

Een plek om te wandelen en de natuur te observeren.

WATERBEHEER

Verbeterde waterinfiltratie en -retentie in de vallei en inzetten op integraal waterbeheer.

NBS

Het aanleggen van nieuwe poelen en het beheer ervan zijn hier de op de natuur gebaseerde oplossingen (NbS) die in de praktijk worden gebracht om de drie geïdentificeerde maatschappelijke uitdagingen aan te pakken.

NIEUWE POEL AANLEGGEN

1997-2018

Aanleg van meerdere kleine landbouwpoelen (ca.; 100m^2), voornamelijk gericht op het behoud van de Kamsalamander

BEHEER VAN POELEN EN POELENLANDSCHAP

- Herstel en beheer van poelen (slibruimen, oevervegetatie maaien)
- Kleine landschapselementen onderhouden (heggen, hakhoutbossen die dienen als overwinteringshabitat voor amfibieën)
- Verhogen van waterretentie en tegengaan van ondergrondse drainage

- Aanleg en onderhoud van wandelpaden, fietsroutes en natuurobservatiepunten
- Aanleg van paalkampeerplaats en een vrij toegankelijke zone voor kinderen
- Inspirerende activiteiten zoals begeleide wandelingen, beheerexcursies, mogelijkheid tot deelname aan monitoring van Kamsalamander

- Nog niet operationeel, maar men is zich steeds meer bewust van de hoge capaciteit van waterinfiltratie en -retentie in de regio.

NCP'S EN GEMETEN INDICATOREN

AQUATISCHE BIODIVERSITEIT

SOORTENRIJKDOM
Waterplanten : **59**
Amfibieën : **8**
(*Pelophylax lessonae/kl. esculentus/bergeri/ kl. hispanicus; Pelophylax bedriagae; Triturus cristatus; Pelophylax ridibundus/kurtmuelleri; Rana temporaria; Bufo bufo; Ichthyosaura alpestris; Lissotriton vulgaris vulgaris)*

HOEVEELHEID
Prioritaire instandhoudingssoorten (N) : **1**
Soorten op Habitatrichtlijnbijlagen (N)**: 1***
Triturus cristatus (amfibieën)
Invasieve uitheemse soorten (N): **1**

VLAGGENSCHIPSOORTEN :

Triturus cristatus

NCP'S EN GEMETEN INDICATOREN

REGULERING VAN HET KLIMAAT

Capaciteit van de jaarlijkse koolstofopslag in de poelen (door primaire productie, door accumulatie van organisch materiaal) (ton CO_2e/poelenlandschap/jaar)

2.43t

1.05t Koolstofaccumulatiesnelheid (ton CO_2e/poelenlandschap/jaar)

FYSIEKE EN PSYCHOLOGISCHE ERVARING

Aantal mensen dat het poelenlandschap bezoekt (vrije tijd, toerisme, vissen, natuur kijken etc.) (bezoeken/jaar)

47'000

60% Gebied binnen het poelenlandschap dat toegankelijk is voor het publiek

Zelfgerapporteerde tevredenheid en welzijn (schaal 1 tot 5)

3.8

Populairste activiteiten:
wandelen (23%), fietsen (16%) en natuur observeren (13%)

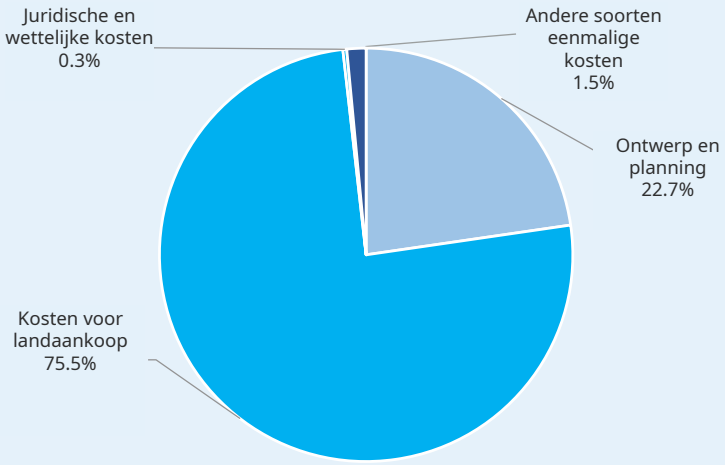
LEREN EN INSPIREREN

>20 (initiatieven/jaar). Diverse wetenschappelijke studies van Natuurpunt, KU Leuven, INBO, en/of SCK-CEN rond biodiversiteit, ecologie en ecohydrologie. Regelmatige biodiversiteitsmonitoring (Natuurpunt), studie rond broeikasgas-emissie door poelen (KU Leuven), vele geleide natuurwandelingen en -excursies (vooral door het lokale beheerteam van Natuurpunt Linter en Zoutleeuw georganiseerd).

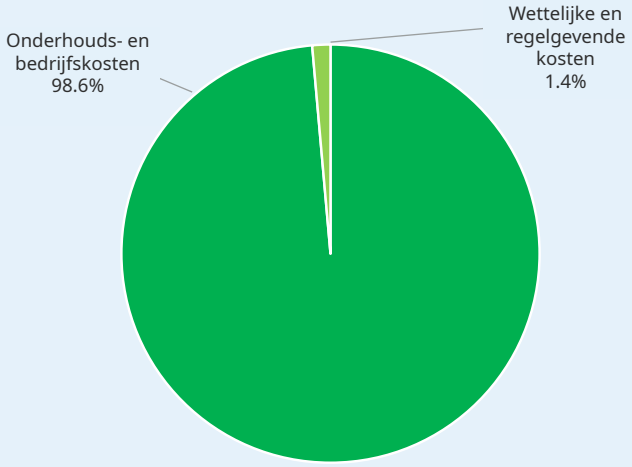
KOSTEN- EN BATENANALYSE

TOTALE KOSTENEVALUATIE

AANDEEL IN DE KOSTEN VOOR NBS-ACTIE

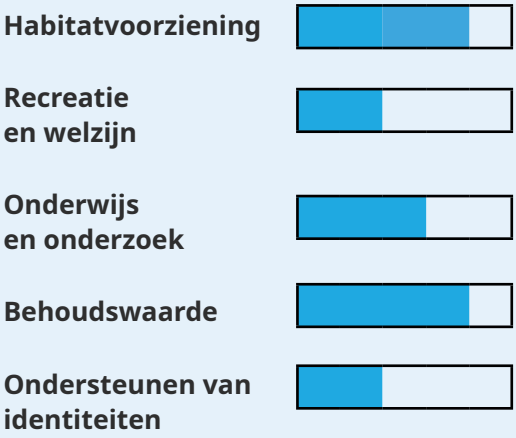


Relatieve kosten van maatregelen voor het creëren van NBS



Relatieve kosten van lopende NBS-beheermaatregelen

BEOORDELING VAN DE VOORDELEN



GESCHIKTE FINANCIERINGS-INSTRUMENTEN OM DE KLOOF TE VERKLEINEN

1. Vrijwillige bijdragen/donaties
2. Subsidies

RESTERENDE BEDREIGINGEN

1. Intensieve landbouw, in het bijzonder erosie en de instroom van meststoffen en pesticiden, is een probleem voor de waterkwaliteit en de voortplanting van Kamsalamander.

2. Infrastructuurwerken (bijkomende verharding van wegen, vergroting van de bebouwde oppervlakte, intensievere drainering via waterbeheerinfrastructuur, enz.) oefenen druk uit op de waterhuishouding en op het leefgebied van De Kamsalamander. Er wordt bijvoorbeeld een toename in nutriëntenvracht verwacht in de waterlopen die door het poelenlandschap stromen.

3. Klimaatverandering leidt tot een kortere hydroperiode van de poelen en ondermijnt zo het behoud van aquatische biodiversiteit op lange termijn.

4. Ondoordachte bebossing van waardevolle cultuurhistorische landschappen.

SUCCESVERHAAL EN OVERDRAAGBAARHEID

ACTIEF BEHEER VAN DE BIODIVERSITEIT IN HET POELENLANDSCHAP

Het beheer van de biodiversiteit in het poelenlandschap is al tientallen jaren aan de gang en is zeer doeltreffend. De belangrijkste speler op het vlak van natuurbehoud in de regio is NGO Natuurpunt. Het huidige beheer wordt grotendeels georganiseerd door lokale vrijwilligers die worden ondersteund door een team van professionele Natuurpunt medewerkers. Natuurpunt is eigenaar van percelen in de regio die beschermd zijn als natuurgebied. Deze natuurgebieden worden beheerd volgens een goedgekeurd natuurbeheerplan. Daarnaast werkt Natuurpunt nauw samen met andere actoren in de streek in functie van natuurbescherming.

Natuurpunt streeft er ook naar om de oppervlakte aan natuurgebied verder uit te breiden door bijkomende percelen te verwerven. Het beheer is gericht op zowel terrestrische als aquatische biodiversiteit, en is grotendeels gericht op het behoud van historische landschappen met bloemrijke graslanden, wastines, heggen, poelen en inheems loofbos. De afgelopen decennia zijn er verschillende (>20) kleine poelen aangelegd om de beschikbaarheid en connectiviteit van de aquatische leefgebieden te verbeteren. Bestaande poelen worden periodiek beheerd door slibruiming en het maaien van de oevervegetatie. De langdurige beheerinspanningen blijken succesvol in het behoud van de biodiversiteit in de regio, met name het behoud van een relatief stabiele populatie Kamsalamanders.

HANDBOOK :

APPENDIX :

FOTOCREDITS

Triturus cristatus, cover1, p.5 image1 © Pieter Jan Alles
Getevallei, cover2&3, p.2, p.6, p.9 © Pieter Jan Alles

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2024

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Ponderful
PONDS FOR CLIMATE

BELGIUM

PONDSCAPE : TOMMELEN

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 pond have been lost from European countries over the past century. 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 pondscape 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

The bombcrater pondscape has been created unintentionally in 1944 during World War II and was designated as a nature reserve in 2006. It is currently owned by the municipality of Hasselt and has been managed by the nature conservation NGO 'Natuurpunt' since 1996.

Name of the pondscape : Tommelen
Name of neighboring large town (in a 30 km radius):
Hasselt (80'000 habitants)
Bioclimatic zone : Atlantic

Dominant land use :
Pondscape - extensive grazing land with some forest patches
Surrounding environment - urban

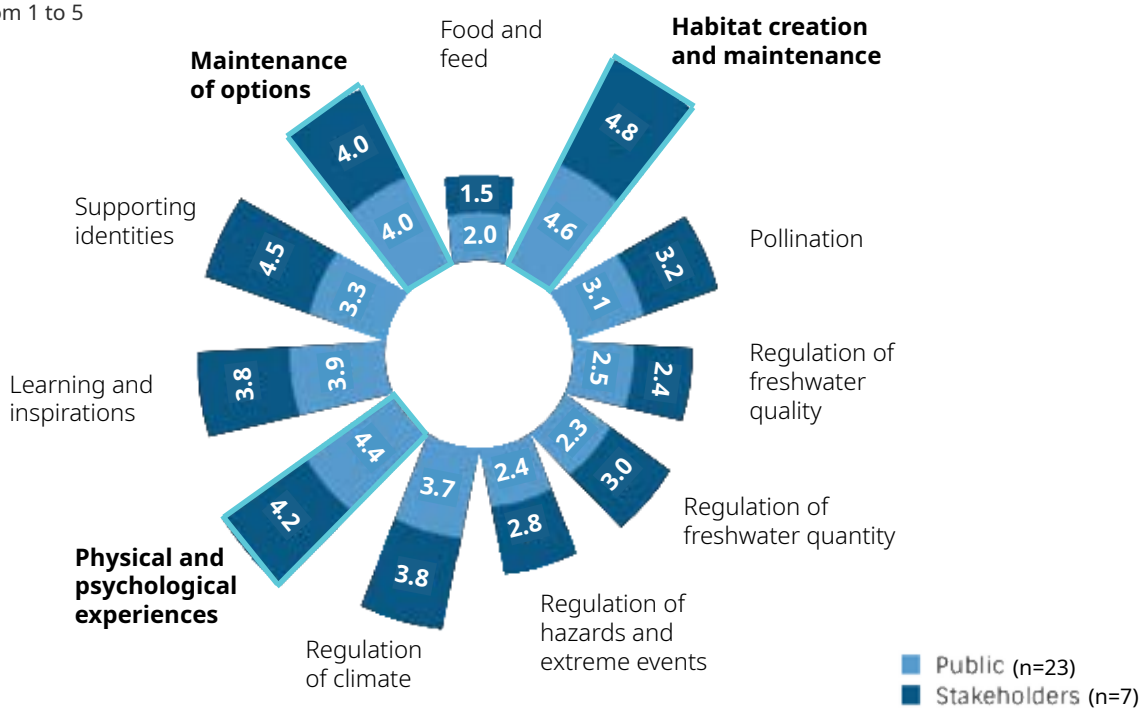
Pondscape area : 0.18 km^2
Pond : number: 144
density: 800/km^2
surface areas : 1 to 150 m^2
depths : 10 to 85 cm
ages : 5 to 70 years

Land owner : Municipality Hasselt
Land manager : Natuurpunt (NGO)
Public access : ~5% of the area is accessible (95% of the nature reserve)
Public amenities : several foot paths, picnic spots, information panels and an observation tower

LOCAL COMMUNITY EXPECTATIONS

The 11 Nature's 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 direct use of these natural areas by people (physical and psychological experiences).

LOCAL POLICIES

The pondscape is owned by the municipality Hasselt and was leased as pasture to farmers until 1995. From 1996 onwards, it was managed by a nature conservation NGO (now 'Natuurpunt'). Tommelen has officially been designated as nature reserve in 2006 because of its high ecological and historical value.

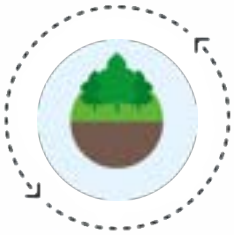
The management is financed by subsidies from the Flemish government (after agreement on management proposal). Budget for habitat restoration and creation comes from additional projects. Natuurpunt provides additional funding from their own overall budget if needed. The day-to-day management is done by a local team of volunteers. Current management involves maintenance of existing ponds by periodic dredging, cutting back trees, and mowing of bank vegetation. Biodiversity is regularly monitored.

-The bombcrater pondscape has been created unintentionally in 1944 during World War II.

-Large populations of seven species of amphibians are present.

-Currently it is a unique nature reserve in a highly urbanised setting.

MAIN CHALLENGES AND OBJECTIVES



BIODIVERSITY ENHANCEMENT

Especially amphibians (most notably Crested newt, more recently also Tree frog).

HUMAN HEALTH

A place for recreation close to the city that can be used for short walks, picnics, and nature observation.

NATURE BASED SOLUTIONS (NBS)

New pond creation and their management are here the Nature-based Solutions put in practice to address the two identified societal challenges.

NEW POND CREATION

2019

Creation of one new pond.

PONDS AND PONDSCAPE MANAGEMENT

- Protection status as nature reserve.
- Pond restoration.
- Maintenance of forest clearings.
- Removal of alien plant species (specifically, *Crassula helmsii*).
- Filling of two ponds with large population of *Crassula helmsii.*
- Mowing of pond edges.
- Dredging of terrestrialised ponds (in 2009-2010, in 2021-2022).
- Restrict access of cattle to a subset of ponds by fencing .
- Maintenance and creation of overwintering habitat for amphibians (such as *Rana esculenta synklepton, Rana temporaria, Bufo bufo, Triturus alpestris, Triturus cristatus,Triturus vulgaris and Hyla arborea).*
- The creation of additional new ponds (n=3) is planned in 2024.

- Maintenance of walking paths.
- Creation of observation tower.
- Installation of picnic spots.
- Creation and maintenance of information sheets.

- Installation of sluice on drainage ditch.

NATURE CONTRIBUTIONS TO PEOPLE AND MEASURED INDICATORS

AQUATIC BIODIVERSITY

SPECIES RICHNESS
Aquatic plants : **49**
Dragonflies : **2**
Families of invertebrates : **13**
Amphibians : **7**
(*Rana esculenta synklepton, Rana temporaria, Bufo bufo, Triturus alpestris, Triturus cristatus,Triturus vulgaris and since 2021 also Hyla arborea)*

AMOUNT OF
Conservation priority species (N) : **2**
Species on Habitat Directive Annexes (N)**: 2***
Triturus cristatus, Hyla arborea (Amphibians)
Invasive alien species (N): **2** *(Crassula helmsii, Ludwigia grandiflora)*

FLAGSHIP SPECIES :

Triturus cristatus

NATURE CONTRIBUTIONS TO PEOPLE AND MEASURED INDICATORS

PHYSICAL AND PSYCHOLOGICAL EXPERIENCE

Number of people visiting the pondscape for walking and nature observation (nb/year) **7'300**

5% Area inside the pondscape accessible to the public

Self-reported satisfaction and well-being (scale 1 to 5) **3.8**

Most popular activities :
hiking (52%), idleness (11%), biking (9%), wild-life observation (9%)

LEARNING AND INSPIRATION

10 Number of groups of students and schools/universities visiting the ponds-cape. (The visits are only partly linked to ponds)

Number of studies for acquisition of knowledge on biodiversity and pond ecology (nb/year). Studies from NGO (Natuurpunt) and universities (VUB and KU Leuven) **3**

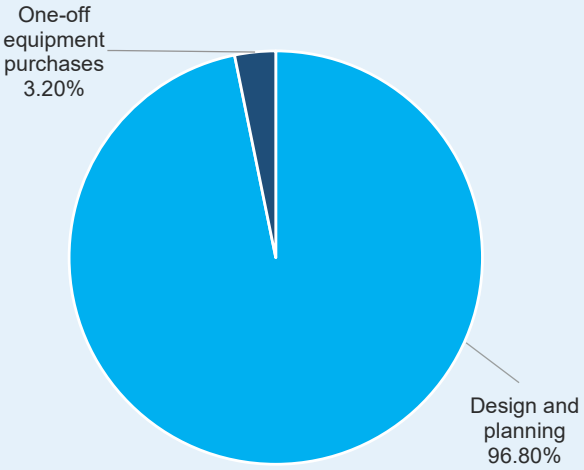
WATER QUANTITY

1 Creation of sluice on drainage ditch to slow drainage and keep more water in the ponds-cape

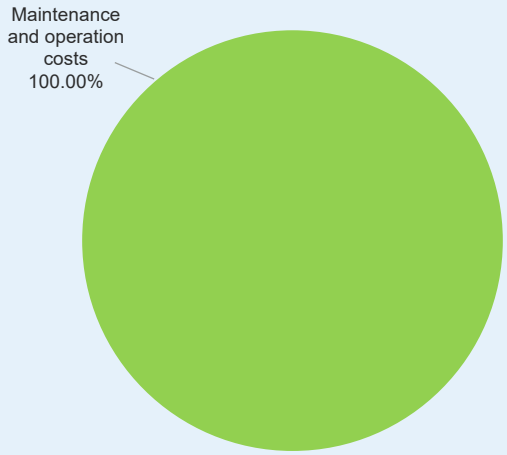
COSTS AND BENEFITS ANALYSIS

OVERALL COSTS ASSESSMENT

SHARE OF COSTS FOR NBS ACTION

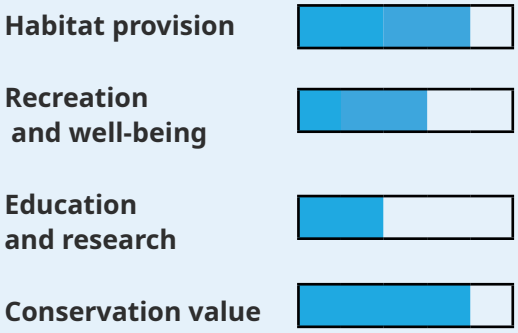


Relative cost of NbS creation measures



Relative cost of ongoing NbS management measures

BENEFITS ASSESSMENT



SUITABLE FINANCE INSTRUMENTS TO REDUCE THE GAP

- 1. Voluntary contributions /donations
- 2. Subsidies
- 3. Grants

REMAINING THREATS

1. The impact of people on biodiversity, including waste dumping and entering closed areas.

2. Accelerated decline of water levels and lower availability of water due to impact of climate change. An increasing number of ponds have shifted from being permanent to temporal.

3. It is a challenge for Natuurpunt to balance conservation and recreation in the pondscape.

SUCCESS STORY AND TRANSFERABILITY

DESIGNATION AS A NATURE RESERVE IN 2006

The designation of the pondscape as 'nature reserve' (approximately 80% of the area currently under protection status) has been a first major step in the effective protection of the pondscape. This also resulted in the creation of a management plan that targets biodiversity conservation and provides access to essential financial funding to maintain the region. While the land is owned by the city of Hasselt, the management is conducted by the NGO Natuurpunt, which largely relies on a team of local volunteers that maintain the pondscape. Part of the area is fenced from the public to reduce disturbance by visiting people. The designation has also resulted in the creation of walking paths to enhance the satisfaction of close by living people. Tommelen is now an important 'green space' in close proximity of the city and is frequented by people for recreation and nature observation.

LONG TERM CONSERVATION OF GREAT CRESTED NEWT AND THE RECENT RE-COLONISATION OF THE PONDSCAPE BY TREE-FROG HYLA ARBOREA

Tommelen is highly recognized for successfully hosting a relatively large population of Crested newt for several decades already. More recently (2021), the pondsape has been recolonized by *Hyla arborea*. Tommelen hosted a small local population of Tree frog (*Hyla arborea*) until 1980. Afterwards, the species has not been observed anymore, despite suitable habitat being available. The lack of protection in earlier times likely resulted in local extinction, while re-colonization was likely strongly hampered by the isolated nature of the pondscape being located in an urban setting and surrounded by heavily used car roads and a railway. In 2022, a few individuals have suddenly been heard; and in 2023; the population seems to have increased massively.

The sudden recolonization of Tommelen by Tree frog might be driven by the overall increase in occurrences and overall population density of Tree frog in the region (province Limburg), and might have been facilitated by the rather wet spring in 2022, in which several small ditches could have acted as dispersal pathways. The aim for the future is to maintain amphibian species diversity in the pondscape through expending ongoing management interventions such as periodic pond dredging and cutting back bank vegetation. Moreover, targeted actions will be led to create suitable overwintering habitats in the pondscape, and to promote the connectivity of the pondscape with other waterbodies.

HANDBOOK :

APPENDIX :

PHOTOS CREDITS

Triturus cristatus, cover, p.5 © Pieter Jan Alles
Hyla arborea, p.8 © Wim Dirckx
Tommelen, cover, p.2, p.3, p.6, p.8, back cover © Filip De Clercq

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2024

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Ponderful
PONDS FOR CLIMATE

BELGIË

POELENLANDSCHAP : TOMMELEN

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

WAT IS EEN POELENLANDSCHAP ?

DEFINITIE

Een poelenlandschap is een netwerk van ruimtelijk bij elkaar gelegen poelen («verbondenheid») en de omringende landschapsmatrix.

De grenzen van een poelenlandschap kunnen bepaald worden door fysieke of ecologische omgevingen (een vallei, een stroomgebied, een reeks poelen in een natuurreservaat) of bepaald worden door maatschappelijke of politieke criteria (stedelijke poelen, provinciale of nationale grenzen).

DRUK/BEDREIGINGEN OP POELEN EN POELENLANDSCHAPPEN

50-90 % van de poelen in Europese landen zijn in de afgelopen honderd jaar verdwenen. Bovendien worden poelen in belangrijke mate verwaarloosd in huidige water- en natuurgerelateerde nationale en Europese beleidsstrategieën, waaronder ook de EU KRW (Kaderrichtlijn Water).

WAAROM IS HET BELANGRIJK OM ZE TE PROMOTEN?

BIODIVERSITEITSVERBETERING

Poelen zijn belangrijk voor het behoud van de lokale en regionale biodiversiteit. Poelenlandschappen vormen hotspots voor biodiversiteit.

RISICOBEPERKING BIJ RAMPEN

Poelen en poelenlandschappen spelen een belangrijke rol in het beperken van overstromingen en vormen ook een waterreserve tijdens droogte.

MENSELIJKE GEZONDHEID

Poelen en poelenlandschappen bieden een breed scala aan bijkomende voordelen voor de mens en de maatschappij, zoals ondersteuning van de menselijke gezondheid en levenskwaliteit, ruimtes voor fysieke activiteiten of sociale interactie, maar ook esthetische ervaringen en educatieve en recreatieve activiteiten.

BEPERKING VAN EN AANPASSING AAN KLIMAATVERANDERING

Door hun grote aantal en hoge productiviteit hebben poelen een grote invloed op de koolstofcyclus.

WATERBEHEER

Poelenlandschappen kunnen een waterreserve bieden, wat vooral belangrijk is in de context van waterschaarste. Dit is voornamelijk nuttig als bron van drinkwater voor dieren en voor irrigatie.

CONTEXT

Het poelenlandschap is onbedoeld ontstaan in 1944 door bombardementen tijdens de Tweede Wereldoorlog en werd in 2006 erkend als natuurreservaat. Tommelen is momenteel eigendom van de stad Hasselt en wordt sinds 1996 beheerd door de natuurbeschermings-NGO 'Natuurpunt'.

Naam van het poelenlandschap : Tommelen
Naam van de naburige grote stad (in een straal van 30 km):
Hasselt (80'000 inwoners)
Bioklimatologische zone : Atlantisch

Overheersend landgebruik :
Poelenlandschap - extensief grasland met enkele kleine bosgebieden
Omgeving - stedelijk

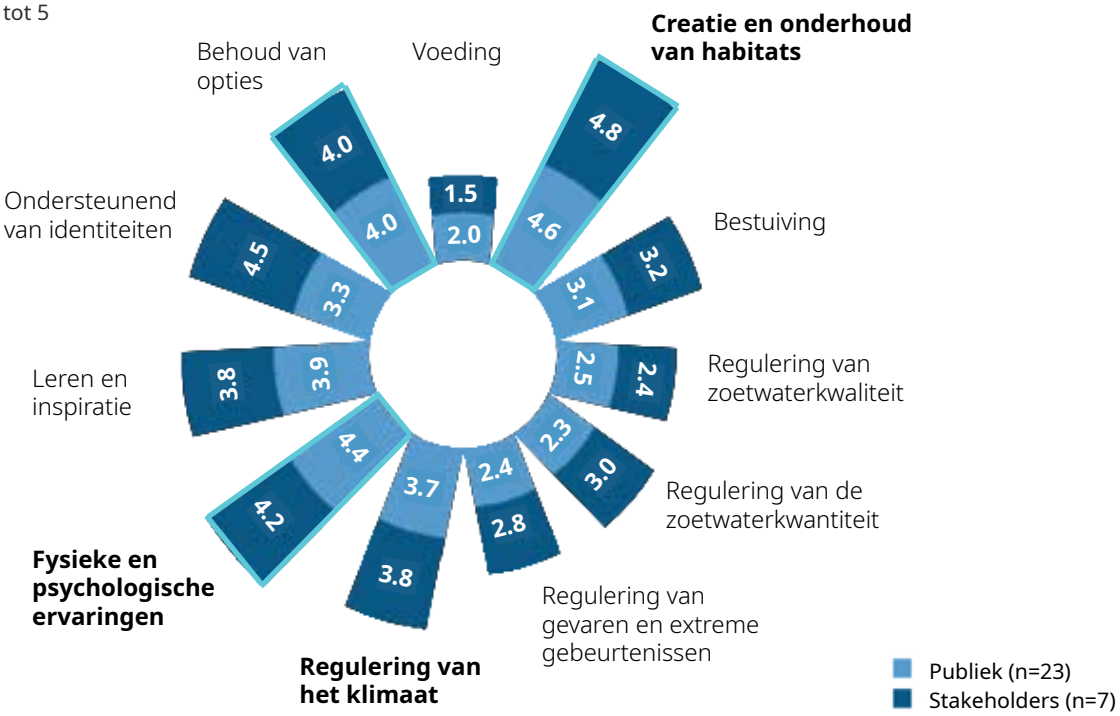
Poelenlandschap gebied : 0.18 km^2
Poelen: aantal:: 144
dichtheid: 800/km^2
oppervlakten : 1 tot 150 m^2
dieptes : 10 tot 85 cm
leeftijden : 5 tot 70 years

Grondeigenaar: stadt Hasselt
Landbeheerder : Natuurpunt (NGO)
Openbare toegankelijkheid : ongeveer 5 % van het gebied is toegankelijk (95% van het natuurgebied)
Openbare voorzieningen : diverse wandelpaden, picknickplekken, informatiepanelen en een uitkijktoren

VERWACHTINGEN VAN DE LOKALE GEMEENSCHAP

De 11 Natuurbijdragen aan mensen (NCP's)

Schaal: score van 1 tot 5



De verwachtingen berusten vooral op (i) het aanbieden van habitats voor biodiversiteit en (ii) het directe gebruik van dit natuurgebied door mensen (fysieke en psychologische ervaringen).

LOKAAL BELEID

Het poelenlandschap is eigendom van de stad Hasselt en werd tot 1995 verpacht als weiland aan boeren. Vanaf 1996 wordt het beheerd door NGO Natuurpunt. Tommelen werd in 2006 officieel erkend als natuurreservaat omwille van zijn hoge ecologische en bijzondere historische waarde.

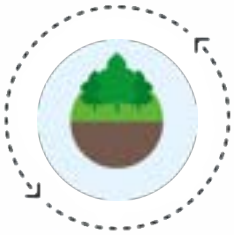
Het beheer wordt gefinancierd door subsidies van de Vlaamse overheid (na akkoord over beheervoorstel). Het budget voor het herstel en de creatie van leefgebieden komt van bijkomende projecten. Indien nodig zorgt Natuurpunt voor bijkomende financiering vanuit eigen budget. Het dagelijks beheer wordt uitgevoerd door een lokaal team van vrijwilligers. Het huidige beheer omvat het onderhoud van de bestaande poelen door periodiek slib te ruimen, het kappen van bomen, en het maaien van de oevervegetatie. De biodiversiteit wordt regelmatig gemonitord.

- Het poelenlandschap is onbedoeld ontstaan in 1944 tijdens de Tweede Wereldoorlog.

- Er zijn grote populaties van zeven verschillende soorten amfibeën aanwezig.

- Momenteel is dit een uniek natuurgebied in een sterk verstedelijkte omgeving

BELANGRIJKSTE UITDAGINGEN EN DOELSTELLINGEN



BIODIVERSITEITS-VERBETERING

Vooral amfibieën (met name Kamsalamander en recent ook Boomkikker).

GEZONDHEID VAN DE MENS

Een plek voor recreatie dicht bij de stad die gebruikt kan worden voor korte wandelingen, picknicks en natuurobservatie.

NBS

Het onderhoud en het beheer van poelen zijn hier de op de natuur gebaseerde oplossingen die in de praktijk worden gebracht om de twee geïdentificeerde maatschappelijke uitdagingen aan te pakken.

NIEUWE POEL AANLEGGEN

2019

Een nieuwe poel werd aangemaakt

BEHEER VAN POEL EN POELENLANDSCHAP

- Beschermingsstatus als natuurreservaat.
- Restauratie poel.
- Onderhoud van open plekken in het bos.
- Verwijdering van uitheemse plantensoorten (met name *Crassula helmsii*).
- Het vullen van twee poelen die sterk waren aangetast door *Crassula helmsii.*
- Maaien van poeloeverzones.
- Uitbaggeren van poelen (in 2009-2010, in 2021-2022).
- De toegang van vee tot een aantal poelen beperken door omheining.
- Onderhoud en creatie van overwinteringshabitat voor amfibieën (zoals *Rana esculenta synklepton, Rana temporaria, Bufo bufo, Triturus alpestris, Triturus cristatus, Triturus vulgaris en Hyla arborea*).
- De aanleg van bijkomende nieuwe poelen (n=3) is gepland in 2024.

- Onderhoud van wandelpaden
- Bouw van observatietoren.
- Installatie van picknickplekken.
- Aanmaken en onderhouden van infobladen.

- Installatie van een sluis in een afwateringssloot.

NCP'S EN GEMETEN INDICATOREN

AQUATIC BIODIVERSITY

SOORTENRIJKDOM
Waterplanten : **49**
Libellen : **2**
Families van ongewervelden : **13**
Amfibieën : **7**
(*Rana esculenta synklepton, Rana temporaria, Bufo bufo, Triturus alpestris, Triturus cristatus,Triturus vulgaris and since 2021 also Hyla arborea)*

HOEVEELHEID
Prioritaire instandhoudingssoorten (N) : **2**
Soorten op Habitatrichtlijnbijlagen (N)**: 2***
Triturus cristatus, Hyla arborea (amfibieën)
Invasieve uitheemse soorten (N)**: 2**
(*Crassula helmsii, Ludwigia grandiflora*)

VLAGGENSCHIPSOORTEN :

Triturus cristatus

NCP'S EN GEMETEN INDICATOREN

FYSIEKE EN PSYCHOLOGISCHE ERVARING

Aantal mensen dat het poelenlandschap bezoekt voor wandelen en natuurobservatie **7'300**

5% Gebied binnen het poelenlandschap toegankelijk voor het publiek

Zelfgerapporteerde tevredenheid en welzijn (schaal 1 tot 5) **3.8**

Populairste activiteiten :
wandelen (52%), luieren (11%), fietsen (9%), natuur observeren (9%)

LEREN EN INSPIREREN

10 Aantal groepen studenten en scholen/ universiteiten die het poelenlandschap bezoeken. (De bezoeken zijn slechts gedeeltelijk gekoppeld aan de poelen)

Aantal studies voor kennisverwerving over biodiversiteit en ecologie (studies/ jaar). Studies van NGO (Natuurpunt) en universiteiten (VUB en KU Leuven) **3**

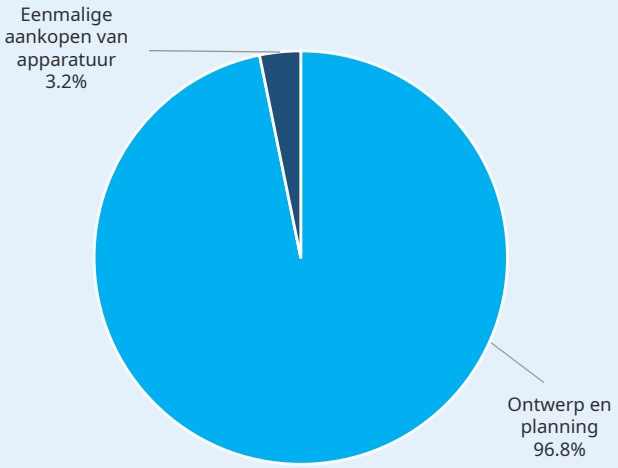
WATERKWANTITEIT

1 Creëren van een sluis op afwateringssloot om meer water in het poelenlandschap te houden

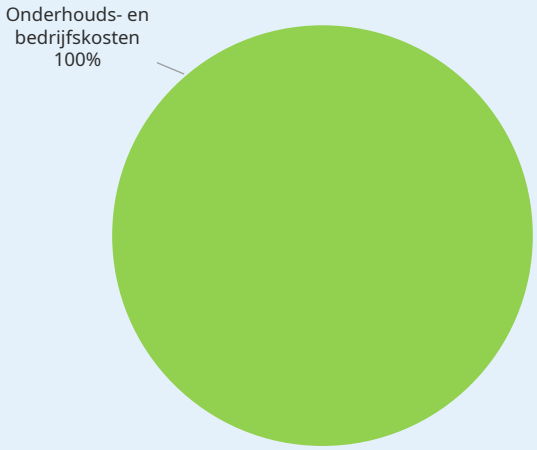
KOSTEN- EN BATENANALYSE

TOTALE KOSTENEVALUATIE

AANDEEL IN DE KOSTEN VOOR NBS-ACTIE

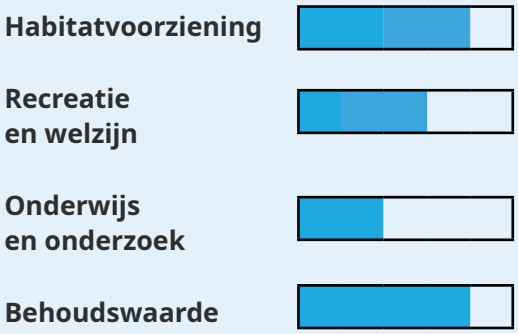


Relatieve kosten van maatregelen voor het creëren van NBS



Relatieve kosten van lopende NBS-beheermaatregelen

BEOORDELING VAN DE VOORDELEN



GESCHIKTE FINANCIERINGS-INSTRUMENTEN OM DE KLOOF TE VERKLEINEN

- **1. Vrijwillige bijdragen/donaties**
- **2. Subsidies**

RESTERENDE BEDREIGINGEN

1. De impact van mensen op de biodiversiteit, zoals het achterlaten van afval en het betreden van afgesloten gebieden.

2. Versnelde daling van het waterpeil en lagere waterbeschikbaarheid door de invloed van klimaatverandering. Een toenemend aantal poelen is van permanent naar tijdelijk waterhoudend verschoven.

3. Het is een uitdaging voor Natuurpunt om een evenwicht te zoeken tussen natuurbehoud en recreatie in het poelenlandschap.

SUCCESVERHAAL EN OVERDRAAGBAARHEID

DE AANWIJZING ALS NATUURRESERVAAT IN 2006

De erkenning van het poelenlandschap als 'natuurreservaat' (ongeveer 80% van het gebied heeft momenteel een beschermings-status) was een eerste belangrijke stap in de effectieve bescherming van het poelenlandschap. Dit resulteerde ook in de creatie van een beheerplan dat gericht is op het behoud van de biodiversiteit en toegang biedt tot essentiële financiering om het gebied te onderhouden.

Hoewel het gebied eigendom is van de stad Hasselt, wordt het beheer uitgevoerd door de NGO Natuurpunt, die grotendeels steunt op een team van lokale vrijwilligers die het poelenlandschap onderhouden. Een deel van het gebied is omheind om verstoring door bezoekers te beperken. De erkenning heeft ook geleid tot de aanleg van wandelpaden om de tevredenheid van omwonenden te vergroten. Tommelen is nu een belangrijke 'groene ruimte' in de nabijheid van de stad en wordt bezocht door mensen voor re-creatie en natuurobservatie.

HET LANGETERMIJNBEHOUD VAN DE KAMSALAMANDER EN DE RECENTE HERKOLONISATIE VAN HET POELENLANDSCHAP DOOR BOOMKIKKER (HYLA ARBOREA)

Tommelen staat erom bekend dat er al tientallen jaren met succes een relatief grote populatie Kamsalamanders voorkomt. Meer recent (2021) werd het gebied opnieuw gekoloniseerd door Boomkikker (*Hyla arborea*). Tommelen herbergde tot 1980 een kleine lokale populatie Boomkikkers. Daarna is de soort niet meer waargenomen, ondanks de aanwezigheid van geschikt habitat. Het gebrek aan bescherming in vroegere tijden heeft waarschijnlijk geleid tot het lokaale uitsterven, terwijl herkolonisatie waarschijnlijk sterk werd bemoeilijkt door het geïsoleerde karakter van het poelenlandschap dat in een stedelijke omgeving ligt en omringd wordt door druk bereden autowegen en een treinspoorlijn.

In 2022 werden plots enkele individuen gehoord en in 2023 lijkt de populatie sterk te zijn toegenomen. De plotse herkolonisatie van Tommelen door de Boomkikker zou gefaciliteerd kunnen zijn door de toename in het voorkomen en de toename in populatiedichtheid van de Boomkikker in de regio (provincie Limburg), en zou vergemakkelijkt kunnen zijn door het nogal natte voorjaar in 2022, waarin verschillende kleine slootjes als verspreidingsroutes zouden kunnen hebben gefungeerd. Het doel voor de toekomst is om de soortenrijkdom van amfibieën in het poelenlandchap the behouden door lopende beheerinterventies, zoals het periodiek ruimen van poelen en het maaien van oevervegetatie, uit te voeren. Bovendien zullen er gerichte acties worden ondernomen om geschikte overwinteringshabitats in het poelenlandschap te creëren en om de verbinding van het poelenlandschap met andere waterlichamen te bevorderen.

HANDBOOK :

APPENDIX :

FOTOCREDITS

Triturus cristatus, cover, p.5 © Pieter Jan Alles
Hyla arborea, p.8 © Wim Dirckx
Tommelen, cover, p.2, p.6, p.8, back cover © Filip De Clercq

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Wijns R., De Meester L.

2024

http://www.ponderful.eu

First page's layout inspired by freepik.com

Ponderful
PONDS FOR CLIMATE

UNITED KINGDOM

PONDSCAPE : PINKHILL, FARMOOR, OXFORDSHIRE

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 pond have been lost from European countries over the past 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 : Pinkhill, Farmoor, Oxfordshire
Name of neighboring large town (in a 30 km radius):
Oxford (160'000 habitants)
Bioclimatic zone : Oceanic

Dominant land use :
Pondscape - Low intensity floodplain grassland
Surrounding environment - agriculture, water storage reservoir

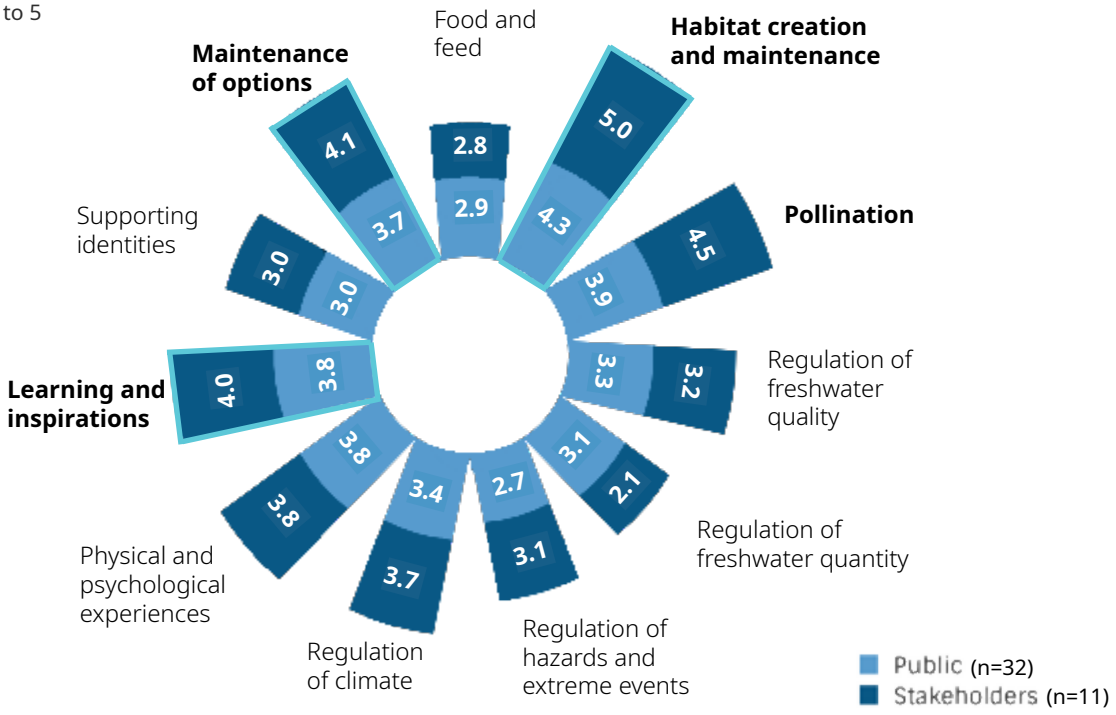
Pondscape area : 12.3 ha
Pond : number: 42 (15 additionnal pools less than 10m^2)
density: 342/km^2 if including only larger ponds more than 10 m^2, and 463/km^2 if including all ponds
surface areas : 5 m^2 to 0.45 ha
depths : 0.2 to 2.5 m
ages : 1 to 32 years

Land owner : Thames Water Utilities
Land Manager : Thames Water Utilities
Public access : 2 % of the area is fully accessible at all times. 5% has gated access for schools and other groups. The whole site is accessible for pre-arranged, accompanied tours.
Public amenities : Two hides. Gated access to boardwalks and dipping platforms. Footpath network. 85% of the site is visible from viewing points.

LOCAL COMMUNITY EXPECTATIONS

The 11 Nature-contribution to people (NCPs)

Scale : scores from 1 to 5



The expectations are very high for habitat creation and maintenance for biodiversity, particularly amongst stakeholders. This value is amongst the highest for any Ponderful pondscape. Expectations are also high for pollination and the provision of opportunities for learning and inspiration, as well as the maintenance of options, which relates to ensuring that the habitats and species are resilient.

LOCAL POLICIES

The pondscape is owned and managed by the private utilities company Thames Water and is part of their large Farmoor Reservoir site. Management is undertaken to maintain site's conservation value, maintain visibility for visitors and increase scientific understanding. It includes: cattle grazing, managing scrub, cutting meadows, creating new ponds and managing/remodeling existing ponds. Management is led by Thames Water with additional partnership projects undertaken with the NGO Freshwater Habitats Trust.

The site is well protected through the long-term commitment of Thames Water. Ownership by a large company means that a part-time site manager can be employed and capital funds are available for management. Good collaboration and synergy between the site owner and wildlife NGOs are key factors in the effective implementation of the NCPs.

100% of the 9.5 ha pondscape is managed for Nature Conservation (98% has restricted access). **100%**

90% of the site classifies as Floodplain Wetland Mosaics which is a designated priority habitat type in England. **90%**

100% of assessed ponds classify as Priority Ponds on the basis of their rich wildlife communities or PSYM score. **100%**

MAIN CHALLENGES AND OBJECTIVES

BIODIVERSITY ENHANCEMENT

New ponds which are exceptionally rich in freshwater plants and invertebrates

HUMAN HEALTH

A refreshing place to walk, watch birds and learn about nature.

GREEN SPACE MANAGEMENT

Creation of a diverse mosaic of water and wetland habitats.

NATURE BASED SOLUTIONS (NBS)

A new wetland reserve, comprising around 30 ponds, was created in a meadow next to the River Thames in 1990. Over the next 30 years the reserve was extended to two further meadows. The pondscape is managed for biodiversity but also has considerable value for nature watching, landscape enhancement, scientific research and education.

NEW POND CREATION

1990-1991
Creation of Pinkhill Meadow reserve for biodiversity: a network of around 30 ponds with wetlands and reedbeds

1998-1999
Creation Shrike Meadow reserve, with seven ponds, areas of wetland and a reed-bed

2011-2012
Creation of Buckthorn Meadow reserve: 15 ponds and small pools created for biodiversity.

2015-2023
Pond reshaping, additional ponds dug, reed / scrub removal. Introduction of grazing animals. Translocation of rare plants.

PONDS AND PONDSCAPE MANAGEMENT

- Creation of clean water ponds and wetland areas
- Willow hedges and reed beds added as screening to reduce human disturbance
- Meadow management and re-seeding with local green hay
- Scrub removed from some heavily shaded ponds/wetlands
- Reeds removed from some ponds
- Some ponds re-shaped to add diversity
- Grazing cattle introduced
- Threatened plant species translocated to ponds
- Fish refuge created linked to the River Thames

- Bird hides and viewing points created
- Information boards created
- Boardwalk and dipping platform created
- Paths maintained

NATURE CONTRIBUTIONS TO PEOPLE AND MEASURED INDICATORS

AQUATIC BIODIVERSITY

SPECIES RICHNESS
Aquatic plants : **77**
Amphibians : **3**

AMOUNT OF
Conservation priority species (N) : **7**
Round-fruited Rush (*Juncus compressus*), Blunt-leaved Pondweed (*Potamogeton obtusifolius*), Marsh Willowherb (*Epilobium palustre*) Common Toad (*Bufo bufo*), Water Vole (*Arvicola amphibius*), Otter (*Lutra lutra*), Breeding Grasshopper Warbler (*Locustella naevia*)
Translocated nationally threatened species (N) : **1**
Invasive alien species : **2**

FLAGSHIP SPECIES :


Hottonia palustris


Juncus compressus


Arvicola amphibius


Baldellia ranunculoides

NATURE CONTRIBUTIONS TO PEOPLE AND MEASURED INDICATORS

PHYSICAL AND PSYCHOLOGICAL EXPERIENCE

2 Wildlife hides for relaxing and for watching birds and other wildlife **2**

85% Area inside the pondscape accessible to the public

3.5 km of paths around the 9.5 ha site. **3.5**

Most popular activities :
wildlife observation (24%), relaxing (21%) and hiking (20%)

HABITAT CREATION AND MAINTENANCE

130 is the density of ponds (per km^2) in this pondscape. Short distances between ponds means that plants and animals can easily move to other waterbodies when conditions change as a result of high temperatures, drought or floods. **130**

GOOD

Pond water quality enables the waterbodies to maintain very rich wildlife communities which increases the pondscape's resilience to climate change.

LEARNING AND INSPIRATION

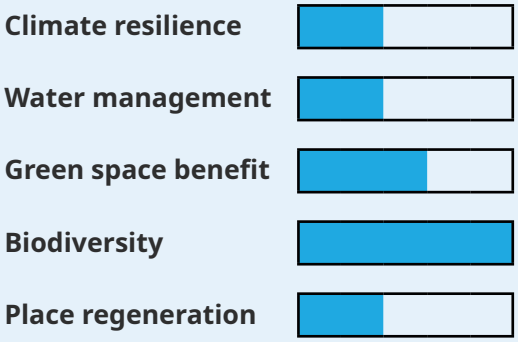
8 Groups per annum taken on guided walks. Including groups of nature conservation professionals, government bodies, NGOs, wildlife groups. Open days have also attracted hundreds of people. A volunteer group meets regularly to manage the site with benefits for learning and health.

Number of studies for acquisition of knowledge (per annum). Undertaken by NGOs, research students and government bodies: researching biodiversity, species introductions, carbon storage, and eDNA. **4**

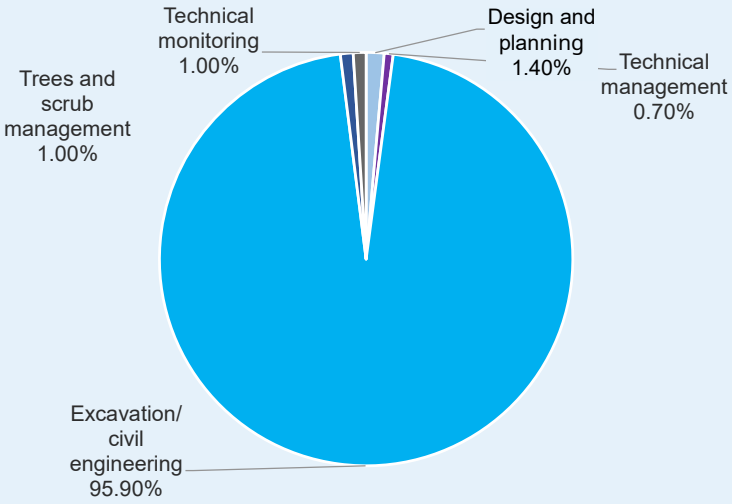
COSTS AND BENEFITS ANALYSIS

OVERALL COSTS ASSESSMENT

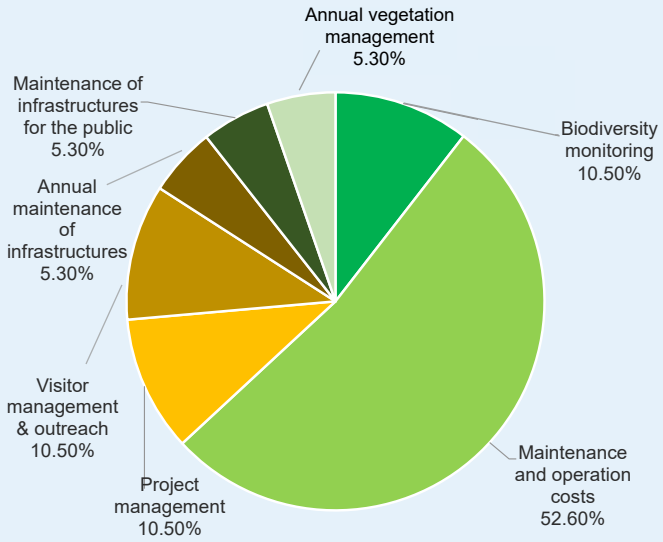
BENEFITS ASSESSMENT



SHARE OF COSTS FOR NBS ACTION



Relative cost of NbS creation measures



Relative cost of ongoing NbS management measures

SUITABLE FINANCE INSTRUMENTS TO REDUCE THE GAP

- ☑ **1. Income instruments**
- ☑ **2. Voluntary contributions /donations**
- ☑ **3. Subsidies**

FUNDING GAP ASSESSMENT

REMAINING THREATS

The polluted River Thames is flooding the meadows and their pond complexes with greater frequency (usually annually), probably because of climate change. This is increasing the nutrient burden in some ponds, making them less suitable for uncommon species and favouring the growth of invasive alien plants like Nuttalls Pondweed (*Elodea nuttallii*).

SUCCESS STORY AND TRANSFERABILITY

CREATING SMALL SITES OF HIGH BIODIVERSITY

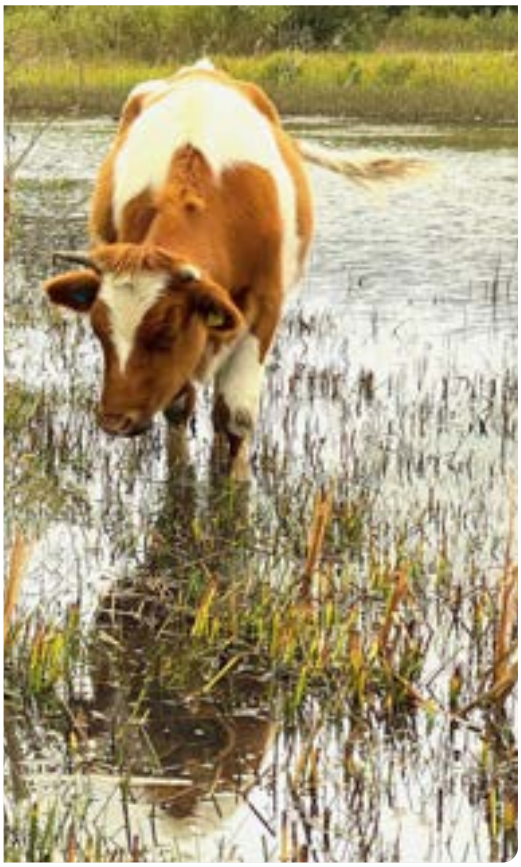
The first pond complex (created in 1990) is less than 3 ha in area but is exceptionally rich and now supports around 20% of all England's freshwater plant and larger invertebrate species. The site's richness is due to a range of factors: there are almost 30 pools of different sizes from 5 m2 to 0.5 ha. Some pools dry every year, others are semi-permanent which provides many different habitats. Most ponds have extensive areas of shallow water and wetland around their edges, and the whole site is located on the ancient floodplain of the River Thames which has a long wetland heritage. It was important to design the ponds so their water quality was as clean as possible. To do this, none of the ponds have direct links to the polluted River Thames. In addition, most of the ponds are fed by groundwater which has low levels of polluting nutrients.

Pinkhill provides clear evidence that it is possible to create new pondscapes of exceptional biodiversity value even when there are quite limited areas of land available.

SUSTAINABLY MANAGING PONDSCAPES USING CATTLE GRAZING AND TREE SHADE

The pondscape has been used to investigate if it is possible to manage sites so that they maintain high biodiversity without needing extensive physical management. To do this, it has been important to introduce grazing cattle. The site has also been partly re-designed to make the most of their effect. For example, extending two ponds to create narrow pinch-points between them, focuses cattle trampling in these areas which creates the semi-bare ground needed by many rare plant species. Tree shade is also used in different ways: including to reduce the abundance of emergent plants which would dominate in full sun, and to attract cattle to particular areas of the site by creating shelter for them. The grazing density on this site is around 1 cow/ha, but on other sites the ideal density will vary considerably depending on factors such as the number, size and location of ponds.

The results from Pinkhill show that pond design and knowledge of natural processes can be valuable tools to maintain and enhance freshwater biodiversity with reduced need for human intervention. It is an area of study that has much promise.



SUCCESS STORY AND TRANSFERABILITY

MANAGING POLLUTION RISK TO MAKE BIODIVERSE PONDS

Some areas of Pinkhill lie within 10 m of the polluted River Thames, and its flooding regularly brings poor quality water onto to the site. Despite this, the ponds still maintain a high biodiversity value. The ponds are surrounded by unfertilized grassland which ensures that the surface water which fills them during most of the year is clean. Boreholes also showed that a gravel aquifer occurs under the meadow at around 1m depth, so groundwater ponds were also created. As groundwater moves through the gravels it washes pollutants out of the ponds so they stay cleaner. Most ponds are not interconnected so that pollutants in ponds that are near the river and receive most floodwater don't spread to other ponds.

Finally, both cattle grazing and tree shade help to stop the adverse effects of pollution on pond communities by preventing tall nutrient-loving plants from dominating more nutrient-enriched ponds. Water quality is of critical importance for maintaining pond biodiversity. An implication from this case study is that a range of factors including pond design, water source and site management can all be used to reduce the impact of low to moderate water pollution on ponds.

INTRODUCING THREATENED PLANT SPECIES

Six freshwater plant species were successfully translocated to new ponds. All were traditionally found in the Thames Valley, but are now nationally threatened or regionally rare. Plants were not translocated to the site until it was more than 25 years old, so it was very unlikely that they would colonise naturally. They were added as seeds or small plants to locations where each species might be expected to thrive: Water Violet (*Hottonia palustris*) and Frogbit (*Hydrocharis morsus-ranae*) were introduced to shallow water in slightly shaded pools. Lesser Marshwort (*Apium inundatum*), Lesser Water-plantain (*Baldellia ranunculoides*), and Tubular Water-dropwort (*Oenanthe fistulosa*) were added at the muddy pond edges which would be regularly grazed and poached by cattle. Marsh Stitchwort (*Stellaria palustris)* was planted in areas which would have occasional grazing, allowing it to scramble through other plants.

Wetland species translocations in Britain have often had a low rate of success. The introductions at Pinkhill seem to have worked well because water quality is good, and different levels of grazing disturbance and of shade are present across the pondscape. This means that likely habitats could be found in different locations, ensuring that at least one or two would be suitable.

MARSH LOUSEWORT: AN ECOSYSTEM ENGINEER

Marsh Lousewort (*Pedicularis palustris*) is a native plant that is a root parasite of sedges and reeds. It was once widespread on floodplains in Thames region but is now rare. In 2019 and 2020, seeds were scattered around pond edges next to beds of Common Reed (*Phragmites australis*). The aim was to see if the plant could control the spread of reed which was becoming a nuisance on the site. Marsh Lousewort has grown well, spread across the site and been effective at reducing reed growth, particularly when combined with grazing. This has opened up areas for other plants to grow and enabled more of the site to be visible to people. It is still early days, but Marsh Lousewort has the potential to become an effective ecosystem engineer in this and other sites: controlling troublesome reed, and possibly sedge growth in areas of damp ground, without the need for human intervention. The species is native to most of Europe, but may not be appropriate to introduce in all locations.

HANDBOOK :

APPENDIX :

PHOTOS CREDITS

Pinkhill Meadow areal photo , p.3 ©A. Driver

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First page's layout inspired by freepik.com

http://www.ponderful.eu

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

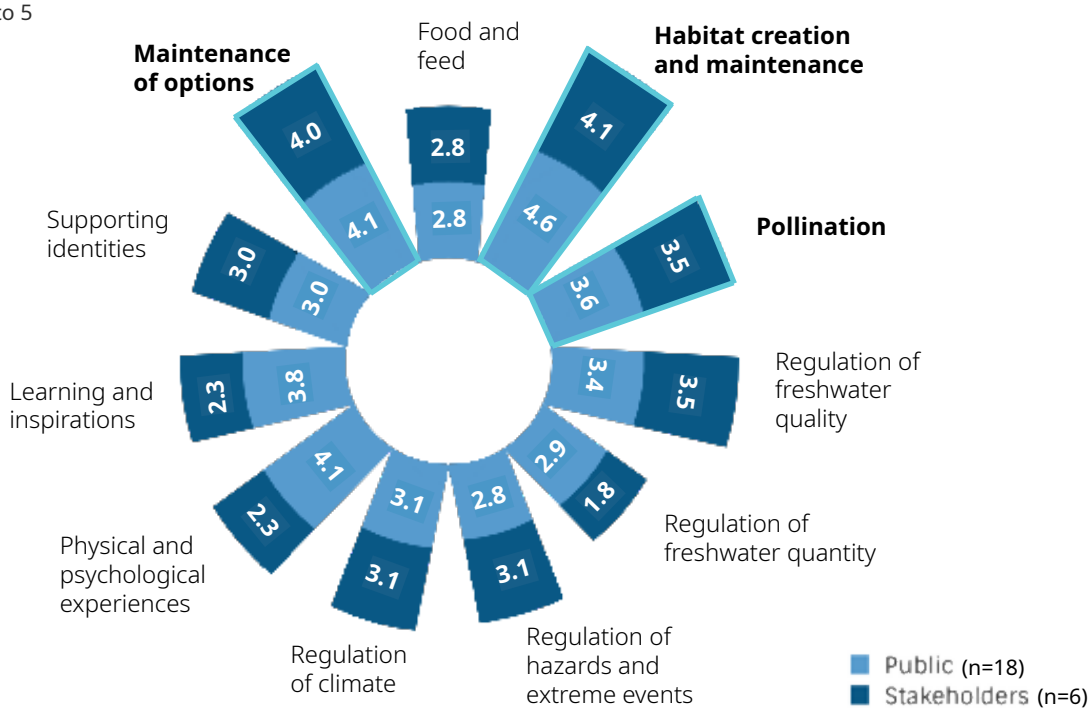
Pondscape area : 30 km^2
Pond : number: 123
density: 4/km^2
surface areas : 15 m^2 to 19'000 m^2
depths : 0.25 to 2.5 m
ages : 1 to 200+ years

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.

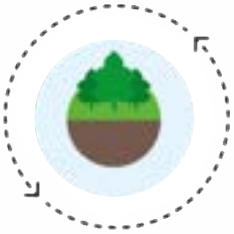
1.5% of the 3,000 ha pondscape is protected for nature conservation as Sites of Scientific Interest (access is restricted, except for public footpaths).

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

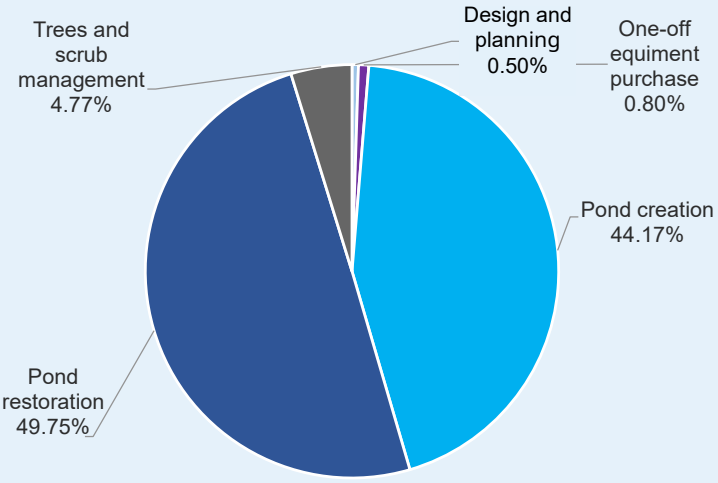
5 Number of groups of professional staff (demonstration visits and training for NGO practitioners, and government bodies e.g. Natural England, Environment Agency (some visits are only partly linked to ponds).

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).

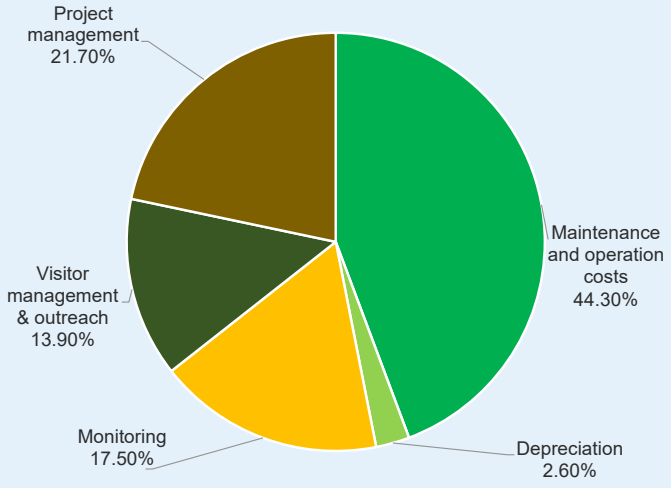
COSTS AND BENEFITS ANALYSIS

OVERALL COSTS ASSESSMENT

SHARE OF COSTS FOR NBS ACTION

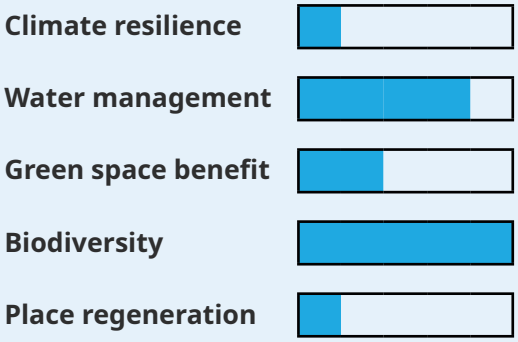


Relative cost of NbS creation measures



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

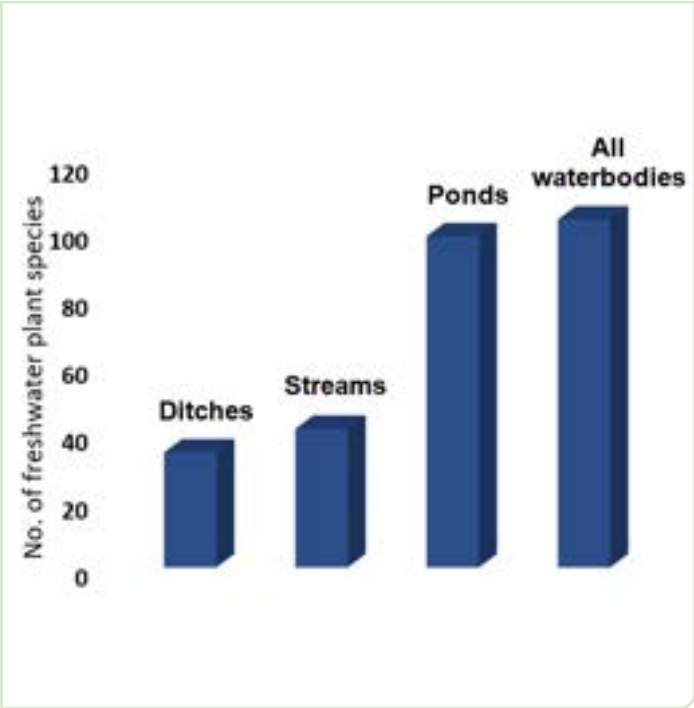
These agricultural ponds face a wide variety of threats. Foremost are:

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

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2024

http://www.ponderful.eu

Ponderful
PONDS FOR CLIMATE

SWITZERLAND

PONDSCAPE : BOIS DE JUSSY

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 pond losses in European countries over the past 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. They're also an ideal place for people seeking freshness during summer heatwaves.

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.

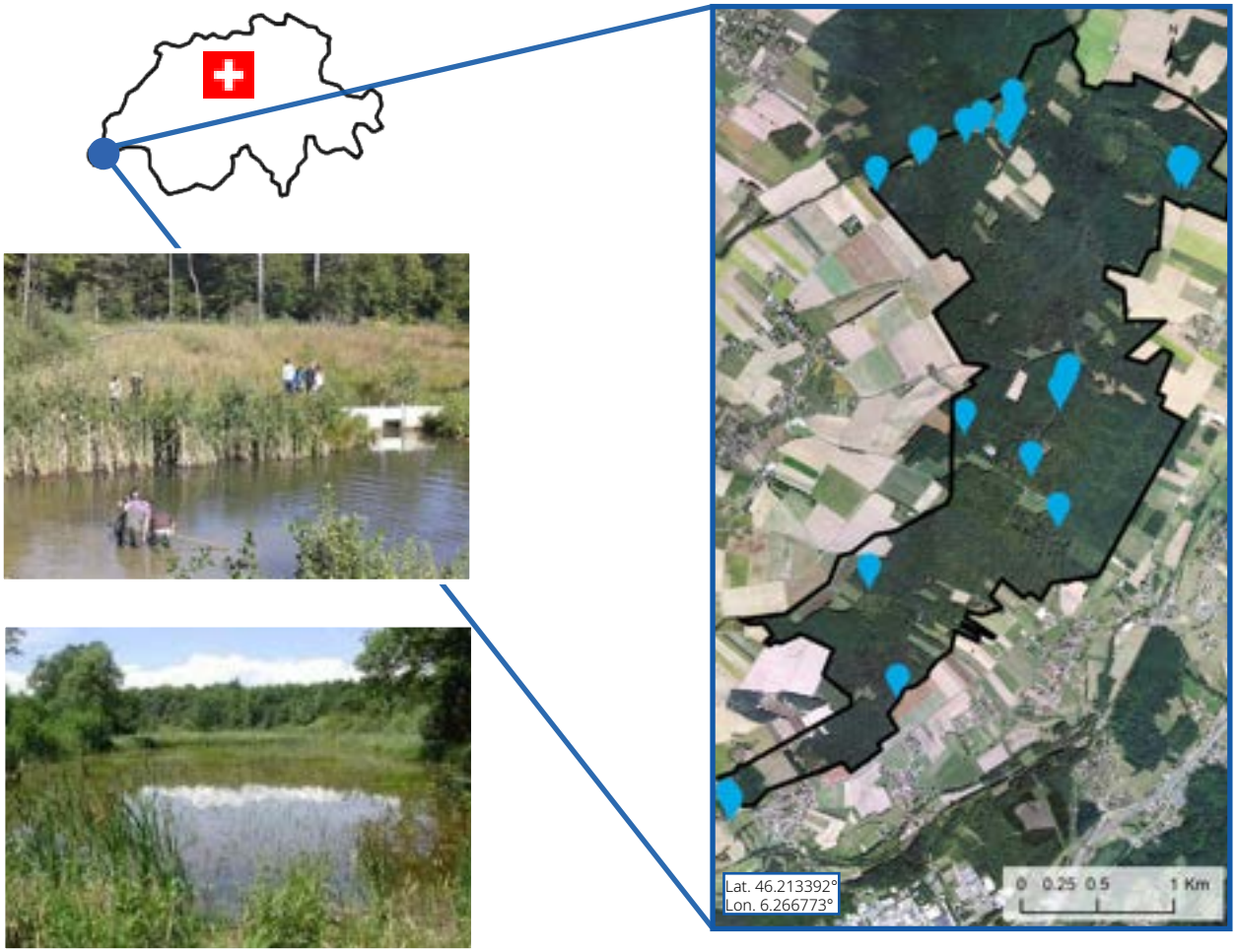
CONTEXT

Name of the pondscape : Bois de Jussy
Name of neighboring large town (in a 30 km radius):
Geneva (600'000 habitants)
Bioclimatic zone : Continental (oceanic influence)

Dominant land use :
pondscape - woodland
surrounding environment - agriculture

Pondscape area : 6.1 km²
Pond : number: 69 (+ 300 pools of 1-2m²)
density: 12/km²
surface areas : 100 to 4000 m²
depths : 0.4 to 2 m

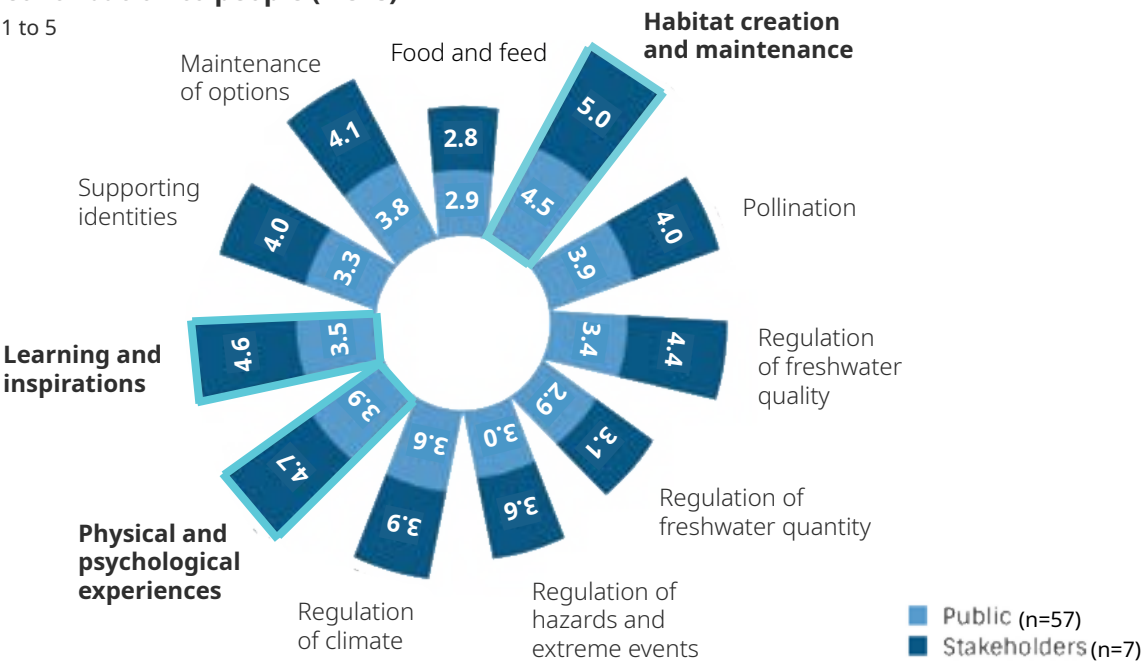
Land owner : Canton of Geneva
Land manager : Canton of Geneva
Public access : 85 % of the area is accessible
Public amenities : several footpaths and some hides



LOCAL COMMUNITY EXPECTATIONS

The 11 Nature-contribution to people (NCPs)

Scale : scores from 1 to 5



The expectations rely mainly on (i) the offer of habitats for biodiversity and (ii) the direct use of these natural areas by people (physical and psychological experiences).

LOCAL POLICIES

In this pondscape, most ponds are of national importance for nature conservation, as a result they are listed on the inventories of natural sites of national importance. Therefore, they benefit from strong statutory protection and management.

60.5% of the 610 hectares of the pondscape is protected (15% with restricted access) : 368 ha is a «Biotopes of National Importance» (Federal Act on the Protection of Nature) and additionnally 90.2 ha have a local protection.

60.5%

Four amphibian spawning sites of national importance (361.5 ha): Passages under roads were built. New temporary ponds were created for toads.

361.5ha

One mire of national importance (6.5 ha): in good state of conservation.

6.5ha

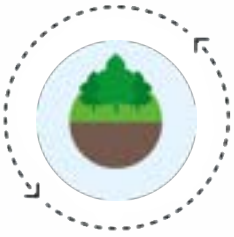
Local protected areas : at cantonal and communal levels (forest reserves) of 90.2 ha (no active action or targeted to the promotion of biodiversity).

90.2ha

The management includes conservation and regeneration of existing wetlands, as well as the creation of new ponds and the maintenance of their quality through management actions. These are mainly conducted by the regional authorities (Cantons) and implemented by private consultancies, with subsidies coming from the government (65% of management cost is linked to the national inventories of natural sites).

This policy framework allows for effective and successful protection and promotion of pond biodiversity. The good collaboration and synergy between the Canton, the NGOs and environmental consultancies is also a key factor in the fruitful and effective implementation of the NBS.

MAIN CHALLENGES AND OBJECTIVES

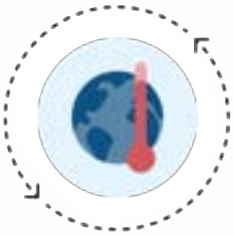


BIODIVERSITY ENHANCEMENT

Especially amphibians, birds, bats and aquatic plants.

HUMAN HEALTH

A place to walk and relax and to educate people about nature.



CLIMATE CHANGE ADAPTATION

A refreshing area to walk and relax during hot days and heat waves.

WATER MANAGEMENT

Buffer the water flow in the forest (reduce the risk of flooding in downstream areas)

NATURE BASED SOLUTIONS (NBS)

New pond creation and their management are here the Nature-based Solutions (NbS) put in practice to address the four identified societal challenges

NEW POND CREATION

1968-1970

Creation of a network of 10 large ponds (2000-5000m^2), primarily aimed at draining the forest

2005-2008

Creation of 59 medium-sized ponds (50-300m^2), aimed as habitats for biodiversity (amphibians)

2019-2022

Creation of 400 very small ponds (1-2m^2), aimed as habitats for biodiversity (e.g. the amphibian *Bombina variegata*)

PONDS AND PONDSCAPE MANAGEMENT

- Protection status
- Ponds restoration
- Creation of forest clearings
- Removal of alien plant species
- Removal of introduced non-native fish
- Threatened species reintroduction
- Measures to provide connectivity for amphibian populations
- Removal of drainage ditches and controlling water level
- Planting aquatic emergent vegetation in newly created or restored ponds
- Planting shrubs and sowing grasslands seeds in the vicinity of ponds

- Creation and maintenance of trails and nature observation points
- Creation and maintenance of information boards

- Dredging of terrestrialised ponds
- Removal of drainage ditches

NATURE CONTRIBUTIONS TO PEOPLE AND MEASURED INDICATORS

AQUATIC BIODIVERSITY

SPECIES RICHNESS
Aquatic plants : **82**
Water birds : **8**
Dragonflies : **17**
Families of invertebrates : **22**

AMOUNT OF
Conservation priority species : **33**
Species on Habitat Directive Annexes : **5***
Introduced threatened species : **2**
Invasive alien species : **1**

CONTRIBUTION TO REGIONAL RICHNESS

FLAGSHIP SPECIES :


*Bombina variegata**


*Leucorrhinia pectoralis **


*Triturus cristatus**


*Emys orbicularis**

CARBON BALANCE

10t

The Carbon budget (emissions-sequestration balance) is directed towards emissions (10 tonnes of CO_2e/ pondscape/year). Future management focused on Carbon could potentially reduce these emissions (see the PONDERFUL Handbook).

REGIONAL MICROCLIMATE

Difference between outside and inside the pondscape. in PET (physiological equivalent temperature), during hot summer days, linked mainly to the presence of trees.

-6°

NATURE CONTRIBUTIONS TO PEOPLE AND MEASURED INDICATORS

PHYSICAL AND PSYCHOLOGICAL EXPERIENCES

Number of people visiting the pondscape (leisure, tourism, nature watching etc.) (number/year) **60’000**

85% Area inside the pondscape accessible to the public

Most popular activities :
wildlife observation (69%), hiking (67%) and relaxing (35%)

LEARNING AND INSPIRATION

8 Number of groups of students school/universitiy visiting the pondscape each year.

Number of studies for acquisition of knowledge (nb/year). Broad estimation. Studies from NGOs, HES-SO & Uni Genève students and nature consultancies. **5**

WATER QUANTITY

9’300m³ Total water volume (m³)

Volume of water stored during a severe flood event (m³) **18’600m³**

WATER QUALITY

Nutrients : **GOOD**

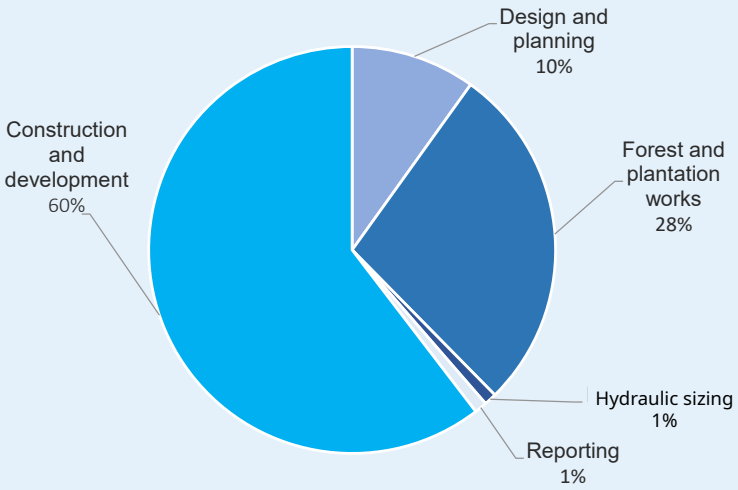
Pesticides : High risk — No risk

Wide range of pollution levels between ponds, some are pristine and others are polluted by pesticides coming from the agricultural drainage area.

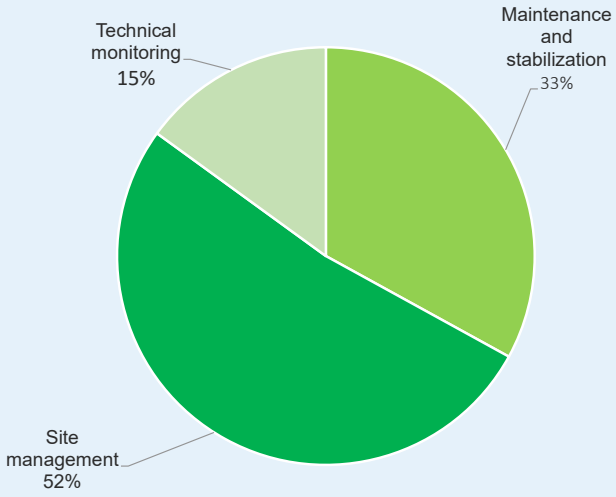
COSTS AND BENEFITS ANALYSIS

OVERALL COSTS ASSESSMENT

SHARE OF COSTS FOR NBS ACTION

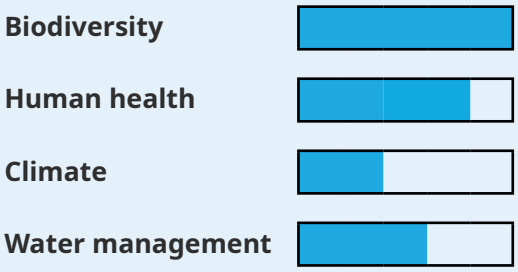


Relative cost of NbS creation measures



Relative cost of ongoing NbS management measures

BENEFITS ASSESSMENT



SUITABLE FINANCE INSTRUMENTS TO REDUCE THE GAP

1. Income instruments

- Sale of materials: gravel extracted or wood cut when creating and maintaining ponds

2. Voluntary contributions /donations

- Philanthropic contributions
- Crowfunding
- Fond vitale environnement (Services Industriels Genevois)

3. Subsidies

- Federal subsidies for the management of objects of national importance.

REMAINING THREATS

1. The impact of people and their pets on biodiversity, including damage to pond banks from walkers and disturbance of wildlife. It also includes the introduction of exotic species (fish, turtles, amphibians and plants).
2. Changes in hydrology linked to climate change, including the timing and quantity of rainfall. Smaller ponds are likely to disappear. This will impact biodiversity.

SUCCESS STORY AND TRANSFERABILITY

ENFORCEMENT OF PROTECTION STATUTS

Successful, the implementation of several protection statuts in the pondscape (covering 60.5% of its surface), together with a regulation of the flow of visitors (car park on the periphery, hiking trails, observatories), allowed to maintain a low anthropic pressure and enabled a full development of the biodiversity in all ponds. For example, there is restricted access to most of the ponds, minimizing trampling and disturbance by dogs. The local population and visitors expressed the added value of this pondscape to their well-being and recognized its ecological quality.

Such NBS can be easily implemented elsewhere and are relatively low-cost measures, which are essential first steps in the conservation of ponds.

HETEROGENEITY IS STRENGHT

The creation of an heterogeneous set of ponds that vary in their morphometry, age or water chemistry has proved to be highly beneficial in increasing the capacity of the pondscape to host flora and fauna. The multiplication of ponds types improves the survival of species by offering them opportunities for dissemination and greater resilience to change and disturbance. Such an approach simply requires upstream consideration of the desired design of the ponds to be created or restored to maximise the heterogeneity of the pondscape.

ACTIVE MANAGEMENT OF THE PONDSCAPE

On-going management of the pondscape for 20 years, with the support of external consultancies, following a management plan. This management plan targets biodiversity. To facilitate the movement and reproduction of amphibians within the Bois de Jussy, a dense network of ponds and small pools was created inside the wood, and barriers to dispersal were identified and removed or resolved (creation of passages under the road, installation of temporary barriers to move individuals daily during the migration period). The combination of forest and ponds is highly favorable for aquatic and terrestrial biodiversity which has developped particularly well, including amphibians, dragonflies, aquatic plants, larges and small mammals, bats and birds. The presence of invasive species is monitored and action is taken to eliminate them when they represent a tangible danger (capture of exotic fish or turtles, uprooting or mowing of neophytes).

Such active management of a pondscape, with the implementation of various management measures, is a NBS requiring continuous funding. It has nevertheless proved here to be the key for the successful protection and enhancement of the biodiversity value of the site.

REINTRODUCTION OF THREATENED SPECIES

The reintroduction of a threatened species, the European pond turtle (*Emys orbicularis*), was successful and the population is now reproducing in this pondscape. This flagship species brings an added social value and enhance the attractiveness of the pondscape for nature-watching. There are other reintroduction programs at the site, e.g. for the Harvest Mouse (*Micromys minutus*).

HANDBOOK :

APPENDIX :

PHOTOS CREDITS

Bombina variegata, p.5. © E. Sansault
Leucorrhinia pectoralis, p.5. ©OPIE
Triturus cristatus, p.5. © E. Sansault
Emys orbicularis p.5 © Sylvain Ursenbacher
Emys orbicularis p.8 © Charlotte Ducotterd

First page's layout inspired by freepik.com

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2024

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Ponderful
PONDS FOR CLIMATE

SUISSE

PONDSCAPE : BOIS DE JUSSY

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

QU'EST-CE QU'UN «PONDSCAPE» ?

DÉFINITION

Un «pondscape» est un réseau d'étangs ayant tous une proximité spatiale («connectivité») au sein de la matrice paysagère environnante.

Les délimitations d'un pondscape sont déterminées par des facteurs physiques ou écologiques (une vallée, un bassin versant, un ensemble d'étangs dans une réserve naturelle). Elles peuvent aussi être déterminées par des critères sociétaux ou politiques (étangs urbains, frontières régionales ou nationales).

PRESSION/MENACE SUR LES ÉTANGS ET LES PONDSCAPES

Entre 50-90% de plans d'eau ont disparu dans les pays d'Europe ces cents dernières années. Au niveau national et européen, les étangs sont aussi largement négligés dans les politiques et stratégies de conservation liées à l'eau et à la biodiversité. C'est aussi le cas dans la directive-cadre sur l'eau de l'UE.

POURQUOI EST-IL IMPORTANT DE LES PROMOUVOIR ?

PROMOTION DE LA BIODIVERSITÉ

Largement négligés et généralement sous-évalués, les étangs sont d'une importance remarquable pour la promotion et la conservation de la biodiversité. Les pondscapes sont des hotspots de biodiversité.

RÉDUCTION DES RISQUES DE DÉSASTRE

Les étangs et les pondscapes jouent un rôle fondamental dans l'atténuation des inondations et constituent aussi une réserve d'eau dans la lutte contre les incendies.

SANTÉ HUMAINE

Les étangs et les pondscapes offrent un large éventail de bénéfices pour la société humaine, tels que l'amélioration de la santé et de la qualité de vie puisqu'ils sont des lieux d'activité physique, d'interactions sociales, d'expérience esthétique ou encore d'apprentissage et de loisir.

ATTÉNUATION DU CHANGEMENT CLIMATIQUE ET ADAPTATION

Etant abondants et très productifs, les étangs influencent fortement le cycle du carbone, à la fois comme puits et comme sources. Ce sont également des espaces privilégiés par les personnes en recherche de fraîcheur pendant l'été et les épisodes de canicule.

GESTION DE L'EAU

Les pondscapes offrent une réserve en eau qui est particulièrement importante dans le contexte de pénurie d'eau. Ils sont utiles pour l'irrigation et pour l'abreuvement du bétail.

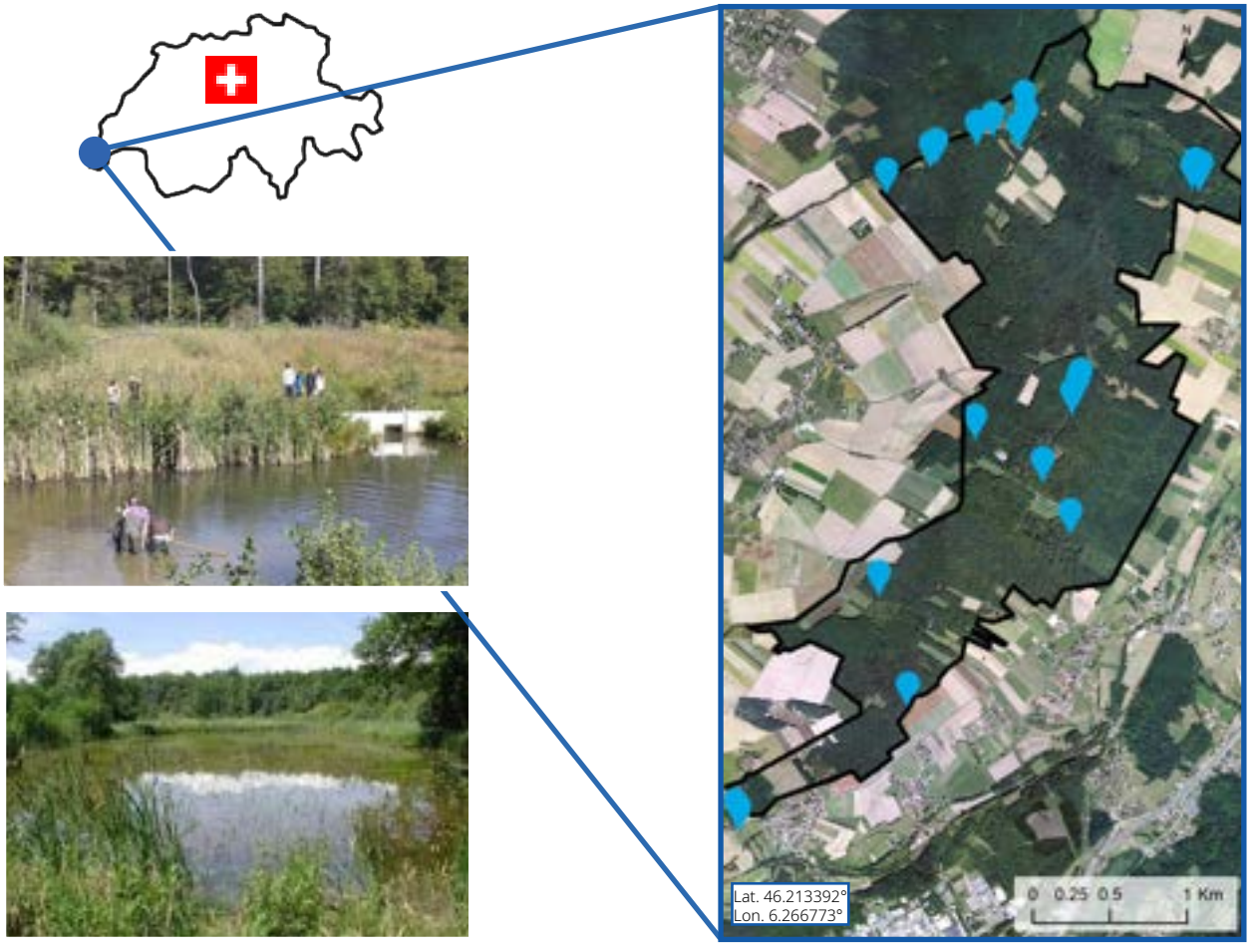
CONTEXTE

Nom du pondscape : Bois de Jussy
Nom de la ville avoisinante (dans un rayon de 30 km):
Genève (600'000 habitants)
Zone bioclimatique : Continentale (influence océanique)

Utilisation principale du sol:
pondscape : forêt
environnement avoisinant : agriculture

Surface du pondscape : 6.1 km^2
Etangs : nombre: 69 (+ 300 mares de 1-2m^2)
densité: 12/km^2
surfaces : 100 à 4000 m^2
profondeurs : 0.4 à 2 m
âges : 5 à 50 ans

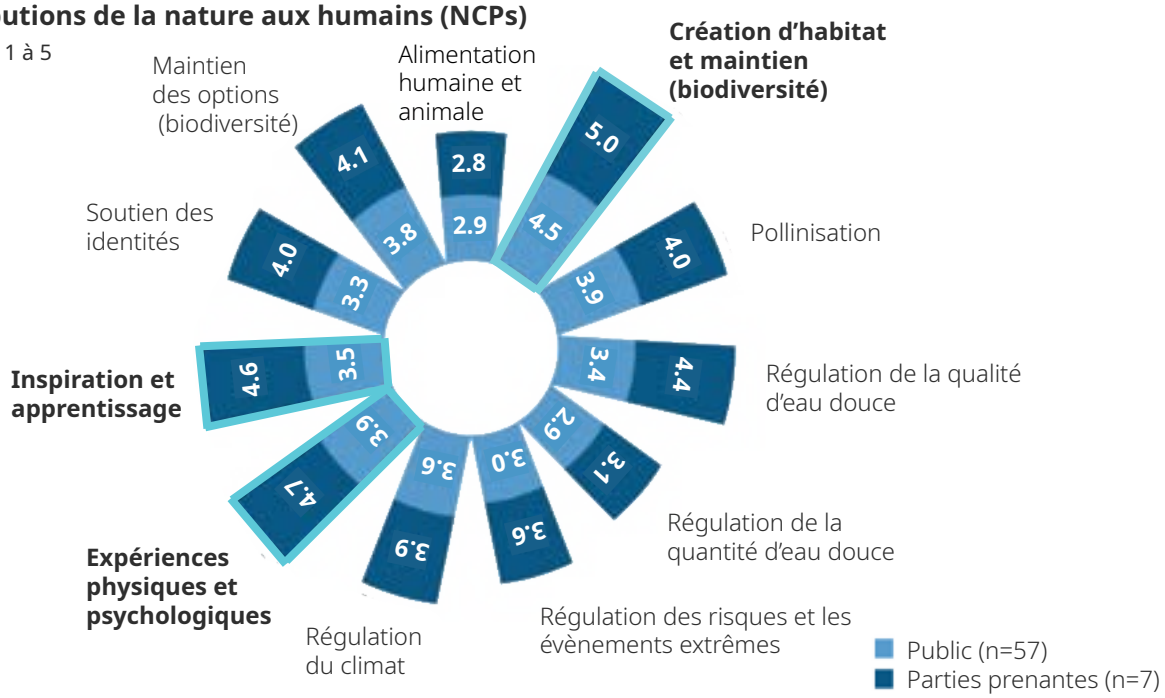
Propriétaire : Canton de Genève
Gestionnaire : Canton de Genève
Accessibilité au public : 85 % de l'aire est accessible
Aménagements pour le public : plusieurs sentiers et quelques observatoires



ATTENTES DE LA COMMUNAUTÉ LOCALE

Les 11 contributions de la nature aux humains (NCPs)

Echelle : scores de 1 à 5



Les attentes reposent principalement (i) sur l'offre en habitats pour la biodiversité et (ii) l'usage direct des espaces naturels par les personnes (expériences physiques et psychologiques).

POLITIQUES LOCALES

Dans ce pondscape, la conservation de la majorité des étangs est considérée d'importance nationale, et c'est pourquoi ils sont inscrits à l'inventaire des sites naturels d'importance nationale. Ainsi, ils bénéficient d'un fort statut de protection et de gestion.

60.5% des 610 hectares (ha) du pondscape sont protégés (15% avec un accès restreint) : 368ha sont considérés comme «Biotopes d'importance nationale» (Loi sur la Protection de la Nature) et 90.2ha hectares bénéficient d'une protection locale.

60.5%

Quatre sites de reproduction des batraciens d'importance nationale (361.5 ha): Des passages sous-voies et des nouvelles mares temporaires ont été réalisés pour les crapauds. Les populations sont soumises à un monitoring.

361.5ha

Un marais d'importance national (6.5 ha): en bon état de conservation.

6.5ha

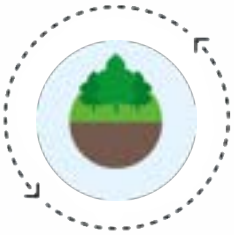
Aires protégées au niveau local (cantonal et communal (réserves forestières)) : 90.2 ha (pas d'action active ou ciblée sur la promotion de la biodiversité).

90.2ha

La gestion inclut la conservation et la régénération des marais existants, ainsi que la création de nouveaux étangs et l'entretien de la qualité de ces milieux à travers des actions de gestion. Ces dernières sont principalement menées par les autorités locales (Cantons) et mises en oeuvre par des bureaux d'études, à l'aide de subventions de l'Etat (65%, liées aux inventaires nationaux de sites naturels).

Ce cadre légal permet une protection et promotion efficiente de la biodiversité des étangs. La collaboration et la synergie entre le Canton, les bureaux d'études et les ONGs sont aussi des clés de réussite pour la mise en place d'une mise en oeuvre efficiente des solutions fondées sur la nature.

PRINCIPAUX ENJEUX ET OBJECTIFS

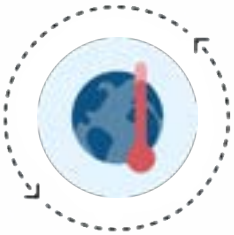


PROMOTION DE LA BIODIVERSITÉ

En particulier les amphibiens, l'avifaune, les chiroptères et les plantes aquatiques.

SANTÉ HUMAINE

Un lieu pour se promener, se détendre et un lieu de sensibilisation à la nature.



ATTÉNUATION DU CHANGEMENT CLIMATIQUE ET ADAPTATION

Un lieu rafraîchissant pour se promener et se détendre lors de fortes chaleurs et canicules.

GESTION DE L'EAU

Tamponner le flux d'eau dans les forêts (réduit le risque d'inondations dans les zones en aval)

SOLUTIONS FONDÉES SUR LA NATURE (SFN)

La création et la gestion de nouveaux étangs correspondent aux solutions fondées sur la nature (SfN) mises en oeuvre pour répondre aux quatre enjeux sociétaux identifiés précédemment.

CRÉATION DE NOUVEAUX ÉTANGS

1968-1970

Création d'un réseau de 10 larges étangs (2000-5000m²), dont le but principal est de drainer la forêt

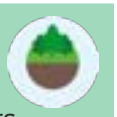
2005-2008

Création de 59 étangs de taille moyenne (50-300m²), dont le but est d'offrir des habitats pour la biodiversité (amphibiens)

2019-2022

Création de 400 petits plans d'eau (1-2m²), dont le but est d'offrir des habitats pour la biodiversité (amphibiens, notamment *Bombina variegata*)

GESTION DES ÉTANGS ET DU PONDSCAPE



- Statuts de protection
- Restauration des étangs
- Création de clairières forestières
- Elimination des poissons introduits non-indigènes
- Elimination des plantes invasives
- Réintroduction d'espèces menacées
- Mesures pour renforcer la connectivité pour les populations d'amphibiens
- Suppression des fossés de drainage et contrôle des niveaux d'eau
- Plantation de macrophytes dans des étangs nouvellement créés ou restaurés
- Plantation d'arbustes et ensemencement à proximité des étangs

- Création et entretien des sentiers pédestres et des points d'observation
- Création et entretien des panneaux informatifs

- Curage d'étangs attéris
- Suppression des fossés de drainage

LES CONTRIBUTIONS DE LA NATURE AUX HUMAINS ET LES INDICATEURS MESURÉS

BIODIVERSITÉ AQUATIQUE

DIVERSITÉ SPÉCIFIQUE
Plantes aquatiques : **82**
Oiseaux d'eau : **8**
Libellules : **17**
Familles d'invertébrés : **22**

QUANTITÉ
Espèces prioritaires (sur Liste Rouge) : **33**
Espèces inscrite sur l'Annexe de la Directive Habitat : **5***
Espèces menacées introduites : **2**
Espèces invasives : **1**

CONTRIBUTION À LA RICHESSE RÉGIONALE

ESPÈCES EMBLÉMATIQUES :


*Bombina variegata**


*Leucorrhinia pectoralis **


*Triturus cristatus**


*Emys orbicularis**

BILAN CARBONE

10t

Le budget Carbone (bilan émissions-séquestrations) est dirigé vers les émissions (10 tonnes de CO_2e/pondscape/an). Une future gestion ciblée sur le Carbone pourrait potentiellement diminuer ces émissions (voir le Handbook PONDERFUL).

MICROCLIMAT RÉGIONAL

Différence de température entre l'extérieur et l'intérieur du «pondscape», en PET (température équivalent physiologique), durant de chauds jours d'été, principalement liée à la présence d'arbres.

-6°

LES CONTRIBUTIONS DE LA NATURE AUX HUMAINS ET LES INDICATEURS MESURÉS

EXPÉRIENCES PHYSIQUE ET PSYCHOLOGIQUE

Nombre de personnes visitant le pondscape (loisir, tourisme, observation de la nature etc.) (nombre/an) **60'000**

85% Zones accessibles au sein des pondscapes pour le public

Activités les plus populaires :
Observation de la faune (69%), randonnée (67%) et détente (35%)

INSPIRATION ET APPRENTISSAGE

8 Nombre de groupes d'élèves scolaires/universitaires visitant le pondscape chaque année.

Nombre d'études pour l'acquisition de connaissances (nb/an). Estimation large. Etudes réalisées par des ONGs, des étudiant-e-s d'HES-SO & Uni Genève et des bureaux d'études. **5**

QUANTITÉ D'EAU

9'300m³ Volume d'eau potentiellement stocké lors de fortes précipitations (m^3)

Volume d'eau total (m^3) **18'600m³**

QUALITÉ DE L'EAU

Nutriments : **BONNE**

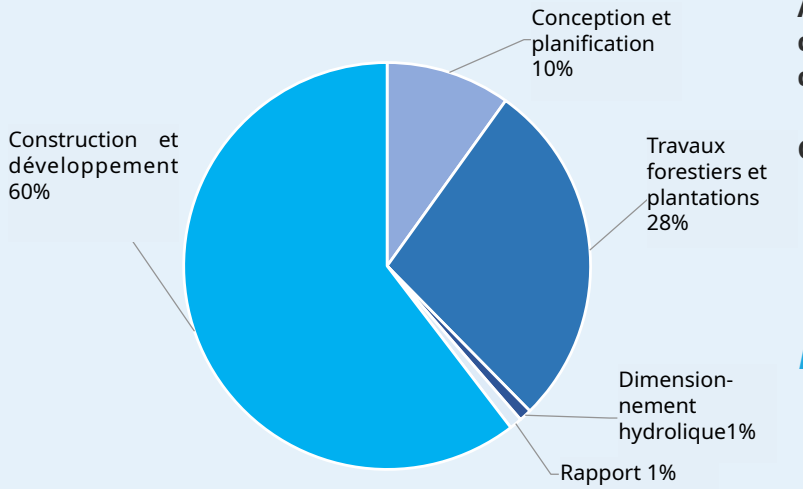
Pesticides : Risque élevé — Risque faible

Les niveaux de pollution varient considérablement d'un étang à l'autre, certains étant pollués par les pesticides issus des zones agricoles drainées et d'autres en étant exempts.

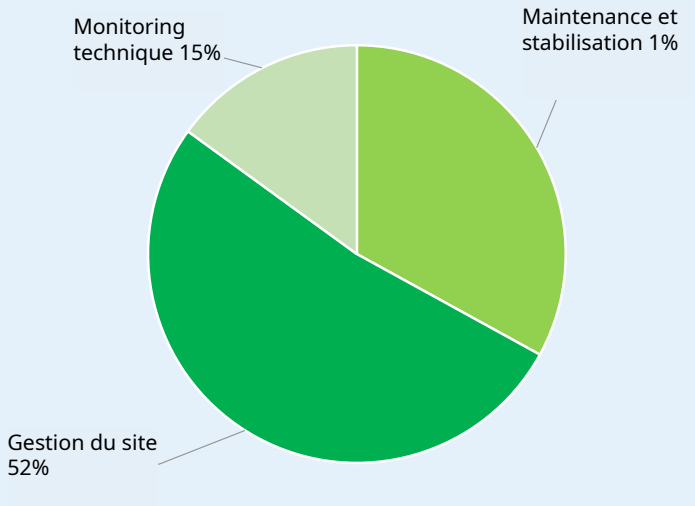
ANALYSES DES COÛTS ET DES BÉNÉFICES

ÉVALUATION DES COÛTS GLOBAUX

COÛTS DE MISE EN OEUVRE DES SFN

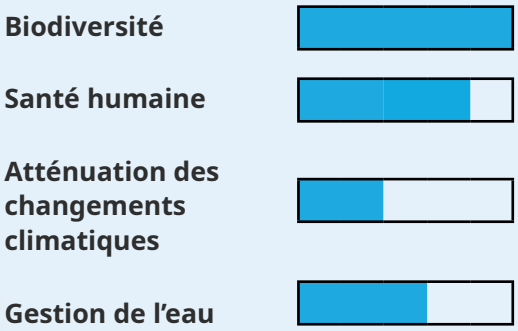


Coûts relatifs aux mesures de création des SfN



Coûts relatifs aux mesures de gestion actuelles des SfN

EVALUATION DES BÉNÉFICES



DES INSTRUMENTS FINANCIERS ADÉQUATS POUR RÉDUIRE LES ÉCARTS

1. Instruments de revenus

-Vente de matériaux : graviers extraits ou bois coupés lors de la création et entretien d'étangs

2. Contribution volontaire de dons

- Contributions philanthropiques

-Crowfunding

-Fond vitale environnement (Services Industriels Genevois)

3. Subventions

subventions délivrées par le gouvernement fédéral.

MENACES SUBSISTANTES

1. L'impact du public sur la biodiversité comprenent notamment le piétinement des berges des étangs et la perturbation de la faune. Il inclut aussi l'introduction d'espèces exotiques (poissons, tortues, amphibiens et plantes)
2. Modifications de l'hydrologie liées au changement climatique, y.c. la quantité et la temporalité des pluies. Les petits étangs sont susceptibles de disparaître. Ceci va impacter la biodiversité.

BONNES PRATIQUES ET TRANSFERABILITÉ

RENFORCEMENT DES STATUTS DE PROTECTION

La mise en place de plusieurs statuts de protection dans le pondscape (couvrant 60.5% de sa surface) et la canalisation du public (parking en périphérie, sentiers pédestres, observatoires) ont permis de maintenir une faible pression anthropique sur les milieux et de permettre un développement de la biodiversité sur tous les étangs. Par exemple, pour la majorité des étangs, l'accès est restreint, ce qui réduit le piétinement ainsi que les perturbations liées aux chiens. La population locale et les visiteurs ont reconnu la valeur ajoutée de ce « pondscape» pour leur bien-être, ainsi que sa qualité écologique.

Ce type d'SfN peut être facilement mis en oeuvre ailleurs et coûte relativement peu. Ces mesures constituent un premier pas, essentiel dans la conservation des étangs.

L'HÉTÉROGÉNÉITÉ FAIT LA FORCE

La création d'un ensemble hétérogène d'étangs dont la topographie, l'âge ou la physico-chimie de l'eau varient s'est avérée très bénéfique pour accroître la capacité d'accueil de la flore et de la faune dans le « pondscape ». La multiplication des types d'étangs améliore la survie des espèces en leur offrant des possibilités de dissémination et une plus grande résilience face aux changements et aux perturbations. Une telle approche nécessite une réflexion en amont sur la conception souhaitée des étangs à créer ou à restaurer pour maximiser l'hétérogénéité du « pondscape ».

GESTION ACTIVE DU PONDSCAPE

Conformément au plan de gestion, le pondscape est géré en continu depuis 20 ans, à l'aide de bureaux externes. Ce plan de gestion favorise la biodiversité. Pour faciliter le déplacement et la reproduction des amphibiens au sein du Bois de Jussy, un réseau dense d'étangs et de petites mares a été créé à l'intérieur du bois. Les obstacles à la dispersion ont été identifiés et supprimés ou résolus (création de passages sous la route, installation de barrière temporaires pour le déplacement quotidien des individus en période de migration). La combinaison de la forêt et des mares est très favorable à la biodiversité aquatique et terrestre qui s'est particulièrement bien développée : amphibiens, libellules, plantes aquatiques, chauves-souris, autres grands et petits mammifères, oiseaux. La présence d'espèces invasives est surveillée et des mesures sont prises pour les éliminer lorsqu'elles représentent une menace (capture de poissons ou de tortues exotiques, arrachage ou fauchage de néophytes).

Une telle gestion d'un pondscape, accompagnée de mesures de gestion concrètes, est une SfN qui recquiert un financement continus. Toutefois, dans ce cas, cet effort est la clé du succès pour la protection et l'amélioration de la valeur naturelle du site.

RÉINTRODUCTION D'ESPÈCES MENACÉES

La réintroduction d'une espèce menacée, la cistude d'Europe (*Emys orbicularis*), a été un succès et la population se reproduit dans le pondscape. Cette espèce emblématique ajoute une plus-value sociale et augmente l'attractivité du pondscape pour l'observation de la faune. Des programmes de réintroduction existent aussi pour d'autres espèces, tel que le rat des moissons (*Mycromys minutus*).

HANDBOOK :

APPENDICE :

CRÉDITS PHOTOS

Bombina variegata, p.5. © E. Sansault
Leucorrhinia pectoralis, p.5. © OPIE
Triturus cristatus, p.5. © E. Sansault
Emys orbicularis p.5 © Sylvain Ursenbacher
Emys orbicularis p.8 © Charlotte Ducotterd

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AUTRICES ET AUTEURS

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2024

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PONDS FOR CLIMATE

SWITZERLAND

PONDSCAPE : RHÔNE GENEVOIS

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 pond losses in European countries over the past 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.

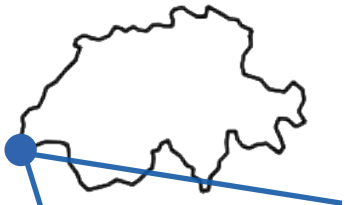
CONTEXT

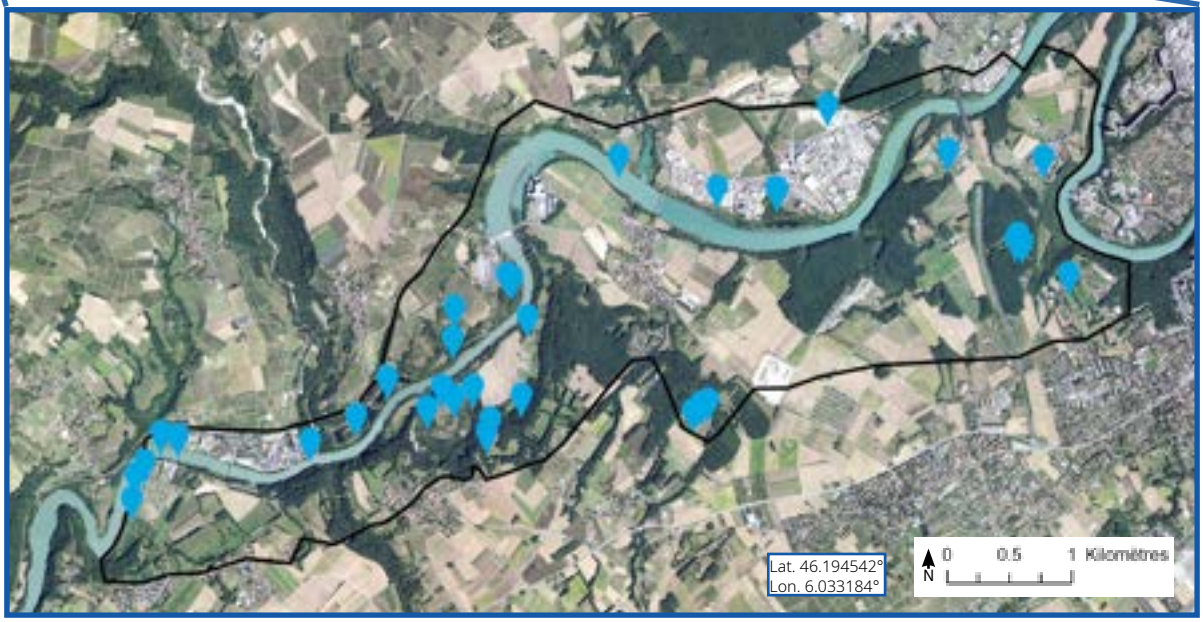
Name of the pondscape : Rhône Genevois
Name of neighboring large town (in a 30 km radius):
Geneva (600'000 habitants)
Bioclimatic zone : Continental

Dominant land use :
pondscape - woodland and agriculture
surrounding environment - intensive agriculture and urbanization

Pondscape area : 15 km^2
Pond : number: 46
density: 3.1/km^2
surface areas : 15 to 36'000 m^2
depths : 0.4 to 4 m
ages : 5 to 50 years

Land owner : Canton of Geneva
Land manager : Canton of Geneva
Public access : 91 % of the area is accessible (outside natural reserves)
Public amenities : footpaths, bird hides, picnic areas,
swimming beach, fish ponds.

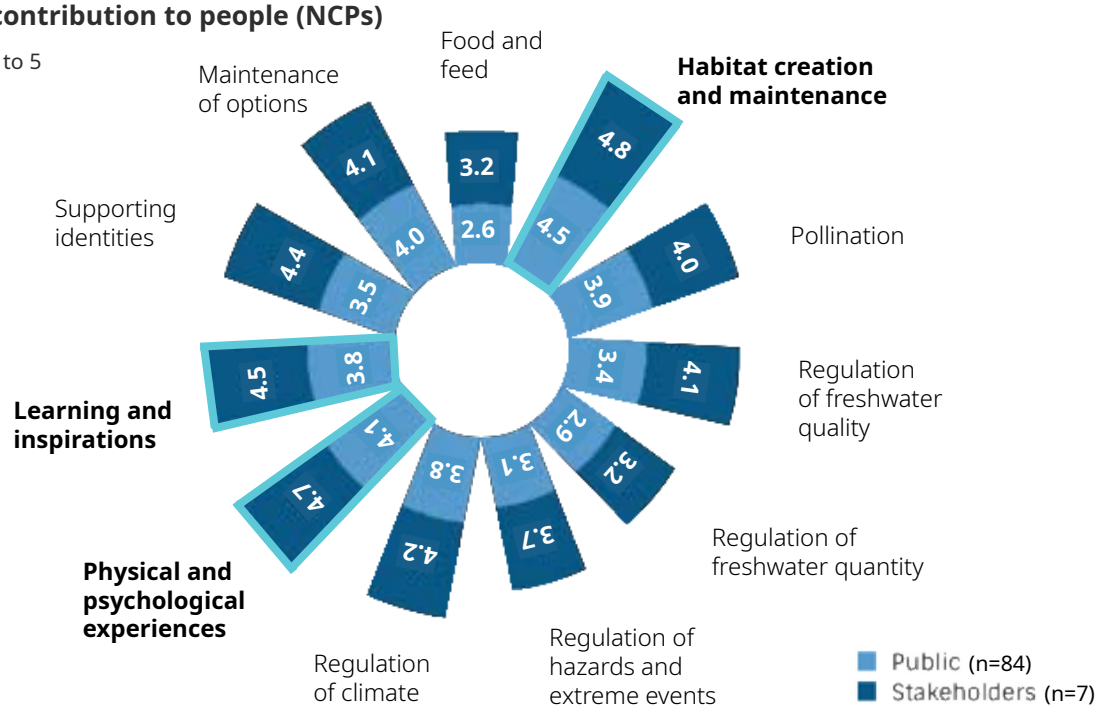




LOCAL COMMUNITY EXPECTATIONS

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 direct use of these natural areas by people (physical and psychological experiences, supporting identities, learning).

LOCAL POLICIES

This pondscape is of international importance for waterfowl (part of Ramsar site Nr 506) and most ponds are also considered of national importance for amphibians. The ponds benefit from strong statutory protection.

67% of the 1500 hectares (ha) of the pondscape is protected (9% with restricted access in natural reserves). (Federal Act on the Protection of Nature, law for the protection of the Rhone and its shores). This represents 1000 ha.

67%

One waterfowl and migratory bird reserve of international importance :
672 ha of the pondscape included in the Ramsar site Nr 506.

672ha

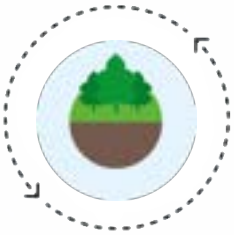
4 amphibian spawning sites of national importance :
595 ha, included partly in the Ramsar site Nr 506.

595ha

Their management is financially supported by subsidies from the government (65%), and it is conducted by the regional authorities (Canton) and implemented by private consultancies. This management includes protection, conservation and regeneration of existing ponds, as well as the creation of new ponds and the maintenance of their good quality through management actions.

Moreover, funding from the hydropower company of Geneva (“SIG”) supports the creation of new ponds. This policy framework allows on one side effective and successful protection and promotion of pond biodiversity, and on another side the enjoyment by the population of the nature, fauna and flora. The good collaboration and synergy between the Canton, the NGOs and private consultancies is also a key factor in the fruitful and effective implementation of the NBS.

MAIN CHALLENGES AND OBJECTIVES

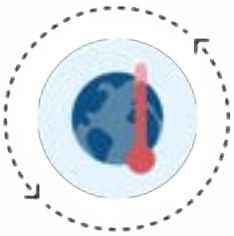


BIODIVERSITY ENHANCEMENT

Especially waterfowls, amphibians, dragonflies and aquatic plants.

HUMAN HEALTH

A place to hike and relax, to educate people about nature and also to fish. A region with a strong and attractive historical, geographic and natural identity (Rhone River and alluvial waterbodies, vineyards, historical villages, natural reserves).



CLIMATE CHANGE ADAPTATION

Refreshing area to walk, relax or swim during hot days and heat waves.

NATURE BASED SOLUTIONS (NBS)

New pond creation and their management are here the Nature-based Solutions (NbS) put in practice to address the three identified societal challenges

NEW POND CREATION

1972-1984

Creation of 3 large ponds (>30'000 m^2)

1990-2005

Creation of 5 large ponds (>5000 m^2) and several small ponds

2007-2018

Creation of 6 large ponds and 4 medium sized and several temporary ones.

PONDS AND PONDSCAPE MANAGEMENT

- Protection status
- Pond creation
- Restauration of landed ponds
- Planting aquatic emergent vegetation in newly created or restored ponds
- Planting shrubs and sowing grasslands seeds in the vicinity of ponds
- Creation of forest and shrubs clearings
- Threatened species reintroduction
- Monitoring of selected threathened species
- Measures to enhance connectivity for amphibian populations
- Water level management
- Removal of introduced non-native fish
- Removal of alien plant species

- Creation and maintenance of trails, nature observation points and information boards.
- Creation of 2 fishponds and of a swimming pond.
- Creation of recreation areas with tables and grill.

NATURE CONTRIBUTIONS TO PEOPLE AND MEASURED INDICATORS

AQUATIC BIODIVERSITY

SPECIES RICHNESS
Aquatic plants : **94**
Water birds : **25**
Dragonflies : **47**
Families of invertebrates : **17**

AMOUNT OF
Conservation priority species : **42**
Species on Habitat Directive Annexes : **8***
Introduced threatened species : **1**
Invasive alien species : **1**

CONTRIBUTION TO REGIONAL RICHNESS

FLAGSHIP SPECIES :


*Leucorrhinia albifrons**


*Epidalea calamita**


*Castor fiber**


*Emys orbicularis**

CARBON BALANCE

18t

The Carbon budget (emissions-sequestration balance) is directed towards emissions (18 tonnes of CO_2e/ pondscape/year). Future management focused on Carbon could potentially reduce these emissions (see the PONDERFUL Handbook).

REGIONAL MICROCLIMATE

Difference between outside and inside the pondscape. in PET (physiological equivalent temperature), during hot summer days, linked mainly to the presence of trees.

-6°

NATURE CONTRIBUTIONS TO PEOPLE AND MEASURED INDICATORS

PHYSICAL AND PSYCHOLOGICAL EXPERIENCE

Number of people visiting the pondscape (leisure, tourism, fishing, nature watching etc.) (number/year) **100'000**

91% Area inside the pondscape accessible to the public

Most popular activities :
hiking (29%), wildlife observation (27%), relaxing (14%) and picknicking (9%)

LEARNING AND INSPIRATION

8 Number of groups of students school/universitiy visiting the pondscape.

Number of studies for acquisition of knowledge (nb/year). Broad estimation. Studies from NGOs, HEPIA_UniGe students and nature consultancies. **6**

WATER QUANTITY

66'250m³ Volume of water stored during a severe flood event (m³)

Total water volume (m³) **132'500m³**

WATER QUALITY

Nutrients : **GOOD**

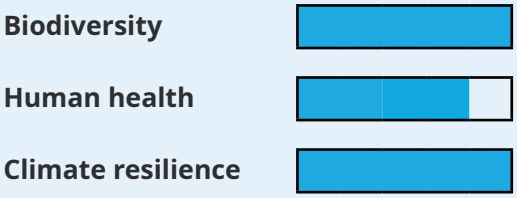
Pesticides :

Wide range of pollution levels between ponds, some are pristine and others are polluted by pesticides (from agricultural drainage areas).

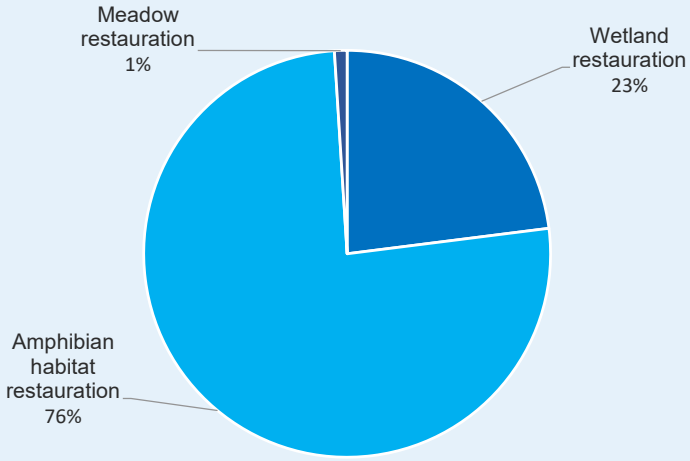
COSTS AND BENEFITS ANALYSIS

OVERALL COSTS ASSESSMENT

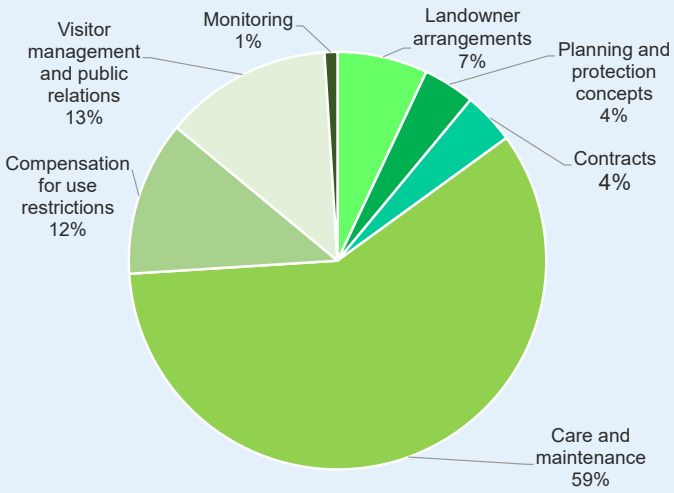
BENEFITS ASSESSMENT



SHARE OF COSTS FOR NBS ACTION



Relative cost of NbS creation measures



Relative cost of ongoing NbS management measures

SUITABLE FINANCE INSTRUMENTS TO REDUCE THE GAP

1. Income instruments

-Sale of materials: gravel extracted or wood cut when creating and maintaining ponds

2. Voluntary contributions /donations

-Philanthropic contributions

-Crowfunding

-Fond vitale environnement (Services Industriels Genevois)

3. Subsidies

-Federal subsidies for the management of objects of national importance.

REMAINING THREATS

1. Increasing pressure from tourism (disturbance, trampling, noise, rubbish, damage to infrastructure).

2. Changes in hydrology and water temperature linked to climate change, including the timing and quantity of rainfall. Some permanent ponds will turn into temporary ponds. Smaller ponds are likely to disappear. This will impact biodiversity.

3. Pollution from agriculture and industrial activities.

SUCCESS STORY AND TRANSFERABILITY

CREATION OF MULTIFUNCTIONALITY ... AT THE PONDSCAPE SCALE !

The spatial delimitation of different types of pond uses promotes simultaneously the protection of pond biodiversity and the delivering of numerous NCPs. For example, several ponds are strictly protected (no access) and the flow of visitors is regulated and limited to pathways and bird hides. Two fishponds and one swimming pond together with recreation areas (with tables, grill and car park) were created outside the natural reserves to meet the public's needs. Thus, on pond also intends to purify the water of a campsite nearby. Arranging an heterogenous set of multiple ponds instead on focusing on creating individual multifunctional ponds can be a successful way to deal with the interactions between different society demands and the protection of ponds biodiversity.

A SPECTACULAR DEVELOPMENT OF THE BIODIVERSITY

This pondscape is hosting an exceptional biodiversity, characterized by a very large number of species (invertebrates, amphibians, reptiles, birds, mammals) including numerous threatened species, making it one of the richest natural site in Switzerland.

This former alluvial area has benefited from effective management over the last twenty years, with creation and restoration of numerous ponds which are currently being monitored. The pond density is presently high (with also a high biological connectivity), and they are particularly diversified, with a large range of sizes (from 10 m2 to 3 ha) and depths (20 cm to 5 m), most with highly vegetated shorelines and buffer areas. Their design is optimized for biodiversity and has benefited from the expertise of local NGOs and private consultancies. This strategy of creating diversified ponds with a good water quality enabled the return of many species that had disappeared while others increased markedly their densities. Emblematic species (e.g. beaver, herons, pond turtle, natterjack toad, white-faced darter) help to raise public awareness, and the public also benefits from facilities specifically dedicated to nature education.

SELLING EXTRACTED GRAVEL TO REDUCE CREATION COSTS

The digging of permanent ponds with a large surface area can be a relatively expensive NBS initially. But approximately 80% of the cost of creating 4 large ponds on the banks of the Rhône was covered by the sale of the gravel extracted.

Gravel is the main building material all around the world. Selling the gravel extracted when building new ponds is a solution to cover a large part of the costs and can be replicated everywhere.

HANDBOOK :

APPENDIX :

PHOTOS CREDITS

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Castor fiber p.5 © C. Angst
Emys orbicularis p. 5 © S. Ursenbacher
Teppes de Verbois p. 8 © J.-C. Brutsch

[1]Coûts calculés d'après d'après Martin, M., Jöhl, R. et al. (2017) Biotopes d'importance nationale – Coûts des inventaires de biotopes. Rapport d'experts à l'attention de la Confédération, établi sur mandat de l'Office fédéral de l'environnement (OFEV). 2ème édition, 2017.

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PONDS FOR CLIMATE

SUISSE

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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

QU'EST-CE QU'UN «PONDSCAPE» ?

DÉFINITION

Un «pondscape» est un réseau d'étangs qui possèdent une proximité spatiale («connectivité») au sein de la matrice paysagère environnante.

Les délimitations d'un pondscape sont déterminées par des facteurs physiques ou écologiques (une vallée, un bassin versant, un ensemble d'étang dans une réserve naturelle). Elles peuvent aussi être déterminées par des critères sociétaux ou politiques (étangs urbains, frontières régionales ou nationales).

PRESSION/MENACE SUR LES ÉTANGS ET LES PONDSCAPES

Entre 50-90% de plans d'eau ont disparu dans les pays d'Europe ces cents dernières années. Au niveau national et européen, les étangs sont aussi largement négligés dans les politiques et stratégies de conservation liées à l'eau et à la biodiversité. C'est aussi le cas dans la directive-cadre sur l'eau de l'UE.

POURQUOI EST-IL IMPORTANT DE LES PROMOUVOIR ?

PROMOTION DE LA BIODIVERSITÉ

Largement négligés et généralement sous-évalués, les étangs sont d'une importance remarquable pour la promotion et la conservation de la biodiversité. Les pondscapes sont des hotspots de biodiversité.

RÉDUCTION DES RISQUES DE CATASTROPHE

Les étangs et les pondscapes jouent un rôle fondamental dans l'atténuation des inondations et constituent aussi une réserve d'eau dans la lutte contre les incendies.

SANTÉ HUMAINE

Les étangs et les pondscapes offrent un large éventail de bénéfices pour la société humaine, tels que l'amélioration de la santé et de la qualité de vie puisqu'ils sont des lieux d'activité physique, d'interactions sociales, d'expérience esthétique ou encore d'apprentissage et de loisir.

ATTÉNUATION DU CHANGEMENT CLIMATIQUE ET ADAPTATION

Etant abondants et très productifs, les étangs influencent fortement le cycle du carbone, à la fois comme puits et comme sources.

GESTION DE L'EAU

Les pondscapes offrent une réserve en eau qui est particulièrement importante dans le contexte de pénurie d'eau. Ils sont surtout utiles pour l'irrigation et pour abreuver le bétail.

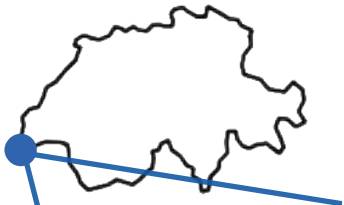
CONTEXTE

Nom du pondscape : Rhône Genevois
Nom de la ville avoisinante (dans un rayon de 30 km):
Genève (600'000 habitants)
Zone bioclimatique : Continentale

Utilisation principale du sol:
pondscape - forêt et agriculture
environnement avoisinant- agriculture intensive et urbanisation

Surface du pondscape: 7 km^2
Etangs : nombre : 46
densité: 3.1/km^2
surface : 15 à 36'000 m^2
profondeur : 0.4 à 4 m
ages : 5 à 50 ans

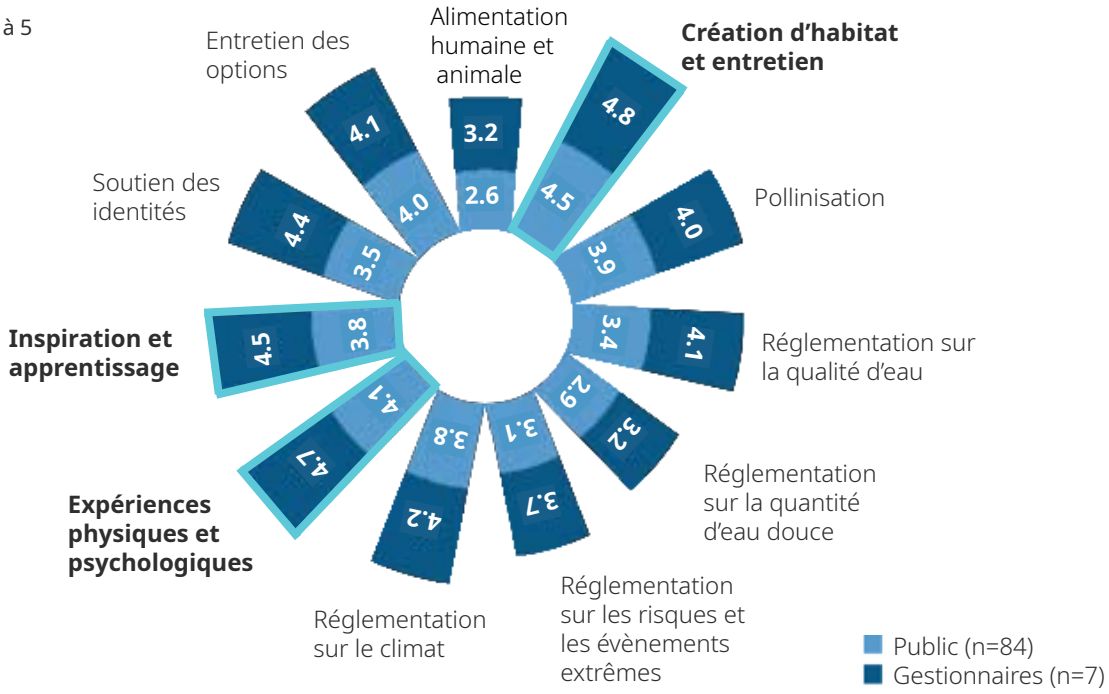
Propriétaire : Canton de Genève
Gestionnaire : Canton de Genève
Accessibilité au public : 91 % de l'aire est accessible (hors réserve naturelle)
Aménagement pour le public : sentiers, observatoires ainsi que des zones de pique-nique, de baignade et de pêche.



ATTENTES DE LA COMMUNAUTÉ LOCALE

Les 11 contributions de la nature aux humains (NCPs)

Echelle : scores de 1 à 5



Les attentes reposent principalement sur (i) la mise à disposition d'habitats pour la biodiversité et (ii) sur l'usage direct des ces espaces naturels par les personnes (expériences physiques et psychologiques).

POLITIQUES LOCALES

Ce pondscape est d'importance nationale pour les oiseaux d'eau et migrateurs (fait partie du site Ramsar N°506) et la plupart des plans d'eau sont aussi d'importance nationale pour les batraciens. Ainsi, ils bénéficient d'un fort statut de protection.

67% des 1500 hectares (ha) du pondscape sont protégés (9% avec un accès restreint dans les réserves naturelles) : 1000 ha sont inscrits sous la Loi Fédérale sur la Protection de la Nature et la loi sur la protection du Rhône et de ses berges.

67%

Une réserve d'importance nationale pour la protection des oiseaux d'eau et migrateurs : 672 ha du pondscape sont inclus dans le site Ramsar n°506.

672ha

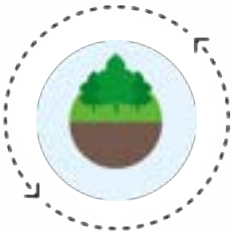
Quatre site de reproduction de batraciens d'importance nationale. Cela représente 595 ha, dont une partie est inclue dans le site Ramsar n°506.

595ha

La gestion de ces sites est soutenue financièrement à l'aide de subventions du gouvernement (65%) et est menée par les autorités régionales (canton) et appliquée par des entreprises privées. Cette gestion comprend la protection, la conservation et la régénération des milieux aquatiques existants, ainsi que la création de nouveaux plan d'eau et le maintien de leur bonne qualité à travers la mise en place de mesures d'entretien.

De plus, il existe un fond géré par les Services Industriels de Genève (SIG) pour la création de nouveaux étangs. Ce cadre politique permet, d'un côté, une protection efficiente et une promotion de la biodiversité des étangs et, d'un autre côté, il permet d'offrir un cadre récréationnel naturel pour la population. La bonne collaboration et synergie entre les autorités, les services industriels, les ONGs et les entreprises privées est un élément clé à la bonne réussite d'une mise en œuvre efficiente de solutions fondées sur la Nature.

PRINCIPAUX ENJEUX ET OBJECTIFS



PROMOTION DE LA BIODIVERSITÉ

En particulier les oiseaux d'eau, les amphibiens, les odonates et les plantes aquatiques.

SANTÉ HUMAINE

Un espace permettant de randonner, de se détendre, de pêcher et de sensibiliser les personnes à la nature. C'est une région avec une identité historique, géographique et naturelle forte (Zone alluviale du Rhône, étangs, vignes, villages patrimoniaux, réserves naturelles).

ATTÉNUATION DU CHANGEMENT CLIMATIQUE ET ADAPTATION

Un lieu rafraîchissant pour se promener, se détendre ou nager durant les fortes vagues de chaleur.

SOLUTIONS FONDÉES SUR LA NATURE (SFN)

La création et la gestion de nouveaux étangs correspondent aux solutions basées sur la nature (SfN) mises en oeuvre pour répondre aux quatres enjeux sociétaux identifiés précédemment.

CRÉATION DE NOUVEAUX ÉTANGS

1972-1984

Création de 3 grands étangs (>30'000 m^2)

1990-2005

Création de 5 larges étangs (>5000 m^2) et de plusieurs petits plans d'eau

2007-2018

Création de 6 larges étangs, de 4 étangs de taille moyenne et de plusieurs étangs temporaires.

GESTION D'ÉTANGS ET DE PONDSCAPE

- Status de protection
- Création d'étangs
- Restauration d'étangs
- Plantation de plantes aquatiques hélophytes dans des étangs récemment créés ou restaurés
- Plantation d'arbustes et ensemencement de prairie à proximité des étangs
- Débroussaillement et création de clairières forestières
- Réintroduction d'espèces menacées
- Mesures pour assurer la connectivité des milieux pour les batraciens.
- Suivi d'espèces caractéristiques
- Elimination de poissons introduits non-indigènes
- Elimination de plantes non-indigènes
- Gestion des niveaux d'eau

- Création et entretien des sentiers, des observatoires et des panneaux d'informations.
- Création de deux étangs de pêche et d'un étang de baignade.
- Création d'aires de pique-nique et de grillades.

LES CONTRIBUTIONS DE LA NATURE AUX HUMAINS ET LES INDICATEURS MESURÉS

BIODIVERSITÉ AQUATIQUE

DIVERSITÉ SPÉCIFIQUE
Plantes aquatiques : **94**
Oiseaux d'eau : **25**
Libellules: **47**
Familles d'invertébrés : **17**

QUANTITÉ
Espèces prioritaires : **42**
Espèces inscrite sur l'Annexe de la Directive Habitat : **8***
Espèces menacées introduites : **1**
Espèces invasives : **1**

CONTRIBUTION À LA RICHESSE RÉGIONALE

ESPÈCES EMBLÉMATIQUES :


*Leucorrhinia albifrons**


*Epidalea calamita**


*Castor fiber**


*Emys orbicularis**

BILAN CARBONE

18t

Le budget Carbone (bilan émissions-séquestrations) est dirigé vers les émissions (18 tonnes de CO_2e/pondscape/an). Une future gestion ciblée sur le Carbone pourrait potentiellement diminuer ces émissions (voir le Handbook PONDERFUL).

MICROCLIMAT RÉGIONAL

Différence de température entre l'extérieur et l'intérieur du «pondscape», en PET (température équivalent physiologique), durant de chauds jours d'été, principalement liée à la présence d'arbres.

-6°

LES CONTRIBUTIONS DE LA NATURE AUX HUMAINS ET LES INDICATEURS MESURÉS

EXPÉRIENCE PHYSIQUE ET PSYCHOLOGIQUE

Nombre de personnes visitant le pondscape (loisir, tourisme, pêche, observation de la nature etc.) (nombre/an) **100'000**

91% Zones accessibles au sein des pondscapes pour le public

Activités les plus populaires :
randonnée (29%), observation de la faune (27%), détente (14%) et pique-nique (9%)

INSPIRATION ET APPRENTISSAGE

8 Nombre de groupes d'élèves scolaires/universitaires visitant le pondscape (nb/an).

Nombre d'études pour l'acquisition de connaissances (nb/an). Estimation large. Etudes réalisées par des ONGs, des étudiant-e-s d'HEPIA_UniGE et des bureaux d'études. **6**

QUANTITÉ D'EAU

66'250m³ Volume d'eau stocké pendant des inondations

Volume d'eau total (m³) **132'500m³**

QUALITÉ D'EAU

Nutriments : **BIEN**

Pesticides : Risque élevé — Risque faible

Les niveaux de pollution varient considérablement d'un étang à l'autre, certains étant pollués par les pesticides issus des zones agricoles drainées et d'autres en étant exempts.

ANALYSES DES COÛTS ET DES BÉNÉFICES

ÉVALUATION DES COÛTS GLOBAUX

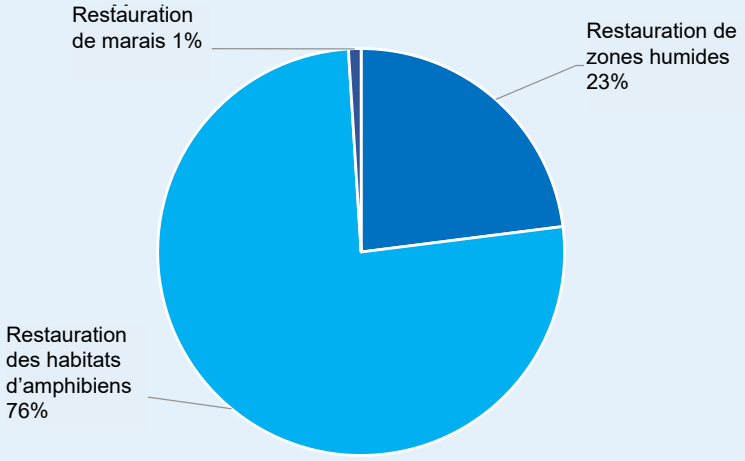
ÉVALUATION DES BÉNÉFICES

Biodiversité

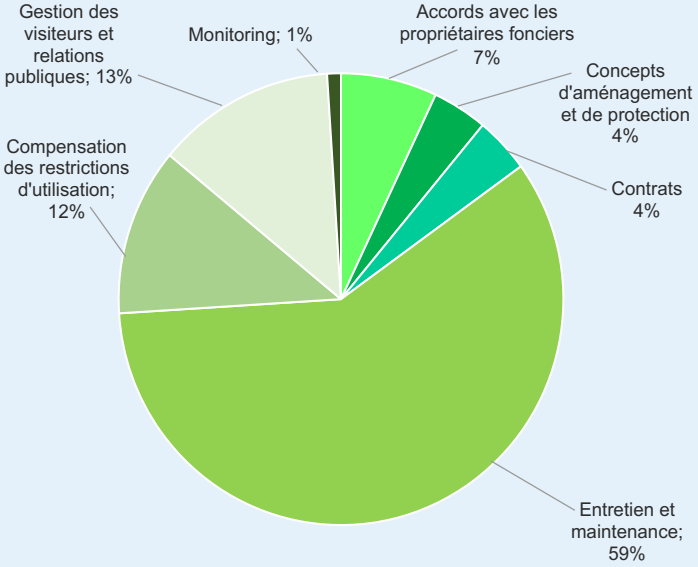
Santé humaine

Atténuation des changements climatiques

PART DES COÛTS D'ACTION DES SFN[1]



Coûts relatifs aux mesures de création des SfN



Coûts relatifs aux mesures de gestion actuelles des SfN

DES INSTRUMENTS FINANCIERS ADÉQUATS POUR RÉDUIRE LES ÉCARTS

1. instruments de revenus

- Vente de matériaux : graviers extraits ou bois coupés lors de la création et entretien d'étangs

2. Contributions volontaires de dons

- Contributions philanthropiques
- Crowfunding
- Fond vitale environnement (Services Industriels Genevois)

3. Subventions

- Subventions de la confédération pour la gestion des objets d'importance nationale.

MENACES RESTANTES

1. Augmentation de la pression lié au tourisme (dérangement, piétinement, bruits, déchets, dégradations des infrastructures).

2. Modifications de l'hydrologie, de l'hygrométrie et des températures de l'eau dues au changement climatique. Certains étangs permanents vont se transformer en étangs temporaires. Les étangs de petite taille sont voués à disparaître. Cela aura un impact sur la biodiversité.

SUCCESS STORY ET TRANSFERABILITÉ

CRÉER DE LA MULTIFONCTIONNALITÉ… À L'ÉCHELLE D'UN PONDSCAPE!

Délimiter différents plans d'eau en fonction de leur usage permet à la fois de protéger la biodiversité et d'offrir différentes contributions de la nature aux humains. Par exemple, certains étangs sont entièrement protégés (accès restreint) et la présence du public est limitée aux sentiers et à des observatoires. Pour pouvoir tout de même répondre aux besoins des visiteurs, deux étangs de pêche et un étang de baignade, ainsi que des zones de pique-nique, de grillades et un parking ont été créées. De plus, un étang est destiné à épurer les eaux d'un camping avoisinnant. L'aménagement d'un ensemble d'étangs à usages hétérogènes au lieu de créer un seul étang multifonctionnel peut être un moyen efficace de répondre aux besoins de la société tout en apportant une protection efficace de la biodiversité.

UN DÉVELOPPEMENT SPECTACULAIRE DE LA BIODIVERSITÉ!

Ce « pondscape » abrite une biodiversité exceptionnelle, caractérisée par un très grand nombre d'espèces (invertébrés, amphibiens, reptiles, oiseaux, mammifères) dont de nombreuses espèces menacées. Ceci en fait l'un des sites naturels les plus riches de Suisse.

Cette ancienne zone alluviale a bénéficié d'une gestion efficace ces vingt dernières années, avec la création et la restauration de nombreux étangs, qui font actuellement l'objet de suivi. La densité des étangs est à ce jour élevée (avec également une connectivité biologique élevée). Ces derniers sont de taille et de profondeur diverse (respectivement de 10 cm^3 à 3 ha et de 20 cm à 5 m), la plupart possédant des rives très végétalisées et des zones tampons. Leur conception est optimisée pour la biodiversité et a bénéficié de l'expertise d'ONG locales et de bureaux d'étude privés.

Cette stratégie de création d'étangs diversifiés avec une bonne qualité d'eau a permis le retour de nombreuses espèces qui avaient disparu. Des espèces emblématiques (castor, hérons, cistude d'Europe, crapaud calamite, leucorrhine à front blanc) contribuent à la sensibilisation du public, tout comme les installations spécifiquement dédiées à l'éducation à la nature.

VENDRE LE GRAVIER EXTRAIT POUR COUVRIR LES FRAIS DU PROJET

Creuser des étangs permanents de grande surface peut être une SfN relativement coûteuse. Dans le cas présent, 80% des coûts pour créer 4 grands étangs permanents ont été couverts grâce à la vente du gravier extrait.

Le gravier étant le principal matériau utilisé dans le domaine de la construction, sa vente est une solution reproductible permettant de couvrir les frais de l'aménagement d'étang.

HANDBOOK :

APPENDICE :

CRÉDITS PHOTOS

Leucorrhinia albifrons, p.5 © G. Bailleux
Epidalea calamita, p.5 © A. Meyers
Castor fiber p.5 © C. Angst
Emys orbicularis p.5 © S. Ursenbacher
Teppes de Verbois p. 8 © J.-C. Brutsch

[1]Coûts calculés d'après d'après Martin, M., Jöhl, R. et al. (2017) Biotopes d'importance nationale – Coûts des inventaires de biotopes. Rapport d'experts à l'attention de la Confédération, établi sur mandat de l'Office fédéral de l'environnement (OFEV). 2ème édition, 2017.

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2024

http://www.ponderful.eu

Ponderful
PONDS FOR CLIMATE

DENMARK

PONDSCAPE : FYN

Pond Ecosystems for Resilient Future Landscapes in a Changing Climate

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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 pond have been lost from European countries over the past 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

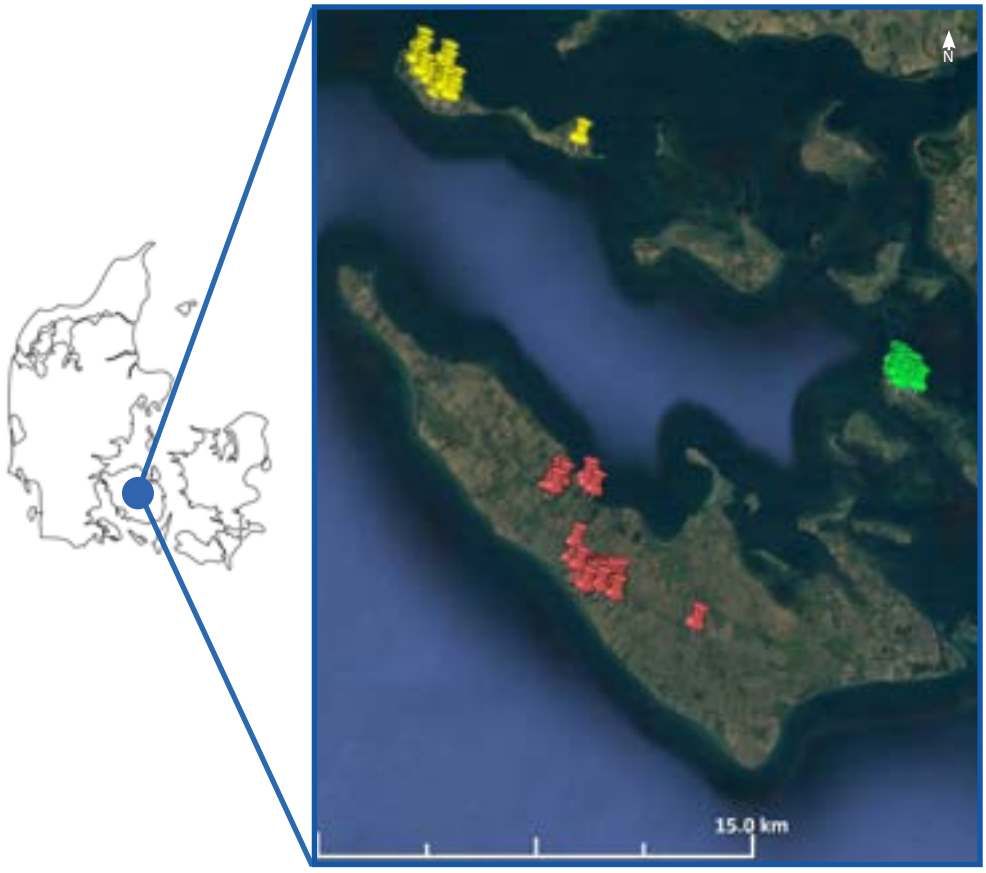
The Fyn Islands pondscape covers Ærø, Avernakø and Birkholm, 3 out of about 55 islands of the South Fyn Archipelago. Ærø is the biggest island of 88 km2 with over 6'000 inhabitants. Avernakø, populated by about 120 people, consists of two islands connected by an artificial dike with a total area of ca. 6 km2. Birkholm is the smallest with a total area of nearly 1 km² and less than 10 people permanently living on it. A hilly moraine landscape covers both Avernakø and Ærø and clay dominates the subsoil. Although Birkholm has the same origin, is very flat, reaching only 2 m over the sea level. Most of the land on islands is agriculturally used.

Name of the pondscape : Fyn Island
Name of neighboring large town (in a 30 km radius):
Faaborg/Marstal (6898/2119 habitants)
Bioclimatic zone : Continental

Dominant land use :
Pondscape - pasture
Surrounding environment - pasture and arable land

Pondscape area : 15 km²
Pond : number : 64 included in the Ponderful project
(Ærø:40, Avernakø:10, Birkholm: 14)
density : 10-15/km²
surface areas : 100 to 1'300 m²
depths : 0.4 to 2 m
ages : 10 to >100 years

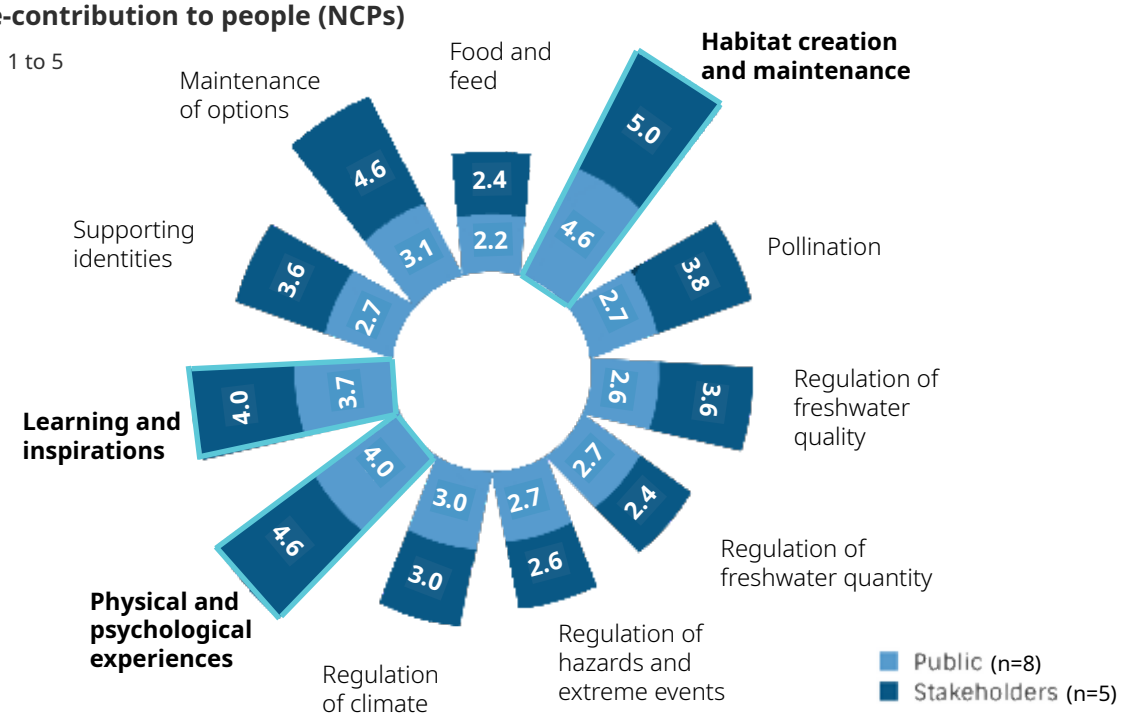
Land owner : Private owners, Danish Nature Agency, Municipalities
Land manager : Private owners, Danish Nature Agency
Public access : Majority of the area is not accessible since ponds are usually located on private pastures.
Public amenities : Several hiking and cycling trails as well as camping areas.



LOCAL COMMUNITY EXPECTATIONS

The 11 Nature-contribution to people (NCPs)

Scale : scores from 1 to 5



The expectations rely mainly on (i) the creation and maintenance of habitats for biodiversity and (ii) the direct use of these natural areas by people (physical and psychological experiences) as well as (iii) learning and inspiration.

LOCAL POLICIES

The majority of land in the pondscape is owned and managed by farmers. The pondscape is partly protected by the Natura 2000 network and RAMSAR Convention on Wetlands. All ponds bigger than 100m^2 are protected by Danish law and change in their condition requires permission.

Since ponds are habitats for amphibian species protected by the Habitats Directive, Danish Law of Environmental Targets (Miljømålsloven) does not allow damage or destruction of their breeding and resting places, intentional disturbance of animals during breeding, migration or hibernating, as well as intentional capture or killing.
Many ponds in the pondscape were created or restored with funds of EU LIFE Programme, supporting conservation of species of EU interest.

The collaboration between landowners, government and private consultancy companies helps to maintain and increase the quality of the ponds, and promote pond biodiversity.

75% of the pondscape is protected
under Natura 2000 network and Ramsar sites.

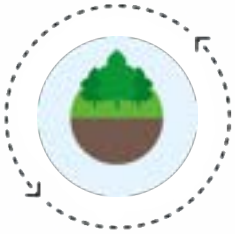
100% of ponds bigger than 100 m^2 are protected
and changes in their condition require permission.

It is a national 'hot spot' for one of the rare amphibians, the Fire-bellied Toad. Many ponds in the pondscape were created or restored specifically for this species, saving it from extinction.

The pondscape is part of the South Fyn Archipelago of 55 islands.

75%
100%
HOT SPOT
55 ISLANDS

MAIN CHALLENGES AND OBJECTIVES



BIODIVERSITY ENHANCEMENT

Especially amphibians, birds and aquatic plants.

PARTICIPATORY PLANNING & GOVERNANCE

A nice place to relax, and for social activities, like cycle, camp and hike.

WATER MANAGEMENT

Creating buffer zones around the ponds to reduce pollution from nutrient run offs.

ECONOMIC OPPORTUNITIES

Environmentally friendly farming and subsidies for landowners to improve hydrology.

NATURE BASED SOLUTIONS (NBS)

The Nature-based Solutions put in practice to address the four identified societal challenges.

NEW POND CREATION

1990-2020's

creation of over 50 ponds for amphibian protection within the pondscape area.

PONDS AND PONDSCAPE MANAGEMENT

- Protecting threatened amphibian species.
- Implementing buffer zones surrounding ponds.
- Introduction of cattle grazing
- Conversion of arable fields to permanent grasslands.
- Scrub and sediment removal from some heavily shaded ponds. At least 18 ponds were restored during 1990-2020.
- Re-introduction and supportive breeding of rare amphibian species
- Monitoring of amphibians and flora in protected ponds

- Creation and maintenance of trails and nature. observation points.
- Protection of ground water through the creation of pesticide spray-free zones.
- Conversion of farming from conventional to environmentally friendly practices.

- Dredging of ponds.
- Regular monitoring of physical, chemical or biological indicators.

NATURE CONTRIBUTIONS TO PEOPLE AND MEASURED INDICATORS

AQUATIC BIODIVERSITY

SPECIES RICHNESS
Aquatic plants : **55**
(Ærø: 55; Avernakø: 40, Birkholm: 38)
Water birds : **61**
(Ærø: 61, Avernakø: 32, Birkholm: 40)
Dragonflies : **7**
Families of invertebrates : **21**
Amphibians : **5**
(Ærø: 5, Avernakø/Birkholm: 4)

AMOUNT OF
Conservation priority species (N) : **22**
Species on Habitat Directive Annexes (N): **5***
Bombina bombina, Triturus cristatus, Rana dalmatina, Bufo viridis, Epidelea calamita (Amphibians)
Introduced threatened species (N) : **1**
Invasive alien species (N) : **1**

FLAGSHIP SPECIES :

Bombina bombina

REGULATION OF CLIMATE

6.7t

Capacity of annual carbon storage in the ponds investigated on Ærø and Birkholm (by primary production, by organic matter accumulation) (tons CO_2 eq/pondscape/year)

NATURE CONTRIBUTIONS TO PEOPLE AND MEASURED INDICATORS

PHYSICAL AND PSYCHOLOGICAL EXPERIENCE

Number of people visiting the islands of the pondscape per year (leisure, tourism, fishing, nature watching etc.) (number/year)

175'000

100KM of bike trails on Ærø. Some sections are going along pastures with ponds.

Self-reported satisfaction well-being (scale 1 to 5)

3.8

Most popular activities :
wildlife observation (21%), relaxing (16%) and biking (11%)

WATER QUANTITY

~ 49'680m³

Total water volume (m^3) stored in the ponds investigated by Ponderful project.

WATER QUALITY

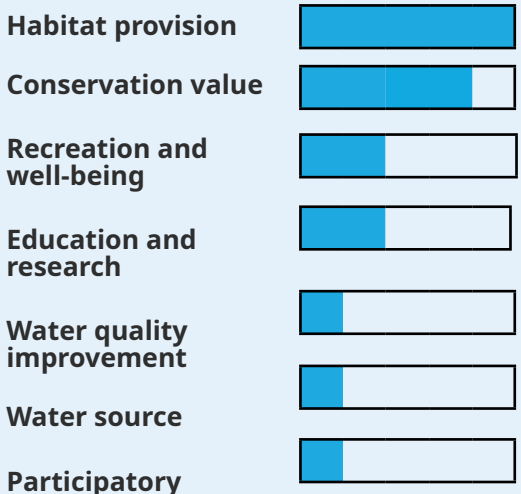
Nutrients : **MODERATE**

Pond quality range is "bad to good"; with mean concentrations of Total Phosphorus =0.35 & Total Nitrogen =2.4 mg/L, Chorophyll-a=23 ug/L.

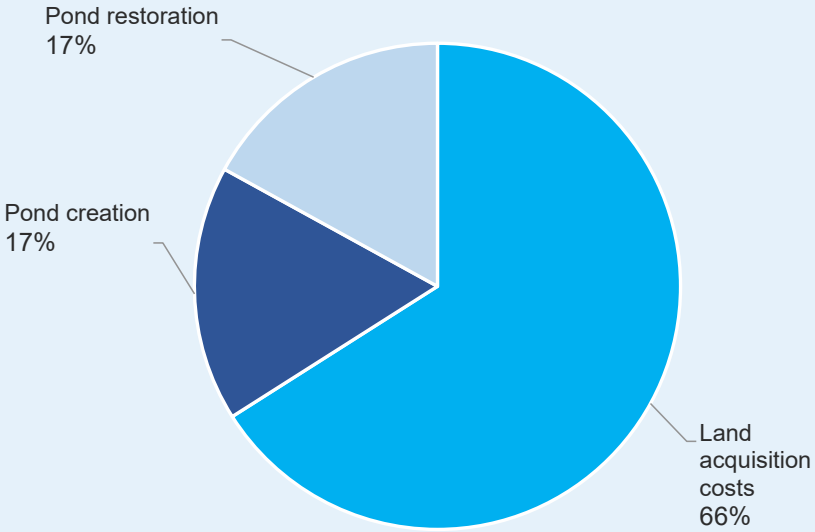
COSTS AND BENEFITS ANALYSIS

OVERALL COSTS ASSESSMENT

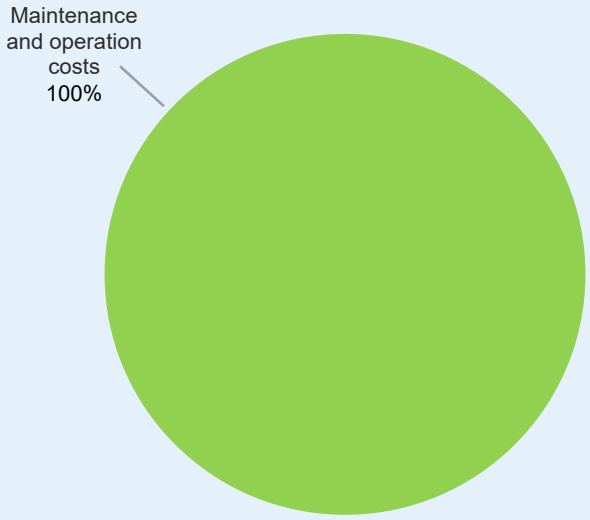
BENEFITS ASSESSMENT



SHARE OF COSTS FOR NBS ACTION



Relative cost of NbS creation measures



Relative cost of ongoing NbS management measures

SUITABLE FINANCE INSTRUMENTS TO REDUCE THE GAP

- ☑ **1. Income instruments**

  -sale of market goods and services
- ☑ **2. Voluntary contributions /donations**
- ☑ **3. Grants**

FUNDING GAP ASSESSMENT

REMAINING THREATS

1. Changes in hydrology linked to climate change, including the timing and quantity of rainfall. Smaller ponds are likely to disappear. This will impact biodiversity.

2. Increased frequency of storm events as well as sea level rise due to the impact of climate change. It causes frequent flooding of ponds with salt water severely impacting biodiversity.

SUCCESS STORY AND TRANSFERABILITY

ACTIVE MANAGEMENT OF DECLINING SPECIES IN DENMARK

The South Fyn Archipelago with its mild climate is a 'hot spot' for the Fire-bellied Toad (*Bombina bombina*), the rarest amphibian in Denmark and one of the species included in the Annex II/IV of the Habitats Directive. Today *Bombina bombina* can be found on 7 islands including Avernakø, Ærø and Birkholm thanks to over 35 years of management of the pondscapes for the species. Only 2 populations on Avernakø and Hjørto are original. All the others on the remaining islands have been restored through re-introduction. The habitats of toads are partially protected by two Natura 2000 sites, which were established especially for the species.

Management of the pondscapes for *Bombina bombina* aimed at improving and enlarging both aquatic and terrestrial habitats as well as preserving genetic variability of the remaining populations. Thanks to the several projects financed by local as well EU LIFE Programme funds, over 80 ponds were created or restored after 1990s, and on Avernakø alone nearly 35 ha of arable land were transformed permanently to meadows without fertilizer, pesticides, or soil treatment. Creation and restoration of ponds in clusters supported habitat connectivity and provided the variability of aquatic habitats required by *Bombina bombina*. Also, municipalities and Nature Agency have helped farmers to start cattle grazing by financing fencing of the meadows. Grazing with the right species and optimal grazing pressure is a very important tool to keep habitats of the Fire-bellied Toad in favorable condition. If the grazing pressure is too low, trees and rushes will develop, shading the ponds and making water cold and unsuitable for *Bombina bombina*. If the grazing pressure is too high, all aquatic plants are eaten, the banks are trampled and cattle excrements lead to eutrophication of the ponds.

In 1987, before a supportive breeding program was initiated, Avernakø had one of the 2 largest surviving populations of Fire-bellied Toad, with only 15-20 adults remaining in the west Danish populations. Avernakø was also proven (in EU LIFE Bombina S-H project) to contain the largest diversity of genetic material, with the population on the island surviving the genetic bottleneck period of 1970-1987. Today the population remains largest in the Archipelago islands with about 180 animals. The population on Ærø was restored with toads coming from Hjortø and Avernakø. The rearing program for the island was carried out during 1987 to 2002. At first, the programm was a success and the population increased to 100 animals after 10 years, but a combination of deteriorating terrestrial habitats as well as periods of droughts resulted in decline. The population on Birkholm restored during 1998-2000 from animals coming from Ærø and Hjortø and today it is the second biggest in Archipelago with over 100 animals.

This success story also contributed to an increase in public environmental awareness and knowledge, because of the involvement of the local community in the re-introduction and habitat improvement program. This good-looking toad was also used for marketing the islands as a local tourist attraction. Every year there are some guided tours for tourists to see them and listen calling to toads during breeding season. The management of the habitats and the restoration of the Fire-bellied Toad (*Bombina bombina*) populations on the South Fyn Archipelago Islands was a success. The species was saved from extinction and it now ranges over a larger area, securing their population for the future.

HANDBOOK :

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PHOTOS CREDITS

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2024

http://www.ponderful.eu

Ponderful
PONDS FOR CLIMATE

DENMARK

PONDSCAPE : FYN

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

HVAD ER ET PONDSCAPE ?

DEFINITION

Et pondscape er et netværk af vandhuller, der er tæt forbundne med hinanden og det omgivende landskab.

Et pondscape afgrænses af fysiske eller økologiske karakteristika (en dal, et opland, en række vandhuller i et naturreservat) eller af samfundsmæssige eller politiske karakteristika (menneskeskabte vandhuller i byer, kommunale eller nationale grænser).

TRUSLER MOD VANDHULLER OG PONDSCAPES

Mellem 50 og 90 % af vandhullerne i de europæiske lande er forsvundet i løbet af det seneste århundrede. Vandhuller og småsøer bliver i vid udstrækning overset i landenes egen og EU's lovgivning, direktiver og strategier for vand og natur, herunder vandrammedirektivet (EU-WFD).

HVORFOR ER DET VIGTIGT AT FREMME VANDHULLER ?

FORBEDRING AF BIODIVERSITET

Småsøer og vandhuller er generelt oversete og undervurderede, men de er bemærkelsesværdigt vigtige for bevarelsen af biodiversitet, bl.a. er mange pondscapes et "hotspot" for biodiversitet.

REDUKTION AF RISIKOEN FOR KATASTROFALE HÆNDELSER

Vandhuller og pondscapes er afgørende for at mindske oversvømmelser og udgør desuden en vandreserve til brandbekæmpelse.

MENNESKELIG SUNDHED

Vandhuller og pondscapes giver en bred vifte af fordele for mennesker; de understøtter sundhed og livskvalitet, skaber rum for fysiske aktiviteter og social interaktion samt for æstetiske oplevelser og uddannelses- og rekreative aktiviteter.

KLIMATILPASNING

På grund af deres høje forekomst og høje produktivitet påvirker vandhuller kulstofkredsløbet markant ved at fungere som både et kulstofdræn og en kulstofkilde.

VANDFORVALTNING

Pondscapes udgør en vandreserve, der især er vigtig i tilfælde af vandmangel, særligt til vanding af dyr og til kunstvanding.

SAMMENHÆNG

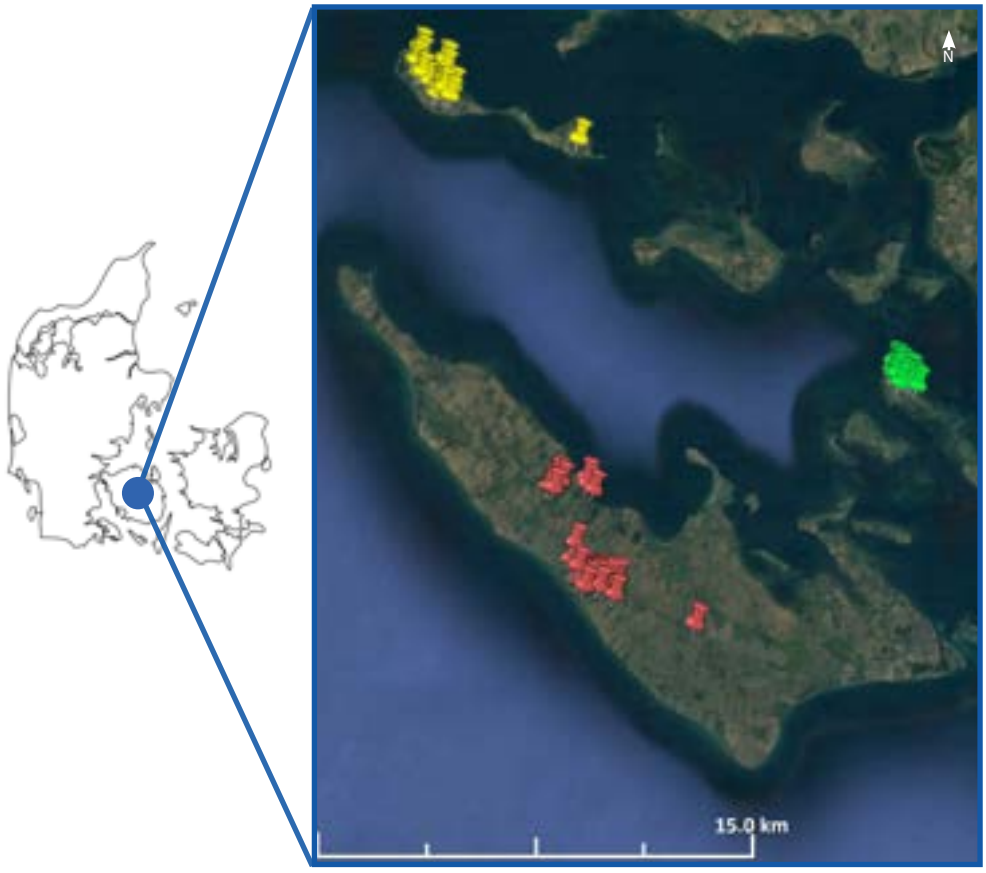
De undersøgte pondscapes på de fynske øer omfatter Ærø, Avernakø og Birkholm, der er tre ud af cirka 55 øer i Det Sydfynske Øhav, hvor Ærø med sine 88 km2 er den største og har over 6.000 indbyggere. Avernakø, hvor der bor cirka 120 mennesker, består af to øer, der er forbundet af en kunstig dæmning og har et samlet areal på ca. 6 km2. Birkholm er den mindste af øerne og har et samlet areal på omkring 1 km2 og færre end ti permanente indbyggere. Avernakø og Ærø er dækket af et bakket morænelandskab, og ler dominerer undergrunden. Birkholm er af samme oprindelse som Avernakø og Ærø, men øen er meget flad og rækker kun 2 m op over havets overflade.

Pondscapes : De fynske øer.
Nærliggende større byer (inden for en radius på 30 km):
Faaborg/Marstal (6898/2119 indbyggere)
Bioklimatisk zone : Kontinental

Dominerende arealanvendelse :
Pondscape - primært græsarealer
Omgivende miljø - primært græsarealer og landbrugsjord

Pondscape-areal : 15 km^2
Vandhuller/småsøer: 64 inkluderet i Ponderful (Ærø: 40, Avernakø: 10, Birkholm: 14)
tæthed: 10-15/km^2
overfladeareal : 100-1'300 m^2
dybde : 0.4-2 m
alder : 10 til >100 år

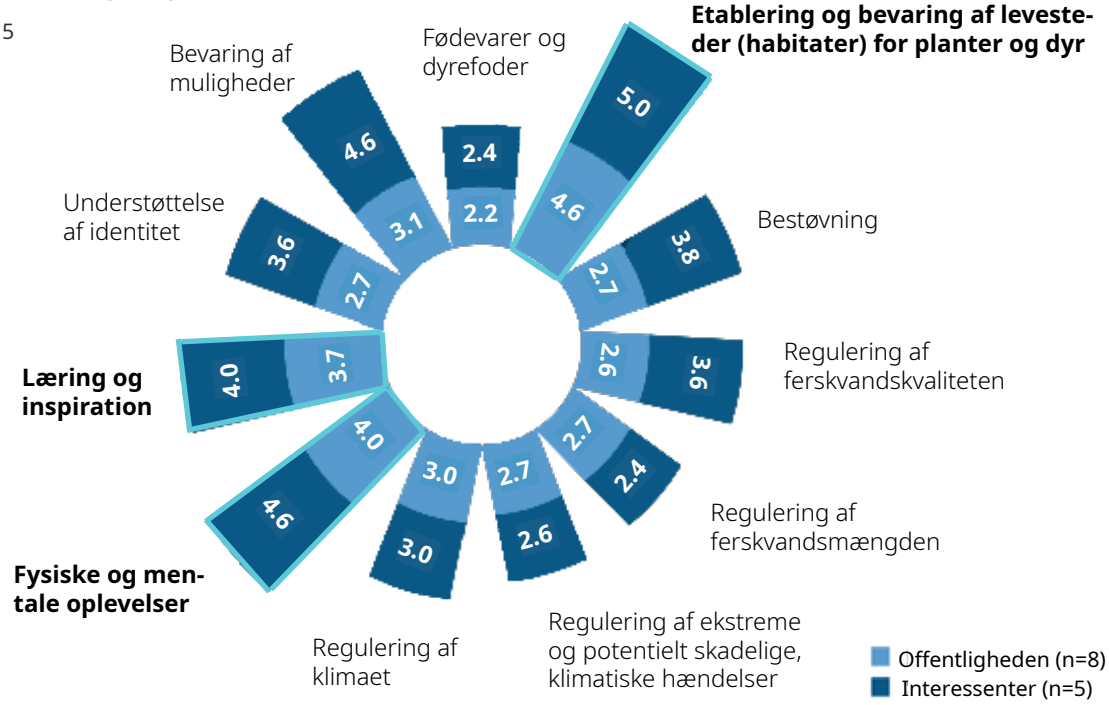
Jordejere : Private, Naturstyrelsen, kommuner
Jordforvaltere : Private ejere, Naturstyrelsen
Offentlig adgang : Størstedelen af området er ikke tilgængeligt, da vandhullerne mestendels ligger på private græsgange
Offentlige faciliteter : Flere vandre- og cykelstier samt campingområderareas.



FORVENTNINGER FRA LOKALSAMFUNDET

De 11 økosystemtjenester (begrebet "naturens bidrag til mennesker" (NCP)

Skala: Point fra 1 til 5



Forventningerne er primært baseret på (i) etablering og vedligeholdelse af levesteder for dyr og planter til fremme af biodiversitet, (ii) menneskets direkte anvendelse af naturområderne (fysiske og mentale oplevelser) og (iii) læring og inspiration.

LOKALE LOVE OG BESTEMMELSER

Størstedelen af landområdet i pondscapet ejes og forvaltes af landmænd. Området er delvist beskyttet af Natura 2000-netværket og Ramsar-konventionen om vådområder. Alle vandhuller større end 100 m2 er beskyttet af dansk lovgivning, og ændringer i deres tilstand kræver tilladelse.

Da vandhullerne er levesteder for paddearter, der er beskyttet af habitatdirektivet, forbyder dansk miljølovgivning (Miljømålsloven) skade på eller ødelæggelse af deres yngle- og hvilesteder, forsætlig forstyrrelse i ynglesæsonen, under vandring eller overvintring samt forsætlig indfangning eller drab.

Mange vandhuller i Pondscapet blev skabt eller genoprettet med midler fra EU's LIFE-program, der støtter bevarelse af arter, der har EU's bevågenhed. Samarbejdet mellem jordejere, statslige og private konsulentvirksomheder bidrager til at bevare og øge vandhullernes kvalitet og fremme deres biodiversitet

75 % af pondscapet er beskyttet
af Natura 2000-netværket eller er en del af Ramsar-områder.

75%

100 % af vandhuller større end 100 m2 er beskyttede,
og ændringer i deres tilstand kræver tilladelse.

100%

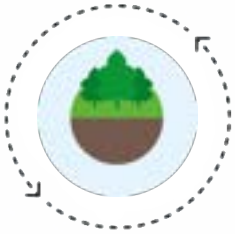
Pondscapet er et nationalt "hotspot" for den sjældne paddeart klokkefrø.
Mange vandhuller i området blev skabt eller genoprettet specifikt til denne art for at redde den fra udryddelse.

HOT SPOT

Pondscapet er en del af det Sydfynske Øhav, der rummer 55 øer.

55 ISLANDS

HOVEDUDFORDRINGER OG -MÅL



FORBEDRING AF BIODIVERSITET

Især for padder, fugle og vandplanter.

PLANLÆGNING OG STYRING

Et velgørende sted til afslapning og sociale aktiviteter såsom cykling, camping og vandring.

VANDFORVALTNING

Etablering af bufferzoner omkring vandhuller for at reducere forurening fra nærings-stofafstrøming

ØKONOMISKE MULIGHEDER

Miljøvenligt landbrug og tilskud til jordejere for at forbedre vandkvaliteten og hydrologien.

NATURBASEREDE LØSNINGER (NBS)

Implementering af naturbaserede løsninger til at imødegå ovenstående fire samfundsudfordringer.

ETABLERING AF NYE VANDHULLER

1990-2020's

Etablering af over 50 vandhuller til beskyttelse af padder inden for pondscapet.

FORVALTNING AF VANDHULLER OG OMGIVENDE OMRÅDER

- Beskyttelse af truede paddearter.
- Etablering af bufferzoner omkring vandhuller.
- Indførelse af græsning med kvæg.
- Omdannelse af dyrkede marker til permanente græsningsområder.
- Fjernelse af krat og sediment fra nogle kraftigt skyggede vandhuller.
- Mindst 18 vandhuller blev genoprettet i perioden 1990-2020.
- Genindførelse og støtteopdræt af sjældne paddearter.
- Overvågning af padder og flora i beskyttede vandhuller.

- Etablering og vedligeholdelse af stier og observationspunkter.
- Beskyttelse af grundvand ved oprettelse af pesticidfrie zoner.
- Omdannelse af konventionelt landbrug til en mere miljøvenlig praksis.

- Dræning af vandhuller.
- Regelmæssig overvågning af fysiske, kemiske eller biologiske indikatorer.

NATURENS BIDRAG TIL MENNESKER OG MÅLBARE INDIKATORER

AKVATISK BIODIVERSITET

ARTSRIGDOM
Vandplanter : **55**
(Ærø: 55; Avernakø: 40, Birkholm: 38)
Vandfugle : **61**
(Ærø: 61, Avernakø: 32, Birkholm: 40)
Guldsmede : **7**
Insekter, taksonomiske familier : **21**
Padder : **5**
(Ærø: 5, Avernakø/Birkholm: 4)

ANTAL
Bevaringsprioriterede arter (N) : **22**
Arter nævnt i habitatdirektivets bilag (N): **5***
Bombina bombina, Triturus cristatus, Rana dalmatina, Bufo viridis, Epidelea calamita (Padder)
Indførte truede arter (N) : **1**
Indførte invasive arter (N) : **1**

FLAGSKIBSARTER :

Bombina Bombina

KLIMAREGULERING

6.7t

Den årlige kulstoflagringskapacitet i de undersøgte vandhuller på Ærø og Birkholm (primærproduktion, ophobning af organisk materiale) (ton CO_2 ækv./landskab/år).

NATURENS BIDRAG TIL MENNESKER OG MÅLBARE INDIKATORER

FYSISKE OG MENTALE OPLEVELSER

Antal årlige gæster på øerne i pondscapet (fritid, turisme, fiskeri, naturobservation osv.) (antal/år)

175'000

100KM og på Ærøs cykelstier, hvoraf nogle går langs græsgange med vandhuller

Selvrapporteret tilfredshed og velbefindende (skala fra 1 til 5)

3.8

De mest populære aktiviteter er iagttagelse af :
dyreliv (21 %), afslapning (16 %) og cykling (11 %).

VANDMÆNGDE

~ 49'680m³

Samlet vandvolumen (m^3) i vandhuller undersøgt i Ponderful-projektet.

VANDKVALITET

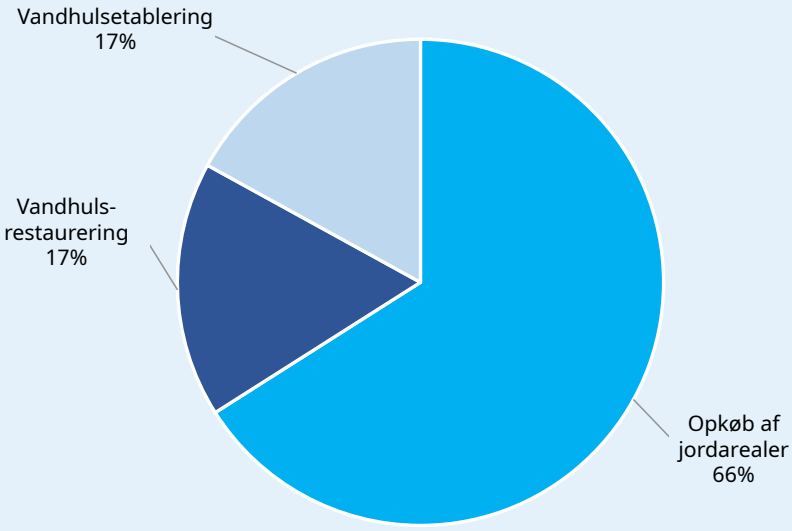
Næringsstoffer : **MODERAT**

Pondscapets kvalitet går fra "dårlig" til "god" med gennemsnitlige koncentrationer af totalfosfor på 0,35 mg/L, totalkvælstof på 2,4 mg/L og klorofyl a på 23 µg/L.

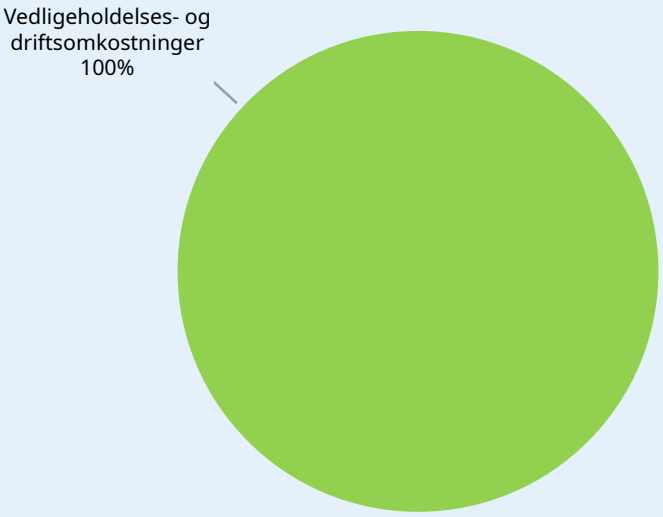
COST-BENEFIT ANALYSE

SAMLET OMKOSTNINGSVURDERING

ANDEL AF OMKOSTNINGER TIL NBS-FORANSTALTNINGER

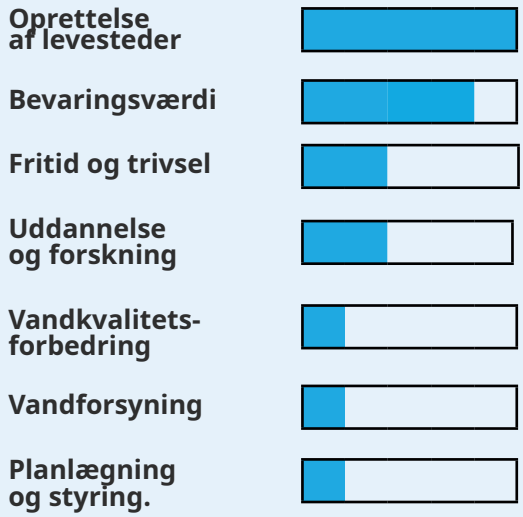


Relativ omkostning ved etablering af NBS-foranstaltninger



Relativ omkostning ved løbende NBS-forvaltningsforanstaltninger

FORDELSVURDERING



EGNEDE FINANSIERINGSMULIGHEDER TIL AT NEDBRINGE FINANSIERINGSUNDERSKUDDET

- **1. Indtægtsmuligheder**
  - salg af markedsvarer og tjenester
- **2. Frivillige bidrag/donationer**
- **3. Tilskud**

VURDERING AF FINANSIERINGSUNDERSKUDDET

ANDRE TRUSLER

1. Ændringer i hydrologien som følge af klimaforandringer, herunder tidspunktet for og mængden af nedbør. Mindre vandhuller er i fare for at forsvinde. Dette vil påvirke biodiversiteten.

2. Øget hyppighed af stormhændelser samt forøget vandstand i havet som følge af klimaforandringer. Det kan medføre hyppige oversvømmelser af vandhuller med saltvand og have en alvorlig indvirkning på biodiversiteten.

SUCCESHISTORIE OG OVERFØRBARHED

AKTIV FORVALTNING AF TRUEDE ARTER I DANMARK

Det Sydfynske Øhav er med sit milde klima et "hot spot" for klokkefrø (Bombina bombina), som er den sjældneste padderart i Danmark og en af de arter, der nævnes i habitatdirektivets bilag II/IV. I dag findes klokkenfrø på syv øer, herunder Avernakø, Ærø og Birkholm, takket være mere end 35 års forvaltning af de områder, hvori arten findes. Kun to bestande på Avernakø og Hjortø er oprindelige. Alle andre bestande på de resterende øer er blevet genoprettet vha. genindførsel. Klokkefrøernes levesteder er delvist beskyttet af to Natura 2000-områder, der blev etableret med særligt henblik på denne art. Forvaltningen af områderne sigtede mod at forbedre og forøge både akvatiske og terrestriske levesteder samt at bevare de tilbageværende bestandes genetiske variation.

Takket være adskillige projekter finansieret af lokale såvel som EU LIFE-programmidler blev der efter 1990'erne oprettet eller genoprettet mere end 80 vandhuller, og på Avernakø alene blev næsten 35 hektar landbrugsjord permanent omdannet til enge uden gødskning, pesticider eller jordbehandling. Etablering og genopretning af vandhuller i klynger understøttede forbindelsen mellem habitaterne og skabte den variation i de akvatiske levesteder, som klokkefrø er afhængig af. Desuden har kommuner og Naturstyrelsen hjulpet landmænd med at opstarte kvæggræsning ved at finansiere indhegning af enge. Græsning med de rette arter og et optimalt græsningstryk er et meget vigtigt redskab til at bevare en gunstig tilstand på klokkefrøernes levesteder. Hvis græsningstrykket er for lavt, vil der fremvokse træer og siv, som vil overskygge vandhullerne og gøre vandet koldt og uegnet til klokkefrø. Hvis græsningstrykket er for højt, bliver de akvatiske planter ædt, bredderne nedtrampes, og kvægekskrementer fører næringsstofbelastning af vandet.

I 1987, før et understøttende avlsprogram blev iværksat, havde Avernakø en af de to største overlevende bestande af klokkefrø, og der var kun 15-20 voksne individer tilbage i de vestlige danske bestande. Det viste sig, at Avernakø (i EU LIFE Bombina S-H-projektet) havde den største mangfoldighed af genetisk materiale, idet øens frøbestande havde overlevet den genetiske flaskehalsperiode 1970-1987. I dag er bestanden på Avernakø øhavets største med omkring 180 individer. Bestanden på Ærø blev genoprettet med haletudser fra Hjortø og Avernakø under et opdrætsprogram, der blev gennemført i perioden 1987 til 2002. I begyndelsen var programmet en succes, og bestanden var steget til 100 individer efter ti år, men en kombination af forringelse af de terrestriske levesteder og tørkeperioder førte til tilbagegang.

Bestanden på Birkholm blev genoprettet i perioden 1998-2000 med individer fra Ærø og Hjortø, og i dag udgør den øhavets næststørste bestand med over 100 individer. Denne succeshistorie bidrog også til en øget miljøbevidsthed og viden i befolkningen på grund af lokalsamfundets involvering i genindførelses- og levestedsforbedringsprogrammet. Den flotte frø blev også brugt til at markedsføre øerne som en lokal turistattraktion. Hvert år arrangeres der guidede ture for turister, som kan se og lytte til frøernes kald, når de yngler. Forvaltningen af levestederne og genopretningen af klokkefrøbestande på øerne i Det Sydfynske Øhav var en succes. Arten blev reddet fra udryddelse, og den har nu et større udbredelsesområde, hvilket sikrer bestanden af klokkefrø i fremtiden.

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FOTOS CREDITS

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FORFATTERE

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2024

http://www.ponderful.eu

Ponderful
PONDS FOR CLIMATE

DENMARK

PONDSCAPE : LYSTRUP

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 pond have been lost from European countries over the past 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

The Lystrup Pondscape covers a sub-urban area located on the hillside at Egådalen, north of Aarhus, the second biggest city in Denmark. The neighborhood is a home for approximately 10,300 inhabitants living in single-family houses. The area is quite green with numerous gardens, few parks, and a network of 18 ponds. Nearly all ponds were altered or created after 2004, as part of the housing development. After a severe storm in 2012, four ponds were re-shaped and two constructed to mitigate the negative consequences of such events in the future. All together 11 different climate adaptation NBS were constructed from 2014 to 2016, aiming at reducing flood risks and runoff to the neighboring artificial lake (Egå Engsø/Egå Meadow Lake). The biggest NBS was created as a large-scale demonstration project of how biodiversity can go hand in hand with climate adaptation in a public park.

Name of the pondscape : Lystrup
Name of neighboring large town (in a 30 km radius):
Aarhus (~290'500 inhabitants)
Bioclimatic zone : Continental

Dominant land use :
pondscape - Urban (55%)
surrounding environnement - Grassland (40%)

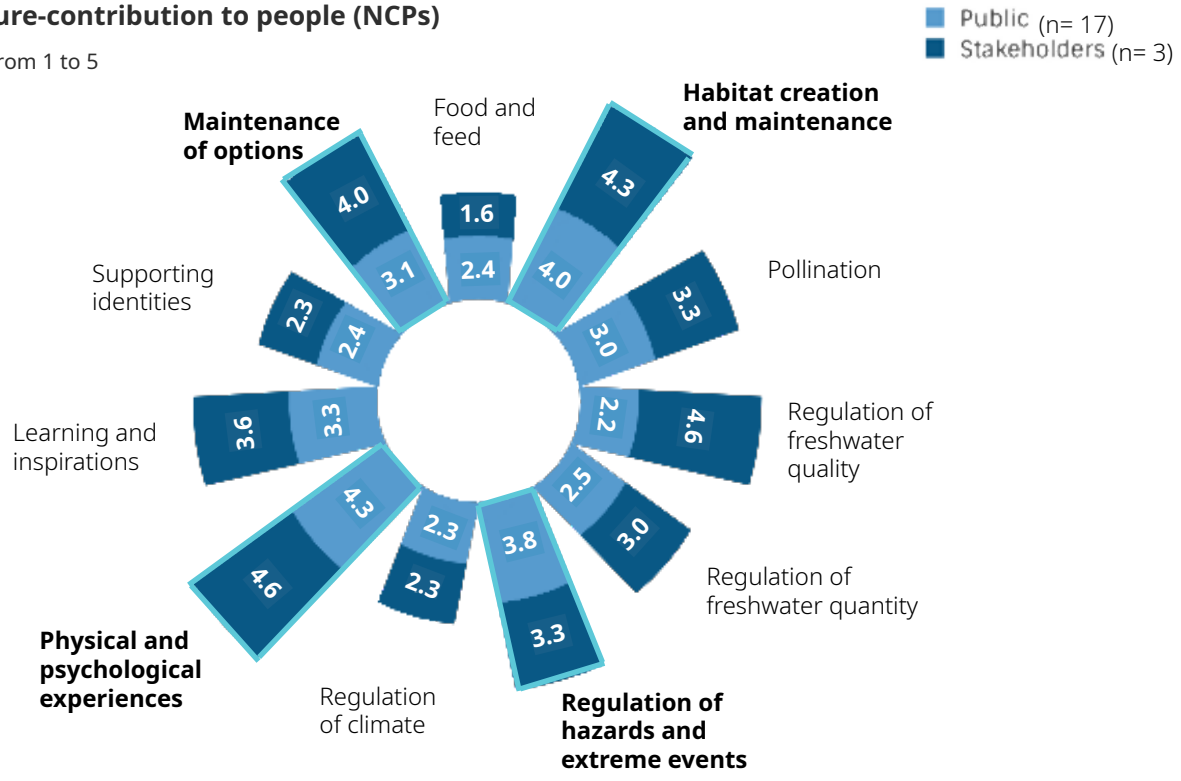
Pondscape area : 5 km^2
Ponds : number: 18 (14 included into Ponderful project survey)
density: 3.6 / km^2
surface areas : 300 to 8'000 m^2
depths : 0.4 to 2 m
ages : 5 to over 200 years

Land owner : Private homeowners' associations, Aarhus Kommune (municipality)
Land Manager : Aarhus Kommune, Aarhus Vand (water utility company), Lystrup Kogræsser- og Naturplejeforening (NGO)
Public access : almost 100 % of the area is accessible
Public amenities : extensive footpaths and some hides

LOCAL COMMUNITY EXPECTATIONS

The 11 Nature-contribution to people (NCPs)

Scale : scores from 1 to 5



The expectations rely mainly on (i) the direct use of the natural areas by people (physical and psychological experiences), (ii) the habitat creation and maintenance, (iii) the regulation of hazards and extreme events as well as the maintenance of options.

LOCAL POLICIES

Most of the ponds in Lystrup were altered or created during the construction of housing.
Despite this, the majority of ponds are protected against changes without permission by the Law of Nature Conservation (Naturbeskyttelsesloven). Some of the ponds were modified or created as part of a climate adaptation scheme to control and slow down stormwater flows according to the Aarhus municipality's climate adaptation plan.

The ponds in the area support a population of great crested newt *Triturus cristatus*. This is an Annex IV species of Habitats Directive, and so changes in their habitats are regulated by Law of Environmental Targets (Miljømålsloven). This means not allowing damage or destruction of their breeding and resting areas, intentional disturbance during breeding, migration or hibernating, as well as intentional capture or killing of individual newts.

Nearly 100% of ponds in the pondscape are protected, as so called ' 3 habitats' by the Danish Law of Nature Conservation (see image).

100%

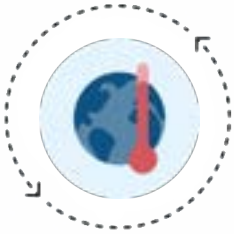
60% of ponds is used by *Triturus cristatus*, Annex II/IV species of Habitats Directive, for breeding and resting: *Triturus cristatus* was found in 11 ponds in Lystrup. It successfully breeds in 5 of them.

60%

6 ha big urban park in the middle of Lystrup is managed by local inhabitants with cattle grazing.

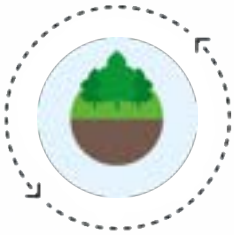
6ha

MAIN CHALLENGES AND OBJECTIVES



CLIMATE CHANGE ADAPTATION

Flood water storage was the primary aim of pond construction – it has been a success.



BIODIVERISTY ENHANCEMENT

Especially meadow vegetation around the ponds, and other measures aimed at enhancing populations of amphibians, birds, and aquatic plants.

HUMAN HEALTH

A refreshing place to walk and relax in, and to educate people about nature.

NATURE BASED SOLUTIONS (NBS)

New pond creation and their management are here the Nature-based Solutions (NbS) put in practice to address the three identified societal challenges.

NEW POND CREATION

1800s-1995

There were three ponds constructed

2004-2010

Creation of seven more medium-sized ponds primarily for storm water retention

2016-2017

Creation of three ponds and management of some existing ponds for storm water retention to deal with extreme rainfall events

PONDS AND PONDSCAPE MANAGEMENT

- At least six ponds are part of the NBS system built to collect water as well as reduce and delay runoff after storms.
- Dredging of terrestrialised ponds is needed every 15-25 years.

- Changes in lawn management from summer mowing to livestock grazing to manage pond edges in the urban park.
- Removal of nutrient rich topsoil and transfer of vegetation and seeds from a disused sand quarry around the biggest pond in the NBS system for storm water retention.

- Creation and maintenance of trails and nature observation points.

NATURE CONTRIBUTIONS TO PEOPLE AND MEASURED INDICATORS

AQUATIC BIODIVERSITY

SPECIES RICHNESS
Aquatic plants : **22**
Water birds : **20**
Amphibians : **4**
Dragonflies : **11**
Families of invertebrates : **25**

AMOUNT OF
Conservation priority species : **8**
Species on Habitat Directive Annexes (N) : **1*** *Triturus Cristatus* (amphibian)
Invasive alien species : **1**

FLAGSHIP SPECIE :

*Triturus cristatus**

REGULATION OF CLIMATE

10.1t

Capacity of annual carbon storage in the ponds (by primary production, by organic matter accumulation) (tons CO_2eq /pondscape/year).

NATURE CONTRIBUTIONS TO PEOPLE AND MEASURED INDICATORS

PHYSICAL AND PSYCHOLOGICAL EXPERIENCE

Number of people visiting the pondscape (leisure, tourism, fishing, nature watching etc.) (nb/year) **10'000**

100% Area inside the pondscape accessible to the public

Self-reported satisfaction well-being (scale 1 to 5) **3.8**

Most popular activities :
wildlife observation (25%), relaxing (23%) and hiking (16%)

WATER QUANTITY

9'300 m^3 Estimated volume of water stocked during a severe flood event (m^3). The NBS constructed after flooding in 2012 reduced both flood risk and runoff to the neighboring artificial lake (Egå Engsø/Egå Meadow Lake).

Total water volume (m^3) **18'600 m^3**

WATER QUALITY

Nutrients : **MIXED**

A wide range of pollution levels between ponds, some have good water quality (low nutrient values Total Phosphorus 0.07 mg l^{-1} and Total Nitrogen 0.4 mg l^{-1}) whereas others are more impacted as it is typical for an urban areas.

COSTS AND BENEFITS ANALYSIS

The NBS construction works implemented during 2016-2017 to adapt the area to future extreme rainfall events costed approximately 4 millions euro. Half was financed directly by the Aarhus Vand (a water utility company), the other half was financed via loan taken out by Aarhus Municipality and repaid with money from ongoing water diversion tax payments to the Aarhus Vand by citizens. Members of the local community paid their water diversion charges as usual without additional expenses.

In addition to the construction costs, there are operating (maintenance) costs, including for example dredging the retention ponds every 15 - 25 years. Operating expenses for the NBSs are paid by the project owners, Aarhus Vand and Aarhus Municipality.

Ordinary maintenance costs of the green spaces are covered as before by the Aarhus Municipality, the owner. A stakeholder-led NGO was established during the project to manage the urban park in the area by livestock grazing.

The project also includes an agreement between Aarhus Vand and a farmer to direct excess rainwater onto his field. If water damages the harvest, the farmer gets compensation for loss of income.

REMAINING THREATS

1. The impact of people on biodiversity, including damage to pond banks from walkers and disturbance of wildlife.

2. The primary use of storm water retention and the urban setting of the ponds puts pressure on the ponds from a biodiversity perspective. With the increasing intensity of rainstorms and the urban setting of the pondscape, pollution from road surfaces is inevitable and likely to impact water quality and so biodiversity. This may be exacerbated by changes in hydrology linked to climate change, including the timing and quantity of rainfall. Smaller ponds are likely to disappear due to drying, which will also impact biodiversity.

SUCCESS STORY AND TRANSFERABILITY

STORM WATER PROTECTION AND BIODIVERSITY ENHANCEMENTS - PROVIDING MULTIPLE BENEFITS IN A PUBLIC PARK

In August 2012, Lystrup was hit by a heavy storm and received 49 mm of rain in three hours, overloading existing the typical 'grey' rainwater system designed to cope with 29mm in 4 hours. This extreme weather event caused substantial damage to both infrastructure and housing. Rather than investing in more grey infrastructure, like expanding the sewage network, Aarhus Municipality decided that Lystrup should become a pilot project for nature-based solutions (NBS). A total of 11 NBS measures including the creation of rainwater retention basins, dikes and swales were constructed as part of the municipality's climate adaptation plan. The construction (2014-2016) aimed at reducing both flood risk and runoff to the neighboring artificial lake (Egå Engsø/Egå Meadow Lake). It was one of the largest contiguous climate adaptation projects in Denmark at that time.

Aarhus University researchers approached Aarhus Municipality to develop this initiative as a demonstration project where residents would be involved in both the design and the implementation phase, and climate adaptation would be combined with the creation of habitat for biodiversity. The aim was also to increase recreational use and the stakeholders' involvement in the maintenance of the area post-construction.

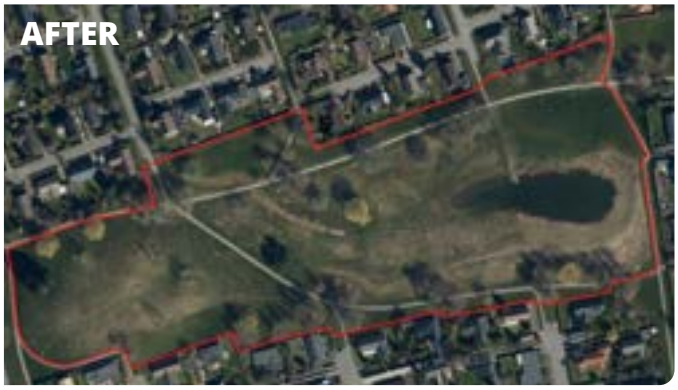
The demonstration project, covering about 6 hectares in a large urban park, Hovmarksparken in the middle of Lystrup, was a partnership including the local community, a school, the public administration (the Aarhus City Council), a water utility company (Aarhus Vand), and scientists (Aarhus University).

N°	NbS	Measures enhancing biodiversity
1	Detention basin	Sowing of seeds collected from plant species characteristic of natural grasslands (*Galium verum, Lotus corniculatus*)
2	Detention basins	-
3	Retention basin	A nutrient-rich topsoil removal, establishment of soil mounds ("hilock")
4	Swales, relocation of the road	-
5	Dike	-
6	Retention basin, dikes and ditches	Removal of vegetation and topsoil, transplantation of vegetation from a gravel pit, sowing of seeds collected from plant species characteristic of natural grasslands (*Galium verum, Knautia arvensis, Lotus corniculatus, Origanum vulgare, Vicia cracca*), establishment of soil mounds and fences for cattle grazing
7	Ditches, dikes and retention basin	Transplantation of vegetation from a gravel pit, sowing of seeds collected from plant species characteristic to natural grasslands (*Anthyllis vulneraria, Campanula persicifolia, Campanula rotundifolia, Knautia arvensis, Lotus corniculatus, Pilosella officinarum*)
8	Deepening of an existing basin	-
9	Dikes	Nutrient-rich topsoil removal
10	Retention basin and a ditch	Nutrient-rich topsoil removal
11	Deepening of an existing basin	Nutrient-rich topsoil removal

A large retention pond, swales and dike were constructed in what was previously a species-poor grass lawn. The nutrient-rich topsoil was removed, and vegetation and seeds from a disused sand quarry were translocated. Also, single perennials plants including *Pilosella officinalis, Anthyllis vulneraria, Campanula persiflora* and *Campanula rotundifolia* were also introduced. A mixture of native annual flower meadow seeds like *Lotus corniculatus, Leucanthemum vulgare* were sown to ensure the areas was aesthetically pleasing rapidly, giving a chance for the perennials to become established. To reduce the nutrient content, no humus-reach topsoil was placed at the bottom of the retention pond or on its margins and banks.

The objective was to increase the biodiversity of the area and to demonstrate a different ecological design principle for urban green parks as an alternative to the common homogeneous landscape of short-mown lawns.

The local community was involved in public meetings and workshops, and a cattle-grazing NGO was established to manage the area, give guided bio-tours, and develop site-specific play activities in parallel to the construction work.



Members of the cattle-grazing NGO (Lystrup Kogræsser- og Naturplejeforening) paid for some of the calves and received a share of the meat produced. They also maintain fencing in the area. The release of grazing animals into the park was an important local event, attracting 50 to 100 people and media attention.

The transformation of the park also required change in its management. Before the project implementation, the Aarhus municipality often mowed a few areas to allow for recreational activities such as picnic and football, and the whole area once in midsummer, leaving the grass clippings on site. The timing of mowing did not take into consideration the needs of insects and birds. The integration of biodiversity objectives into the overall park management required re-scheduling the mowing regime from a summer cut to once in spring and once in autumn, with the removal of grass cuttings and the introduction of cattle grazing. This way, for the first time in Denmark in a public urban park, a pasture was created for cattle managed by the local community.

The retention pond contributes to the natural value of the area. Two of the most common species of amphibians, *Lissotriton vulgaris* and *Rana temporaria* are breeding there. The new retention pond is also part of the network of ponds used by the protected species *Triturus cristatus*. A measurement of GHG emissions in the pond carried out during the Ponderful project has shown that the pond has buried more carbon than it emitted.

The effectiveness of the NBS has been shown during a storm in October 2023, when the area received about 60 mm of rain during 10-12 hours. This is equal to the amount of rain usually measured during a whole month. There was no damage reported in Lystrup with the exception of one settlement very close to the highway.

HANDBOOK :

APPENDIX :

PHOTOS CREDITS

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2024

http://www.ponderful.eu

Ponderful
PONDS FOR CLIMATE

DENMARK

PONDSCAPE : LYSTRUP

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

HVAD ER ET PONDSCAPE ?

DEFINITION

Et pondscape er et netværk af vandhuller, der er tæt forbundne med hinanden og det omgivende landskab.

Et pondscape afgrænses af fysiske eller økologiske karakteristika (en dal, et opland, en række vandhuller i et naturreservat) eller af samfundsmæssige eller politiske karakteristika (menneskeskabte vandhuller i byer, kommunale eller nationale grænser).

TRUSLER MOD VANDHULLER OG PONDSCAPES

Mellem 50 og 90 % af vandhullerne i de europæiske lande er forsvundet i løbet af det seneste århundrede. Vandhuller og småsøer bliver i vid udstrækning overset i landenes egen og EU's lovgivning, direktiver og strategier for vand og natur, herunder vandrammedirektivet (EU-WFD).

HVORFOR ER DET VIGTIGT AT FREMME VANDHULLER ?

FORBEDRING AF BIODIVERSITET

Småsøer og vandhuller er generelt oversete og undervurderede, men de er bemærkelsesværdigt vigtige for bevarelsen af biodiversitet, bl.a. er mange pondscapes et "hotspot" for biodiversitet.

REDUKTION AF RISIKOEN FOR KATASTROFALE HÆNDELSER

Vandhuller og pondscapes er afgørende for at mindske oversvømmelser og udgør desuden en vandreserve til brandbekæmpelse.

MENNESKELIG SUNDHED

Vandhuller og pondscapes giver en bred vifte af fordele for mennesker; de understøtter sundhed og livskvalitet, skaber rum for fysiske aktiviteter og social interaktion samt for æstetiske oplevelser og uddannelses- og rekreative aktiviteter.

KLIMATILPASNING

På grund af deres høje forekomst og høje produktivitet påvirker vandhuller kulstofkredsløbet markant ved at fungere som både et kulstofdræn og en kulstofkilde.

VANDFORVALTNING

Pondscapes udgør en vandreserve, der især er vigtig i tilfælde af vandmangel, særligt til vanding af dyr og til kunstvanding.

SAMMENHÆNG

Pondscapet Lystrup dækker et forstadsområde beliggende på skråningen ved Egådalen nord for Aarhus, Danmarks næststørste by. Her bor cirka 10.300 indbyggere i parcelhuse. Området er forholdsvis grønt med talrige haver, enkelte parker og et netværk af 18 vandhuller, hvoraf næsten alle blev ændret eller etableret efter 2004 som en del af boligudviklingen i området. Efter en alvorlig storm i 2012 blev fire vandhuller ændret, og to blev anlagt for at reducere negative konsekvenser af fremtidige stormhændelser. I alt blev 11 forskellige naturbaserede klimatilpasningsløsninger (eksempel på "nature-based solutions", NBS) anvendt fra 2014 til 2016 for at reducere risikoen for oversvømmelser og afstrømning til den tilstødende kunstige sø, Egå Engsø. Den mest omfattende NBS-foranstaltning var et stort demonstrationsprojekt for, hvordan biodiversitet kan forenes med klimatilpasning i en offentlig park.

Pondscapets navn: Lystrup
Navn på nærliggende storby (inden for en radius på 30 km):
Aarhus (~290.500 indbyggere)
Bioklimatisk zone: Kontinental

Dominerende arealanvendelse :
pondscape og by (55 %).
omgivende miljø: Græsareal (40 %).

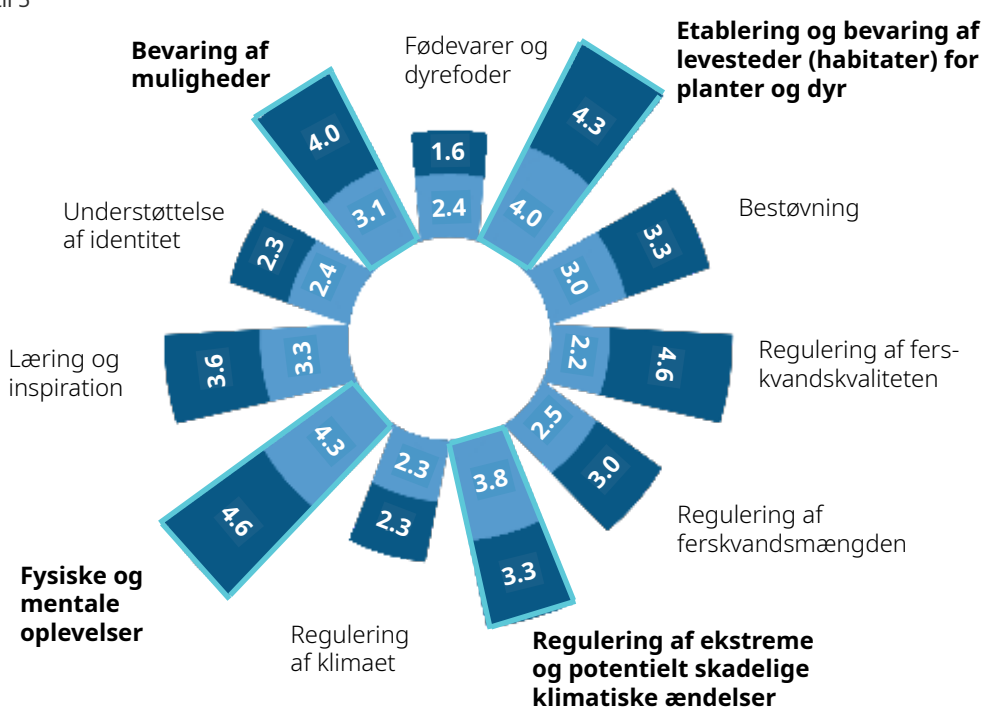
Pondscapets areal: 5 km^2
Vandhuller: 18 (14 inkluderet i Ponderful-projektet)
tæthed: 3,6 km^2
overfladeareal: 300 til 8'000 m^2
dybde: 0,4 til 2 m
alder: 5 til >200 år

Jordejere: Private ejere, Naturstyrelsen.
Ejere af naturområder: Private grundejerforeninger, Aarhus Kommune
Områdeforvalter: Aarhus Kommune, Aarhus Vand (vandforsyningsvirksomhed), Lystrup Kogræsser- og Naturplejeforening (NGO)
Offentlig adgang: Næsten 100 % af området er tilgængeligt
Offentlige faciliteter: Omfattende stisystemer og nogle shelters

FORVENTNINGER FRA LOKALSAMFUNDET

De 11 økosystemtjenester (begrebet "naturens bidrag til mennesker" (NCP))

Skala: Point fra 1 til 5



Forventningerne baserer sig hovedsageligt på (i) menneskers direkte brug af naturområderne (fysiske og mentale oplevelser), (ii) etablering og vedligeholdelse af levesteder, (iii) regulering af farer og ekstreme hændelser samt bevaring af muligheder.

LOKALE LOVE OG BESTEMMELSER

De fleste af vandhullerne i Lystrup blev ændret eller etableret under byggeriet af boliger. På trods af dette er flertallet af vandhullerne beskyttet mod ændringer uden tilladelse i henhold til Naturbeskyttelsesloven. Nogle af vandhullerne blev ændret eller etableret som en del af en klimatilpasningsordning med henblik på at kontrollere og bremse afstrømningen af regnvand i henhold til Aarhus Kommunes klimatilpasningsplan.

Områdets vandhuller understøtter en bestand af stor vandsalamander (*Triturus cristatus*). Denne art nævnes i habitatdirektivets bilag IV, og ændringer i artens levesteder reguleres af Miljømålsloven, der forbyder skade på eller ødelæggelse af dens yngle- og hvilesteder, forsætlig forstyrrelse i ynglesæsonen, under vandring eller overvintring samt forsætlig indfangning eller drab

Næsten 100 % af pondscapets vandhuller er beskyttet som såkaldte "3-habitater" ifølge Naturbeskyttelsesloven.

100%

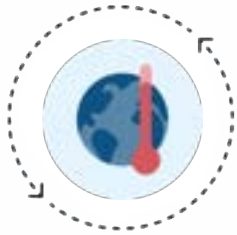
60 % af vandhullerne bruges af stor vandsalamander som yngle- og hvileområde. Stor vandsalamander blev fundet i 11 vandhuller i Lystrup og yngler med succes i de fem.

60%

En bypark på seks hektar i midten af Lystrup administreres af de lokale beboere med kvæggræsning.

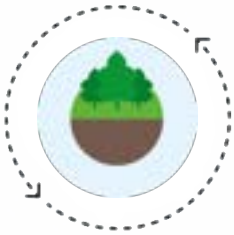
6ha

HOVEDUDFORDRINGER OG -MÅL



KLIMATILPASNING

Opbevaring af oversvømmelsesvand var det primære mål med etableringen af vandhuller, og det har været en succes.



FORBEDRING AF BIODIVERSITEN

Især engvegetation omkring vandhullerne og andre foranstaltninger til forøgelse af bestandene af padder, fugle og vandplanter.

MENNESKELIG SUNDHED

Et velgørende sted til vandring og afslapning samt oplysning af folk om naturen.

NATURBASEREDE LØSNINGER (NBS)

Etablering af nye vandhuller og deres forvaltning er den iværksatte løsning til imødegåelse af de tre identificerede samfundsudfordringer.

ETABLERING AF NYE VANDHULLER

1800s-1995

Der er blevet etableret tre vandhuller.

2004-2010

Etablering af syv mellemstore vandhuller primært til tilbageholdelse af regnvand.

2016-2017

Etablering af tre vandhuller og forvaltning af nogle eksisterende vandhuller til tilbageholdelse af regnvand til håndtering af ekstreme regnhændelser.

FORVALTNING AF VANDHULLER OG PONDSCAPES

- Mindst seks vandhuller er en del af NBS-systemet, der er anlagt til at opsamle vand og at mindske og forsinke vandafstrømningen efter storme med voldsomt regnvejr.
- Oprensning af tilgroede vandhuller er nødvendig hvert 15.-25. år.

- Ændringer i vedligehold fra græsslåning om sommeren til kvæggræsning for at holde vegetationen omkring vandhulskanterne i byparken nede.
- Fjernelse af næringsrig topjord og overførsel af vegetation og frø fra en nedlagt grusgrav omkring det største vandhul i NBS-systemet til tilbageholdelse af regnvand.

- Etablering og vedligeholdelse af stier og naturobservationspunkter.

NATURBIDRAG TIL MENNESKER OG MÅLTE INDIKATORER

AKVATISK BIODIVERSIET

ARTSRIGDOM
Vandplanter : **22**
Vandfugle : **20**
Padder : **4**
Guldsmede : **11**
Insekter, taksonomiske familier : **25**

AMOUNT OF
Bevaringsprioriterede arter : **8**
Arter nævnt i habitatdirektivets bilag (N) : **1*** *Triturus Cristatus* (Padder)
Invasive fremmede arter: **1**

FLAGSKIBSARTER :

*Triturus cristatus**

KLIMAREGULERING

10.1t

Den årlige kulstoflagringskapacitet i de undersøgte vandhuller (primærproduktion, ophobning af organisk materiale) (ton CO_2 ækv./landskab/år).

NATURBIDRAG TIL MENNESKER OG MÅLTE INDIKATORER

FYSISKE OG MENTALE OPLEVELSER

Antal årlige gæster i det område af pondscapet (fritid, turisme, fiskeri, naturobservation osv.) (antal/år) **10'000**

100% der er tilgængeligt for offentligheden

Selvrapporteret tilfredshed og velbefindende (skala fra 1 til 5) **3.8**

De mest populære aktiviteter er observation af dyreliv (21 %), afslapning (16 %) og cykling (11 %).

VANDMÆNGDE

9'300 m^3

Estimeret vandvolumen lagret under en alvorlig oversvømmelseshændelse (m^3). NBS-foranstaltninger efter oversvømmelsen i 2012 mindskede både oversvømmelsesrisikoen og afløbet til den tilstødende kunstige sø, Egå Engsø.

Totalt vandvolumen (m^3) **18'600 m^3**

VANDKVALITET

Næringsstoffer : **BLANDET**

Der er stor forskel på forureningsniveauet mellem vandhullerne; nogle har en god vandkvalitet (lave næringsstofværdier: totalfosfor 0,07 mg l^{-1} og totalkvælstof 0,4 mg l^{-1}), mens andre er mere påvirkede, som det typisk ses i byområder.

COST-BENEFIT ANALYSE

NBS-foranstaltningerne, der blev iværksat i 2016-2017 for at tilpasse området til fremtidige ekstreme regnhændelser, beløb sig til cirka 4 millioner euro. Halvdelen blev finansieret direkte af Aarhus Vand (en vandforsyningsvirksomhed), og den anden halvdel blev finansieret via et lån optaget af Aarhus Kommune og tilbagebetalt med penge fra de løbende vandafledningsafgiftsbetalinger til Aarhus Vand af borgerne. Indbyggerne i lokalsamfundet betalte deres vandafledningsafgifter som vanligt uden yderligere omkostninger.

Ud over anlægsomkostningerne er der driftsomkostninger, herunder f.eks. oprensning af regnvandsbassiner hvert 15. til 25. år. Driftsudgifterne for NBS'erne betales af projektets ejere, Aarhus Vand og Aarhus Kommune.

Almindelige vedligeholdelsesomkostninger for de grønne områder dækkes som tidligere af ejeren Aarhus Kommune. En interessentstyret NGO blev etableret under projektet med henblik på vedligeholdelse af byparken i området ved hjælp af husdyrgræsning.

Projektet omfatter også en aftale mellem Aarhus Vand og en landmand om at lede overskydende regnvand ud på hans mark. Hvis vandet beskadiger høsten, får landmanden kompensation for tab af indtægt.

BLIVENDE TRUSLER

1. Menneskers indvirkning på biodiversiteten, herunder skader på vandhulsbrinker fra gående og forstyrrelse af dyrelivet.

2. Det primære brug af regnvandsbassiner og vandhullernes beliggenhed i byen lægger pres på vandhullerne set ud fra et biodiversitetsperspektiv. Grundet den stigende intensitet af storme med voldsomt regnvejr og pondscapets bybeliggenhed er forurening fra vejoverflader uundgåelig, og dette vil sandsynligvis påvirke vandkvaliteten og dermed biodiversiteten. Dette kan forværres af hydrologiske ændringer som følge af klimaforandringer, herunder tidspunktet for og mængden af nedbør. Mindre vandhuller vil sandsynligvis forsvinde på grund af udtørring, hvilket også vil påvirke biodiversiteten.

SUCCESHISTORIE OG OVERFØRBARHED

REGNVANDSBESKYTTELSE OG BIODIVERSITETSFORBEDRINGER – TILVEJEBRINGNING AF FLERE FORDELE I EN OFFENTLIG PARK

I august 2012 blev Lystrup ramt af en kraftig storm. I løbet af tre timer faldt der 49 mm regn, hvilket overbelastede det typiske "grå" regnvandssystem, der er designet til at klare 29 mm på fire timer. Denne ekstreme vejrbegivenhed forårsagede betydelig skade på både infrastruktur og boliger. I stedet for at investere i mere grå infrastruktur, som f.eks. udvidelse af kloaknettet, besluttede Aarhus Kommune, at Lystrup skulle blive et pilotprojekt for naturbaserede løsninger (NBS). I alt 11 NBS-foranstaltninger, herunder etablering af regnvandsbassiner, diger og lavninger, blev iværksat fra 2014 til 2016 som en del af kommunens klimatilpasningsplan med det formål at reducere både risikoen for oversvømmelser og afstrømningen til den nærliggende kunstige sø, Egå Engsø. Det var på daværende tidspunkt et af de største sammenhængende klimatilpasningsprojekter i Danmark.

Forskere fra Aarhus Universitet henvendte sig til Aarhus Kommune for at udvikle initiativet som et demonstrationsprojekt, hvor beboerne skulle deltage både i design- og implementeringsfasen, og klimatilpasningen skulle kombineres med etablering af habitater til gavn for biodiversiteten. Målet var også at øge det rekreative brug af området og interessenternes engagement i dets vedligeholdelse.

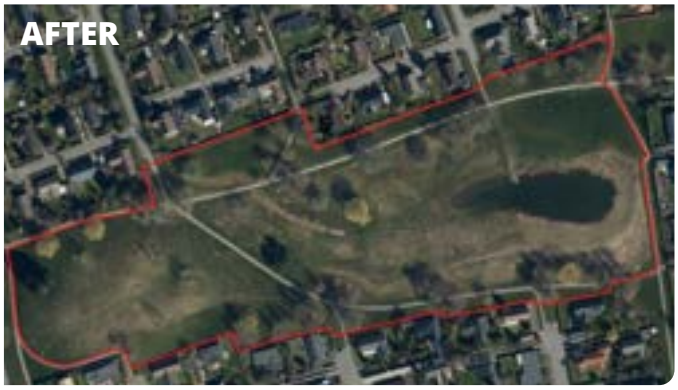
Demonstrationsprojektet, der omfattede ca. 6 hektar i en stor bypark, Hovmarksparken midt i Lystrup, var et partnerskab med deltagelse af lokalsamfundet, en skole, den offentlige forvaltning (Aarhus Byråd), et vandforsyningsselskab (Aarhus Vand) og forskere (Aarhus Universitet).

N°	Naturbaserede løsninger (NbS)	Foranstaltninger til fremme af biodiversitet
1	Opsamlingsbassin	Såning af frø indsamlet fra plantearter karakteristiske for naturlige græsarealer (*Galium verum, Lotus corniculatus*)
2	Regnvandsbassiner	-
3	Regnvandsbassiner	Fjernelse af næringsrig topjord, etablering af jordhøje
4	Lavninger, vejomlægning	-
5	Dige	-
6	Regnvandsbassin, diger og grøfter	-Fjernelse af vegetation og topjord, transplantation af vegetation fra en grusgrav, såning af frø indsamlet fra plantearter karakteristiske for naturlige græsarealer (*Galium verum, Knautia arvensis, Lotus corniculatus, Origanum vulgare, Vicia cracca*), etablering af jordhøje og hegn til kvæggræsning
7	Grøfter, diger og regnvandsbassin	Transplantation af vegetation fra en grusgrav, såning af frø indsamlet fra plantearter karakteristiske for naturlige græsarealer (*Anthyllis vulneraria, Campanula persicifolia, Campanula rotundifolia, Knautia arvensis, Lotus corniculatus, Pilosella officinarum*)
8	Uddybning af et eksisterende bassin	-
9	Diger	Fjernelse af næringsrig topjord
10	Regnvandsbassin og en grøft	Fjernelse af næringsrig topjord
11	Regnvandsbassin og en grøft	Fjernelse af næringsrig topjord

Et stort regnvandsbassin, lavninger og diger blev anlagt på det, der tidligere var en artsfattig græsplæne. Den næringsrige topjord blev fjernet, og vegetation blev flyttet og frø sået fra en nedlagt grusgrav. Der blev også introduceret etårige planter, herunder *Pilosella officinalis*, *Anthyllis vulneraria*, *Campanula persiflora* og *Campanula rotundifolia*. En blanding af frø fra blomsterenge med hjemmehørende arter såsom *Lotus corniculatus* og *Leucanthemum vulgare* blev sået for at sikre, at området hurtigt var æstetisk tiltalende og muliggøre etablering af flerårige planter. For at reducere næringsindholdet blev der ikke udlagt humusrig topjord i bunden af regnvandsbassinet eller på dets kanter og brinker.

Målet var at øge områdets biodiversitet og demonstrere et andet økologisk designprincip for byens grønne parker som et alternativ til det almindelige homogene landskab med kortklippede græsplæner.

Lokalsamfundet blev inddraget via offentlige møder og workshops, og en NGO for kvæggræsning blev oprettet for at administrere området, give guidede bioture og udvikle stedsbestemte legeaktiviteter sideløbende med anlægsarbejdet.



Medlemmer af kvæggræsnings-NGO'en (Lystrup Kograesser- og Naturplejeforening) betalte for nogle af kalvene og fik en andel af det producerede kød. Medlemmerne vedligeholder også hegnene i området. Udsætningen af græssende dyr i parken var en vigtig lokal begivenhed, der tiltrak 50-100 mennesker og medieopmærksomhed.

Transformationen af parken krævede også en ændring af dens forvaltning. Før igangsættelsen af projektet plejede Aarhus Kommune ofte at slå nogle områder for at give plads til rekreative aktiviteter som picnics og fodbold, og hele området blev slået én gang midt om sommeren med efterladelse af græsafklip på stedet og uden hensyntagen til insekters og fugles behov. Integrationen af biodiversitetsmål i den overordnede parkforvaltning krævede en omlægning af slåningen fra én gang om sommeren til to gange, en om foråret og en om efteråret med fjernelse af græsafklip, samt indførelse kvæggræsning. På den måde blev der for første gang i Danmark i en offentlig bypark skabt en græsmark for kvæg, der blev administreret af lokalsamfundet.

Regnvandsbassinet bidrager til områdets naturligværdi. To af de mest almindelige paddearter, lille vandsalamander (*Lissotriton vulgaris*) og butsnudet frø (*Rana temporaria*), yngler der. Det nye regnvandsbassin er også en del af nettet af vandhuller, der benyttes af den beskyttede art stor vandsalamander (*Triturus cristatus*). En måling af drivhusgasemissioner i bassinet, udført under Ponderful-projektet, har vist, at vandhullet har lagret mere kulstof, end det har udledt.

Effektiviteten af NBS blev påvist under en storm i oktober 2023, hvor området fik omkring 60 mm regn i løbet af 10-12 timer. Dette svarer til mængden af regn, der normalt måles i løbet af en hel måned. Der blev ikke rapporteret om skader i Lystrup med undtagelse af en bebyggelse meget tæt på motorvejen.

HANDBOOK :

APPENDIX :

FOTOS CREDITS

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Background map, p.3 © Styrelsen for Dataforsyning og Effektivisering
Background map, p.8 ©Styrelsen for Dataforsyning og Infrastruktur.

FORFATTERE

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2024

http://www.ponderful.eu

Ponderful
PONDS FOR CLIMATE

GERMANY

PONDSCAPE : SCHÖNEICHE

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 pond losses in European countries over the past 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.

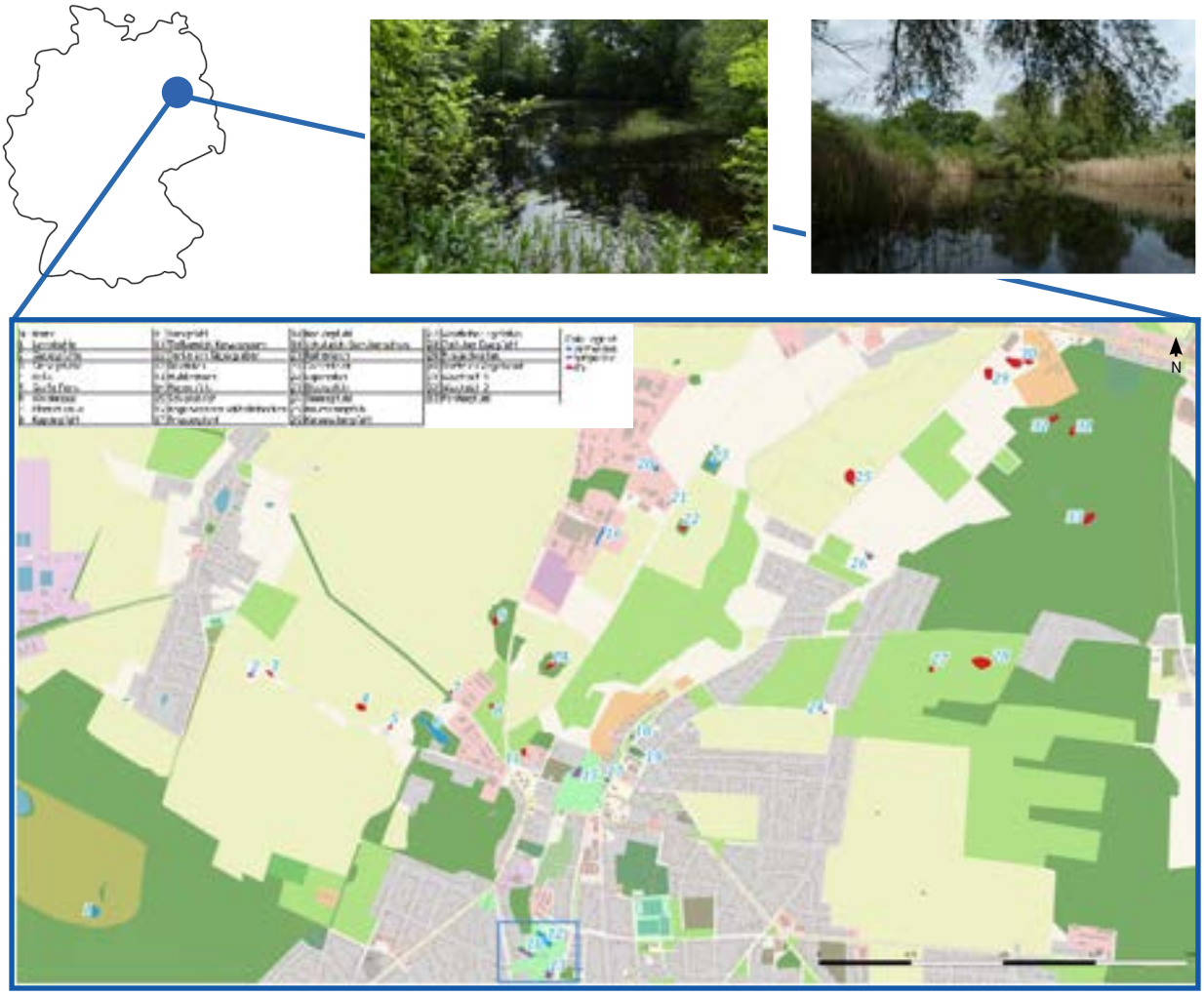
CONTEXT

Name of the pondscape: Schöneiche
Name of neighboring large town (in a 30 km radius):
Berlin (3'850'000 habitants)
Bioclimatic zone: Continental

Dominant land use:
Pondscape - grassland and pasture
Surrounding environment - agriculture and urbanization

Pondscape area: 16 km^2
Ponds : number: 33 (18 of them completely dry)
density: 1.6/km^2
surface areas : 170 to 5'770 m^2
depths : 0.1 to 2.5 m
ages : mostly ~12.000 years

Land owner: Various public and private owners
Land manager: Various public and private owners
Public access: 90 % of the area is accessible
Public amenities: Central spot at Kleiner Spreewaldpark, several footpaths

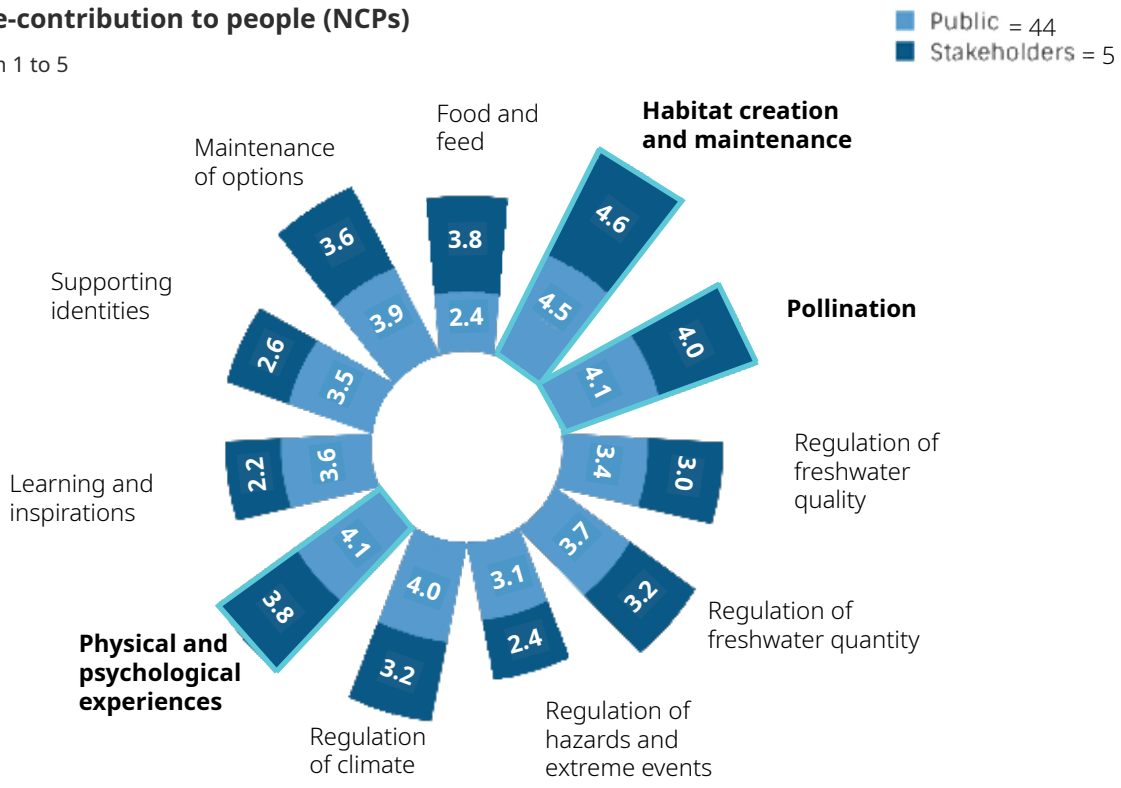


Map of Pondscape Schöneiche, with pond names. Ponds number 1-24, and 27 & 28 are part of the municipality Schöeneiche. Ponds 25 & 26, and 29-33 are part of the municipality Vogelsdorf. The different hydroperiods are indicated by the color legend. The blue rectangle depicts the area of the Kleiner Spreewaldpark.

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, (ii) pollination and (iii) the direct use of these natural areas by people (physical and psychological experiences).

LOCAL POLICIES

Part of the pondscape Schöneiche comprises the southern area of the Natura 2000 FFH-area „Fredersdorfer Mühlenfließ, Breites und Krummes Luch“ with the EU-Number 3448-302. However, while the Natura site focuses on the little river (Fredersdorfer Mühlenfließ) and its adjacent terrestrial vegetation, there is no formal protection status for the ponds of natural origin (post-glacial kettle holes) in Schöneiche, except the landscape around three ponds designed as “Natural Monument or Feature”. The dry ponds in the northern adjacent municipality Vogelsdorf are part of a Landscape Protection Site.

Local management approaches target the increasingly dramatic change in hydrological cycles, with negative balance between precipitation and evapotranspiration, and with lower groundwater tables. This regional trend induces massive permanent loss of ponds by complete dry-out. Key actions aim to collect rainwater and supply it to ponds located in the municipality of Schöneiche, to maintain aquatic habitats.

Stakeholder awareness and engagement is facilitated by a local NGO, which contributes to participatory decision processes in the municipality. The benefits of ponds and pondscapes as Nature-based Solutions are disseminated by educational formats to local school pupils and the wider public.

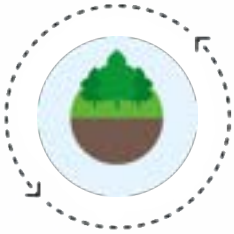
MAIN CHALLENGES AND OBJECTIVES

WATER MANAGEMENT

Retain water in the pondscape to prevent dry-out of ponds.

HUMAN HEALTH

A refreshing place to walk and relax, and to educate people about nature.



BIODIVERISTY ENHANCEMENT

Especially amphibians, insects, birds, and (semi-) aquatic vegetation.

NATURE BASED SOLUTIONS (NBS)

PONDS AND PONDSCAPE MANAGEMENT

- Rainwater collection from the roof of buildings for ponds in municipality (Bäckerpfuhl, Priesterpfuhl)
- Rainwater storage ponds in Gewerbegebiet connected to Blockspfuhl for water supply
- Annual water supply to Weidensee from Fredersdorfer Mühlenfließ
- Groundwater pump to provide water to Dinoteich in Kleiner Spreewaldpark

- Creation and maintenance of playground, paths and bridges in Kleiner Spreewaldpark
- Creation and maintenance of information boards

-Maintenance of minimum water level in some ponds to support aquatic biodiversity
-Documentation of emerging and potentially protected terrestrial plant and animal species on pond areas that dried out

NATURE CONTRIBUTIONS TO PEOPLE AND MEASURED INDICATORS

HABITAT CREATION AND MAINTENANCE

SPECIES RICHNESS
Aquatic plants: **32**
including shoreline vegetation: **87**
Amphibians: **4**
Dragonflies: **3**
Families of invertebrates: **15**

AMOUNT OF
Conservation priority species: **1**
Invasive alien species: **3**

NATIVE AMPHIBIAN SPECIES :


Pelophylax lessonae


Pelobates fuscus


Lissotriton vulgaris

REGULATION OF CLIMATE

Capacity of annual carbon storage in the ponds (by primary production, by organic matter accumulation) (tons CO_2e/pondscape/year)

156t

17t

Realized carbon accumulation rate (tons of CO_2e/pondscape/year)

NATURE CONTRIBUTIONS TO PEOPLE AND MEASURED INDICATORS

PHYSICAL AND PSYCHOLOGICAL EXPERIENCE

Number of people visiting the Kleiner Spreewaldpark (centre of pondscape) (nb/year) **17'000**

90% Area inside the pondscape accessible to the public

Self-reported satisfaction well-being (scale 1 to 5) **3.2**

Most popular activities :
relaxation (25%), wildlife observation (23%), ecological interest (21%) and hiking (20%)

LEARNING AND INSPIRATION

3000-4000 Number of pupils/students from school/university visiting the pondscape. (visits are only partly linked to ponds)

REGULATION OF WATER QUANTITY, LOCATION AND TIMING

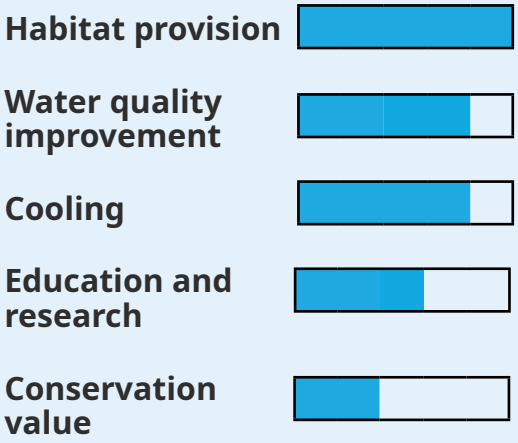
27'000m³ Potential water storage capacity in all ponds (m^3)

8 ponds out of 26 in Schöneiche are kept wet by external supply from river water, rainwater or groundwater **8 (31%)**

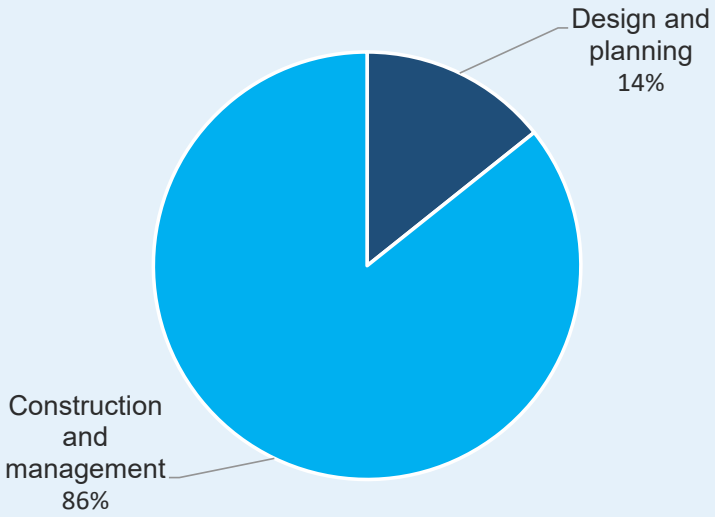
COSTS AND BENEFITS ANALYSIS

OVERALL COSTS ASSESSMENT

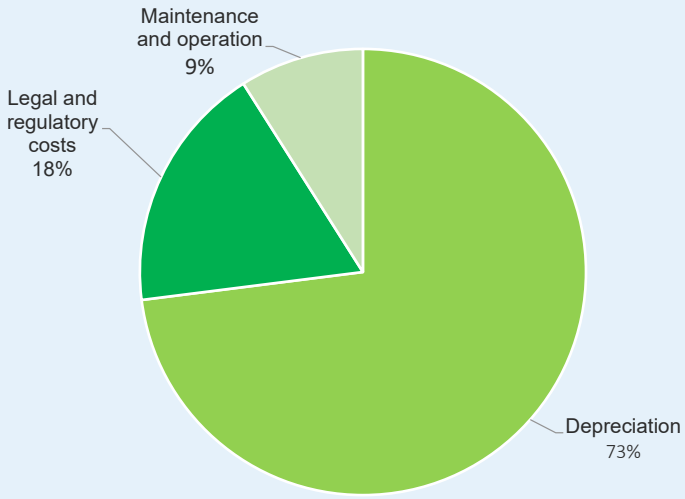
BENEFITS ASSESSMENT



SHARE OF COSTS FOR NBS ACTION



Relative cost of NbS creation measures



Relative cost of ongoing NbS management measures

SUITABLE FINANCE INSTRUMENTS TO REDUCE THE GAP

- 1. Voluntary contributions /donations
- 2. Grants
- 3. Other

FUNDING GAP ASSESSMENT

REMAINING THREATS

1. Changes in hydrology linked to climate change (timing and quantity of rainfall) and regional land management and agricultural practices. Further drawdown of groundwater levels due to sealed surfaces in urban areas and increased evapotranspiration by dominance of winter-green pine forests. More ponds are likely to dry out. This will impact aquatic biodiversity.

2. The impact of people on biodiversity, including introduction of exotic species (fish, amphibians and plants).

SUCCESS STORY AND TRANSFERABILITY

PREVENTING LARGE-SCALE POND DRY-OUT BY ARTIFICIAL WATER MANAGEMENT

The implementation of several measures to divert water into some of the ponds prevented the complete loss of the entire pondscape because none of the 26 ponds would keep water permanently without these measures. These actions include diversion of river water into one pond during high river water level, collection and supply of rainwater from roofs of municipality buildings into two central municipality ponds, and collection of rainwater from sealed surfaces in industrial area into storage ponds, from which water is supplied to one natural pond. As a consequence, aquatic biodiversity (amphibians, dragonfly larvae, birds) are still present in the pondscape. Keeping a minimum water level all year around is important because once water has disappeared from a pond for one or two years without re-wetting, the overgrowth of terrestrial vegetation prevents easy re-wetting even in years with strong rain.

Such NbS can be easily implemented in areas with large sealed surfaces (urban or industrial sites) close to the ponds. Construction costs may be high, while maintenance costs are relatively low.

DEVELOPMENT OF A NATURE EDUCATION CENTER ABOUT WATER AND PONDS IN THE MIDDLE OF THE MUNICIPALITY

The local NGO 'Naturschutzaktiv Schöneiche' has developed the Kleiner Spreewaldpark as a centre for education and inspiration. Local and regional inhabitants, in particular families, are attracted by footpaths along ponds and waterways, by a diverse fauna, and by activity opportunities (e.g. children's playground). Information boards educate the visitors.

The site is used for group visits of school pupils for nature education. The threats from global warming and change of land use on water availability in the area are directly visible from the drastic annual changes of water level in Kleiner Spreewaldpark. This may motivate municipality inhabitants to engage in actions to prevent further loss of local ponds from dry-out.

Such NbS is ideally implemented in areas where natural ponds can be found even in urbanized sites. The short distance to the education center from home of the inhabitants facilitates frequent visits and deeper understanding of annual changes of the systems.

HANDBOOK :

APPENDIX :

PHOTOS CREDITS

All pictures ©P. Mehner/IGB except :
Pond p.5 © M. Bendix/IGB
Pelobates fuscus p.5 © M. Krüger
Lissotriton vulgaris p.5 © Aneyrisme
p. 8-back cover © T. Mehner/IGB

First page's layout inspired by freepik.com

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2024

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PONDS FOR CLIMATE

DEUTSCHLAND

TÜMPELLANDSCHAFT : SCHÖNEICHE

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

WAS IST EINE TÜMPELLANDSCHAFT?

DEFINITION

Eine Tümpellandschaft ist ein Netzwerk von Tümpeln in räumlicher Nähe zueinander, eingebettet in die umgebende Landschaft

Die Grenzen einer Tümpellandschaft können durch physische oder ökologische Gegebenheiten (in einem Tal, einem Einzugsgebiet, oder eine Reihe von Tümpeln in einem Naturschutzgebiet) oder sogar durch gesellschaftliche oder politische Kriterien (Tümpel in der Stadt, oder innerhalb von Provinz- oder Landesgrenzen) bestimmt sein.

BEDROHUNGEN DER TÜMPEL UND TÜMPELLANDSCHAFTEN

50-90% der Tümpel und ähnlicher Kleingewässer in den europäischen Ländern sind während der letzten 100 Jahre verschwunden. Darüber hinaus werden Tümpel und Teiche in wasser- und naturbezogenen nationalen und EU-Politiken und Strategien, einschließlich der EU-Wasserrahmenrichtlinie, weitgehend vernachlässigt.

WARUM IST ES WICHTIG, SIE ZU FÖRDERN?

FÖRDERUNG DER BIOLOGISCHEN VIELFALT

Weitgehend vernachlässigt und im Allgemeinen unterbewertet, sind Tümpel und ähnliche Kleingewässer von bemerkenswerter Bedeutung für die Erhaltung der biologischen Vielfalt. Tümpellandschaften stellen Hotspots der biologischen Vielfalt dar.

REDUZIERUNG DES KATASTROPHENRISIKOS

Tümpel und Tümpellandschaften spielen eine grundlegende Rolle bei der Eindämmung von Überschwemmungen und stellen auch eine Wasserreserve für die Brandbekämpfung dar.

MENSCHLICHE GESUNDHEIT

Tümpel und Tümpellandschaften bieten eine breite Palette von Vorteilen für die menschliche Gesellschaft, wie z. B. Förderung der menschlichen Gesundheit und Lebensqualität, Raum für körperliche Aktivitäten oder soziale Interaktion, aber auch ästhetische Erlebnisse sowie Bildungs- und Freizeitaktivitäten.

ABSCHWÄCHUNG DES KLIMAWANDELS UND ANPASSUNG

Aufgrund ihrer hohen Zahl und ihrer hohen Produktivität haben Tümpel und ähnliche Kleingewässer einen erheblichen Einfluss auf den Kohlenstoffkreislauf, da sie sowohl als Kohlenstoffsenken als auch als Kohlenstoffquellen fungieren.

WASSERMANAGEMENT

Tümpellandschaften stellen eine Wasserreserve dar, die vor allem im Zusammenhang mit Wasserknappheit wichtig ist. Sie sind besonders nützlich für das Tränken von Tieren und für die Bewässerung.

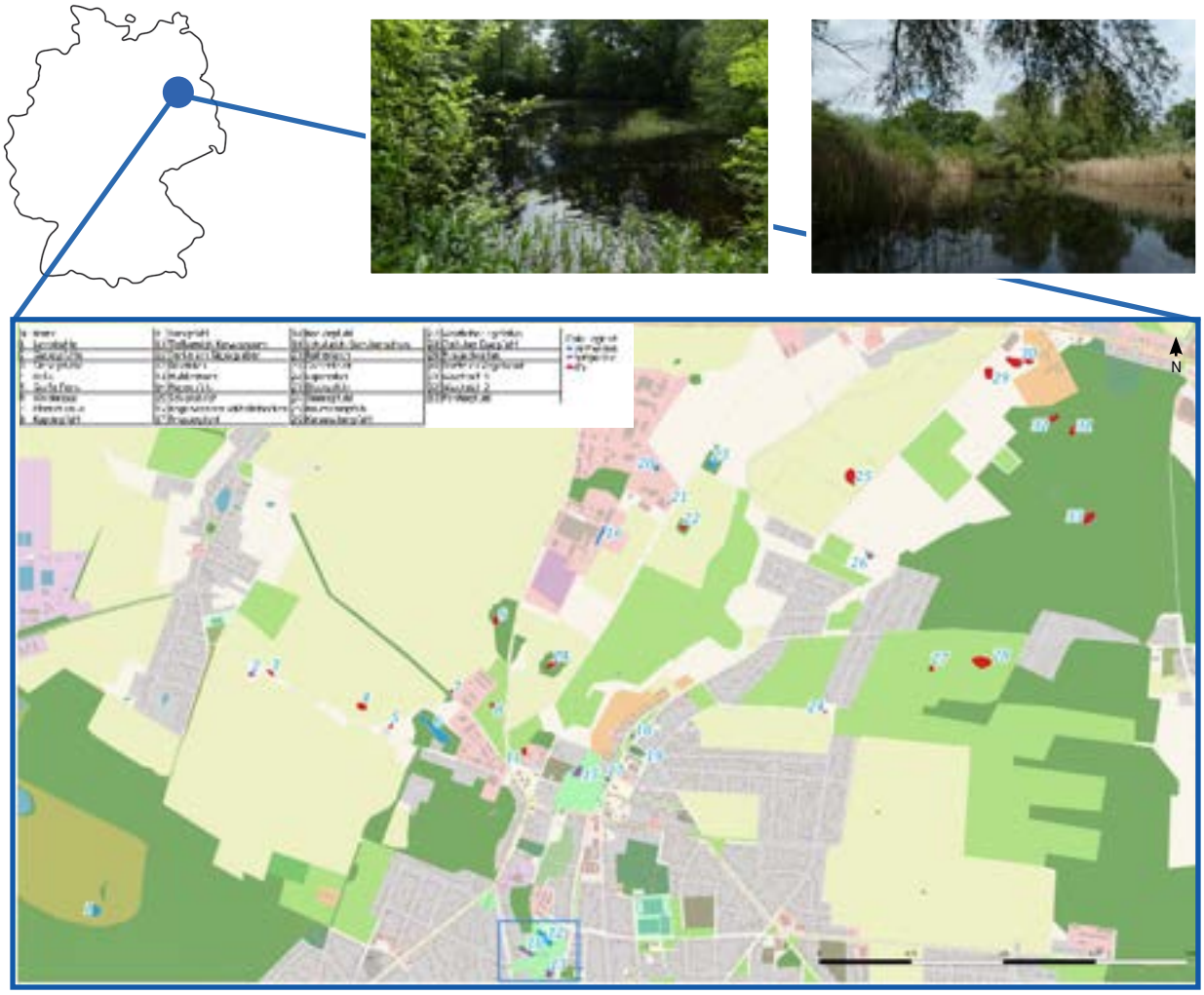
KONTEXT

Name der Tümpellandschaft: Schöneiche
Name der nächsten großen Stadt (im 30 km Radius):
Berlin (3’850’000 Einwohner)
Bioklimatische Zone : Kontinental

Dominierende Landnutzung:
Tümpellandschaft – Wiesen und Weiden, Ackerbau
Umgebende Flächen – Siedlungsgebiet, Ackerbau

Fläche der Tümpellandschaft: 16 km^2
Anzahl der Tümpel: 33 (18 von 33 (55 %) vollständig ausgetrocknet (2023))
Dichte: 1.6/km^2
Oberfläche: 170 bis 5’770 m^2
Tiefe: 0.1 bis 2.5 m
Alter: in der Mehrzahl ~12.000 Jahre (eiszeitliche Sölle)

Landeigentümer: verschiedene private und öffentliche Eigentümer
Landbewirtschafter: verschiedene private und öffentliche Eigentümer
Öffentliche Zugänglichkeit: 90 % der Fläche sind öffentlich zugänglich
Infrastruktur: Zentrale Einrichtung im Kleinen Spreewaldpark, verschiedene Fußwege



Karte der Tümpellandschaft Schöneiche, mit Lokalnamen der Tümpel. Nummer 1-24, und 27 & 28 sind Teil der Gemeinde von Schöneiche. Tümpel 25 & 26, und 29-33 sind Teil der Gemeinde Vogelsdorf. Die unterschiedliche Wasserführung ist in der Legende erklärt. Das blaue Rechteck zeigt das Gebiet des Kleinen Spreewaldparks.

ERWARTUNGEN DER ÖFFENTLICHKEIT

Die 11 Beiträge der Natur für den Menschen (NCPs)

Skala: Bewertung von 1 bis 5

Die Erwartungen beziehen sich vor allem auf (i) die Bereitstellung von Lebensräumen für die biologische Vielfalt und die Bestäubung und (ii) die unmittelbare Nutzung dieser Naturräume durch den Menschen (physische und psychologische Erfahrungen).

LOKALE REGELWERKE

Ein Teil der Tümpellandschaft Schöneiche umfasst den südlichen Bereich des Natura 2000 FFH-Gebietes «Fredersdorfer Mühlenfließ, Breites und Krummes Luch» mit der EU-Nummer 3448-302. Während sich das Natura-Gebiet jedoch auf das Fredersdorfer Mühlenfließ und die unmittelbar angrenzende terrestrische Vegetation konzentriert, gibt es für die Tümpel natürlichen Ursprungs (nacheiszeitliche Feld-Söl-le) in Schöneiche keinen formalen Schutzstatus, mit Ausnahme der Landschaft um drei Tümpel, die als «Flächen-Naturdenkmal» ausgewiesen sind. Die inzwischen trockengefallenen Tümpel in der nördlichen Nachbargemeinde Vogelsdorf sind Teil eines Landschaftsschutzgebietes.

Die lokalen Bewirtschaftungsansätze zielen auf die zunehmend dramatische Veränderung der hydrologischen Kreisläufe mit negativem Gleichgewicht zwischen Niederschlag und Verdunstung, mit der Folge eines sinkenden Grundwasserspiegels. Dieser regionale Trend führt zu einem massiven und dauerhaften Verlust von Tümpeln durch vollständiges Austrocknen. Die wichtigsten Maßnahmen zielen darauf ab, Regenwasser zu sammeln und in Tümpel in der Gemeinde Schöneiche zu leiten, um die aquatischen Lebensräume zu erhalten.

Die Sensibilisierung und Einbeziehung der Betroffenen wird unter anderem durch das lokale Naturschutzaktiv Schöneiche ermöglicht, welches zu partizipativen Entscheidungsprozessen in der Gemeinde beiträgt. Die Vorteile von Tümpeln und Tümpellandschaften als naturbasierte Lösungen werden durch Bildungsformate an lokale Schüler und die breite Öffentlichkeit weitergegeben.

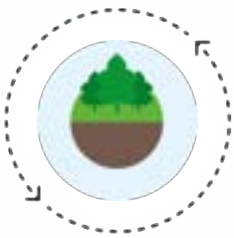
WICHTIGSTE HERAUSFORDERUNGEN UND ZIELE

WASSERMANAGEMENT

Aufrechterhaltung einer Mindestwassermenge in ausgewählten Tümpeln, um komplettes Austrocknen zu verhindern.

MENSCHLICHE GESUNDHEIT

Ein erfrischender Ort zum Spazierengehen und Entspannen und um die Menschen über die Natur aufzuklären.



ERHÖHUNG DER BIODIVERSITÄT

Besonders Amphibien (Frösche und Kröten), Insekten, Vögel und Pflanzen im und am Gewässer.

NATURBASIERTE LÖSUNGEN (NBS)

TÜMPEL INFRASTRUKTUR UND MANAGEMENT

- Regenwassersammlung von Hausdächern für Tümpel in der Dorfaue (Bäckerpfuhl, Priesterpfuhl)
- Speicherteiche für Regenwasser im Gewerbegebiet Nord mit Anschluss an den Blockspfuhl zur Wasserversorgung
- Jährliche Wasserversorgung des Weidensees über Fredersdorfer Mühlenfließ
- Grundwasserpumpe zur Wasserversorgung von Dinoteich im Kleinen Spreewaldpark

- Schaffung und Erhaltung von Spielplatz, Wegen und Brücken im Kleinen Spreewaldpark
- Schaffung und Erhaltung von Schautafeln

- Aufrechterhaltung einer Mindestwasserführung in ausgewählten Tümpeln zur Stabilisierung der aquatischen Biodiversität
- Ausgetrocknete Teiche unter Beobachtung, inwieweit schützenswerte Flora und Fauna sich auf den neu entstandenen terrestrischen Gebieten ansiedelt

NATURBASIERTE LÖSUNGEN UND GEMESSENE KENNGRÖSSEN

SCHAFFUNG UND ERHALTUNG VON HABITATEN

ARTENVIELFALT
Aquatische Pflanzenarten : **32**
einschließlich der Ufervegetation : **87**
Amphibien : **4**
Libellen : **3**
Familien aquatischer Wirbelloser: **15**

ANZAHL
geschützter Arten : **1**
invasive Arten: **3**

EINHEIMISCHE AMPHIBIENARTEN:


Pelophylax lessonae


Pelobates fuscus


Lissotriton vulgaris

KLIMAREGULATION

Geschätzte maximale Kapazität der jährlichen Speichermenge von Kohlenstoff in den Tümpeln bei ganzjähriger Wasserführung (durch Photosynthese, und durch Sammlung von organischem Material wie Laub) (Tonnen CO_2 Äquivalente/ Tümpellandschaft/Jahr)

156t

17t

Realisierte Speichermenge von Kohlenstoff in den wasserführenden Tümpeln (Tonnen CO_2 Äquivalente/ Tümpellandschaft/Jahr)

NATURBASIERTE LÖSUNGEN UND GEMESSENE KENNGRÖSSEN

PHYSISCHE UND PSYCHOLOGISCHE ERFAHRUNGEN

Anzahl der Besucher im Kleinen Spreewaldpark (Zahl/Jahr) **17'000**

90% öffentlich zugängliches Gebiet innerhalb der Tümpellandschaft

Selbst-berichtete Zufriedenheit und Wohlbefinden (Skala 1-5) **3.2**

Häufigste Aktivitäten :
Erholung (25%), Tier- und Pflanzenbeobachtungen (23%), ökologisches Interesse (21%) und Wandern (20%)

LERNEN UND INSPIRATION

3000-4000 Anzahl von Schulkindern, welche jährlich den Kleinen Spreewaldpark und Teile der Tümpellandschaft besuchen.

REGULIERUNG DER WASSERMENGE

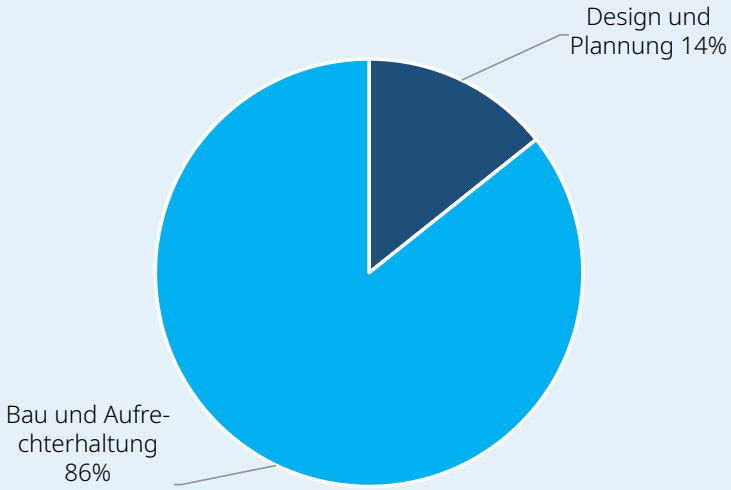
27'000m³ Geschätztes Speichervolumen von Wasser in allen Tümpeln (m^3)

Tümpel von insgesamt 26 in Schöneiche werden durch externe Wasserzufuhr ganzjährig wasserführend gehalten. **8 (31%)**

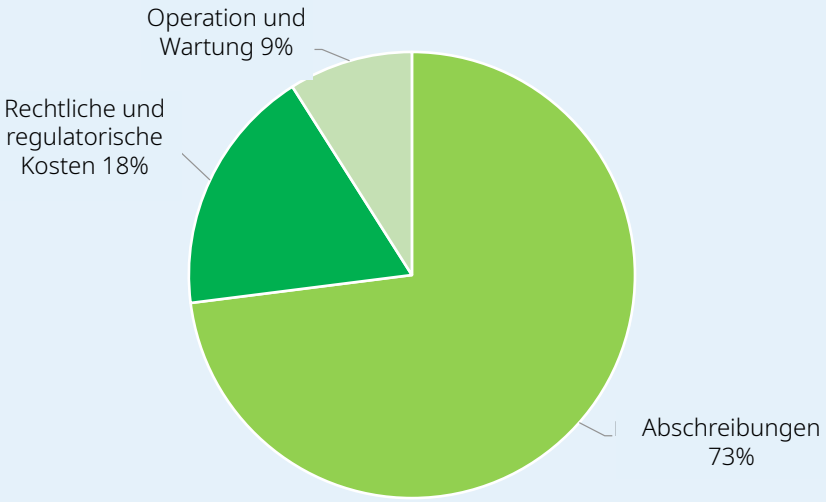
KOSTEN-NUTZEN ANALYSE

ALLGEMEINE KOSTENANALYSE

KOSTENVERTEILUNG FÜR EINE NBS LÖSUNG

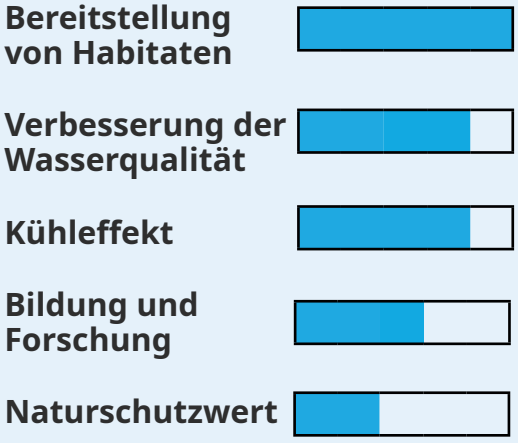


Relative Kosten der Schaffung naturbasierter Lösungen



Relative Kosten der Weiterführung naturbasierter Lösungen

BEWERTUNG DES NUTZENS



FINANZIERUNGS-MÖGLICHKEITEN

- ☑ 1. Spenden
- ☑ 2. Öffentliche Forschungs- und Entwicklungsprojekte
- ☑ 3. Andere

GESCHÄTZTE FINANZIERUNGSLÜCKE

VERBLEIBENDE RISIKEN

1. Veränderungen der Hydrologie im Zusammenhang mit dem Klimawandel (Zeitpunkt und Menge der Niederschläge) und der regionalen Landnutzung und mit den landwirtschaftlichen Praktiken. Weitere Absenkung des Grundwasserspiegels durch versiegelte Flächen und erhöhte Evapotranspiration durch die Dominanz wintergrüner Kiefernwälder. Weitere Tümpel werden wahrscheinlich austrocknen. Dies wird sich auf die aquatische Artenvielfalt auswirken.

2. Die Auswirkungen des Menschen auf die biologische Vielfalt, einschließlich der Einschleppung invasiver Arten (Fische, Amphibien und Pflanzen).

ERFOLGSGESCHICHTEN UND ÜBERTRAGBARKEIT

AKTIVES (REGEN)WASSER-MANAGEMENT VERHINDERT AUSTROCKNUNG DER TÜMPEL

Durch die Umsetzung mehrerer Maßnahmen zur Umleitung von Wasser in einige der Tümpel konnte der vollständige Verlust der gesamten Tümpellandschaft verhindert werden, da keiner der 26 Tümpel ohne diese Maßnahmen ganzjährig Wasser führen würde. Zu diesen Maßnahmen gehören die Umleitung von Wasser aus dem Fredersdorfer Mühlenfließ in den Weidensee im Frühjahr, das Sammeln und Einleiten von Regenwasser von den Dächern der Gemeindegebäude in zwei zentrale Gemeindeteiche (Priester- und Bäckerpfuhl) und das Sammeln von Regenwasser von versiegelten Flächen im Gewerbegebiet Nord in Speicherteiche, von denen Wasser in den Blockspfuhl geleitet wird. Infolgedessen ist die aquatische Artenvielfalt (Amphibien, Libellenlarven, Vögel) in der Tümpellandschaft weiterhin vorhanden. Es ist wichtig, das ganze Jahr über einen Mindestwasserstand aufrechtzuerhalten, denn wenn das Wasser erst einmal ein oder zwei Jahre lang ohne Wiedervernässung aus einem Tümpel verschwunden ist, verhindert der Bewuchs mit terrestrischen Pflanzen eine einfache Wiedervernässung selbst in Jahren mit starken Regenfällen.

Solche naturbasierten Lösungen lassen sich leicht in Gebieten mit großen versiegelten Flächen (Stadt- oder Industriegebiete) in der Nähe von Tümpeln umsetzen. Die Baukosten können hoch sein, während die Wartungskosten relativ gering sind.

ENTWICKLUNG EINES NATURBILDUNGSZENTRUMS ÜBER WASSER UND TÜMPEL IN DER MITTE DER GEMEINDE SCHÖNEICHE

Das Naturschutzaktiv Schöneiche hat den Kleinen Spreewaldpark als Bildungs- und Inspirationszentrum entwickelt. Wanderwege entlang von Teichen und Wasserläufen, eine vielfältige Tierwelt und Aktivitätsmöglichkeiten (z.B. Kinderspielplatz) locken die Bewohner der Gemeinde und der Region, insbesondere Familien, an. Informationstafeln klären die Besucher auf. Das Gelände wird für Gruppenbesuche von Schülern im Rahmen der Naturerziehung genutzt. Die Bedrohung der Wasserverfügbarkeit in dem Gebiet durch die globale Erwärmung und die veränderte Landnutzung ist an den drastischen jährlichen Schwankungen des Wasserstands im Kleinen Spreewaldpark direkt ablesbar. Dies kann die Einwohner der Gemeinde motivieren, Maßnahmen zu unterstützen, die den weiteren Verlust der örtlichen Tümpel durch Austrocknung verhindern.

Eine solche naturbasierte Lösung wird idealerweise dort umgesetzt, wo natürliche oder auch künstlich angelegte Tümpel auch in dicht besiedelten Gebieten zu finden sind. Die geringe Entfernung zwischen dem Bildungszentrum und den Wohnorten der Einwohner erleichtert häufige Besuche und ein tieferes Verständnis der jährlichen Veränderungen der Systeme.

HANDBOOK :

APPENDIX :

FOTOS CREDITS

Alle Fotos © Paula Mehner/IGB, Außer:
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Pelobates fuscus S.5 © M. Krüger
Lissotriton vulgaris S.5 © Aneyrisme
S. 8-backcover © T. Mehner/IGB

First page's layout inspired by freepik.com

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2024

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PONDS FOR CLIMATE

CATALONIA, SPAIN

PONDSCAPE : LA PLETERA

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 pond losses in European countries over the past 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

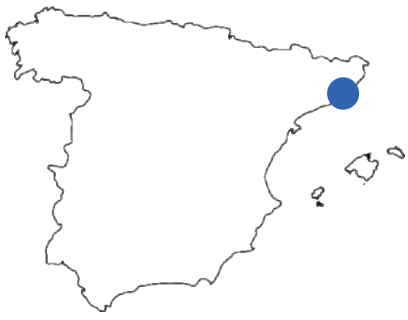
Name of the pondscape : La Pletera
Name of neighboring large town (in a 15 km radius):
Torroella de Montgr (12'000 habitants)
Bioclimatic zone : Mediterranean

Dominant land use :
pondscape - Coastal salt marshes
surrounding environment - tourist residential estate, agriculture

Pondscape area : 0.6 km^2
Pond : number: 20
density: 33/km^2
surface areas : 150 to 17'000 m^2
depths : 0 to 4 m
ages : 5 to 20 years (some natural ponds present)

Land owner : Gobierno de España
Land manager : Parc Natural del Montgrí, les Illes Medes i el Baix Ter
Public access : peripheral paths and the whole beach accessible
Public amenities : several footpaths and some hides

A deconstruction project where a failed attempt of urbanization was substituted by a fully functional salt marsh ecosystem

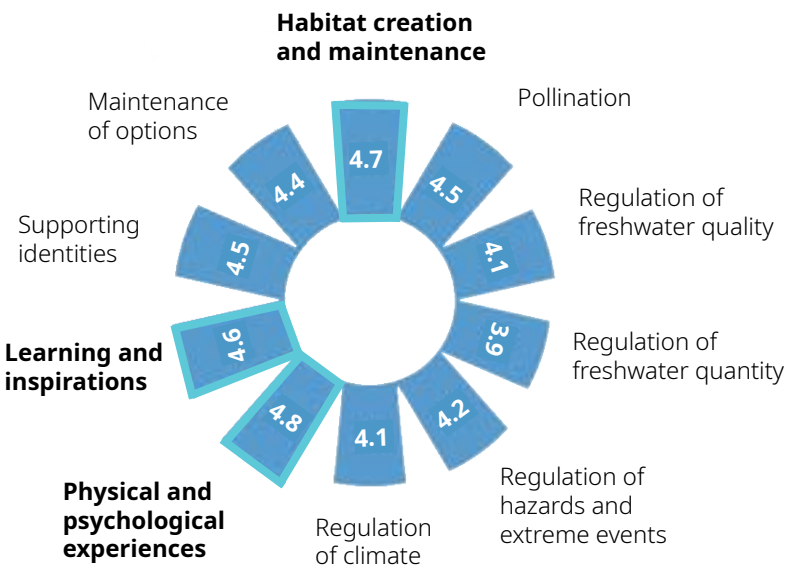


Latitude : 42.032043°
Longitude : 3.1090959°

LOCAL COMMUNITY EXPECTATIONS

The 10 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 direct use of these natural areas by people (physical and psychological experiences).

LOCAL POLICIES

La Pletera pondscape has been the focus of two LIFE projects, which have restored c. **60 ha of saltmarsh habitats**, in particular coastal lagoons.

Two natural ponds were restored and 18 new seasonal lagoons were created. This is a key habitat for the endangered fish species *Aphanius iberus*.

18

The area has been partially urbanized in early 1990´s. The restoration projects have removed the urban infrastructure, restored the ecological function of the saltmarsh, and created **12 ha of habitats of Community interest (priority).**

12ha

In the first two years after restoration actions, the dune system has increased an average of **71% of its sand volume and 1m in dune height.**

71%

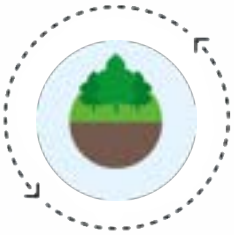
La Pletera has a strong legal protection status. 100 % is classified as a Partial Natural Reserve within the Montgrí, Medes Islands and Baix Ter Natural Park. It is also part of the Natura 2000 Network and included in the Spanish Maritime-terrestrial Public Domain (DPMT), that forbids urbanisation and agriculture use in the area. Furthermore, La Pletera is included in the Catalonian Plan for Spaces of Natural Interest.

100%

The Natural Park board and the Town Council of Torroella de Montgrí are both responsible for managing the la Pletera area, including actions to control and adapt accesses, maintenance of infrastructures (paths, viewpoints, signage, etc.), management of protected species, environmental education and other outreach activities.

The persistence of various intensive land uses in its immediate environment, in particular tourism and agriculture, constitutes the main threat to the fulfillment of the conservation goals. The collaboration among the Natural Park, the Town Council of Torroella de Montgrí and the University of Girona is a key factor for the effective implementation of the NbS at the site.

MAIN CHALLENGES AND OBJECTIVES



BIODIVERSITY ENHANCEMENT

Salt marsh plants. Endemic fish (*Aphanius iberus*). Endangered birds (e.g. *Charadrius alexandrinus*).

HUMAN HEALTH

A place to walk and relax and to educate people about nature.

CLIMATE CHANGE ADAPTATION

Carbon storage, contributing to the Catalan long-term climate strategy.

WATER MANAGEMENT

A buffer regulating the sea water flow in the salt marsh, reducing the risk of flooding during sea storms.

NATURE BASED SOLUTIONS (NBS)

Change in land use, **restoration** of existing ponds and **new pond creation** are the Nature-based Solutions put in practice at La Pletera to address the four identified societal challenges.

TOURIST RESIDENTIAL ESTATE → ***FUNCTIONAL COASTAL ECOSYSTEM***

1983	1987-1993	1988-2001	1999-2002	2004	2010	2014-2018
Declaration of 81ha as urbanizable	Construction of the first building	Revision of the urbanism plan : declaration of natural area	First LIFE Nature project. Creation of some new coastal ponds	Declaration of 60ha as public zone	Included in the recently created Natural Park	Second LIFE Nature Project for definitive restoration

PONDS AND PONDSCAPE MANAGEMENT

- Protection status
- Removal of unfinished building works
- Pond creation and restoration
- Recovery of a coastal habitat parallel to the seashore, formed by lagoons surrounded by salt marsh vegetation
- Restoration to a fully-functional dune system
- No human intervention in water and nutrient dynamics

Public use:
- Change in land use
- Peripheral footpaths and open access to the beach, but not to the dunes or the salt marsh to prevent human pressure in the natural areas

Recovery of salt marsh capacity to prevent flooding during sea storms
Prevention of beach erosion
Adaptation of the coast line to climate change

TECHNICAL DESIGN

MAIN RESTORATION ACTIONS

1. Removal of the promenade and the breakwater

2. Removal of paved streets and accesses

3. Restoration of the front dune

4. Removal of the dams that limit lagoons overflow

ECOLOGICAL CRITERIA APPLIED IN RESTORATION DESIGN

A. Recovery of the ecological functioning of the coastal ecosystem

B. Improvement of the existing population of the endemic Iberian toothcarp (*Aphanius iberus*)

C. Non-intervention in areas still maintaining salt marsh vegetation

D. Recovery of the topographical levels existing before the urbanisation process

E. A design of the ponds distribution that recalls the existence of an unfinished urbanisation process in the area

POTENTIAL THREATS

Issues addressed by the restoration work

- Habitat destruction and degradation due to the presence building work.
- Reduction of run-off areas for seawater during sea storms, causing marine intrusion. Little capacity for lagoons to flood.
- Dune degradation and sand loss with risk of sand building up in the salt marsh.

Partly addressed and improving issues

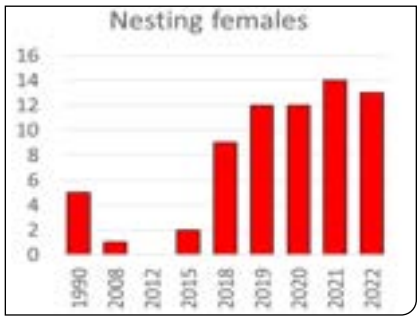
- Water eutrophication and anoxic conditions due to confinement.
- Presence of invasive species, such as the Mosquitofish (*Gambusia holbrooki*).
- Over-frequentation.

SUCCESS STORY AND TRANSFERABILITY

1. HABITAT CREATION AND MAINTENANCE FOR THE CONSERVATION OF BIODIVERSITY

Aphanius iberus

Charadrius alexandrinus



The creation of several new lagoons favors the conservation of the populations of the endemic Iberian toothcarp (*Aphanius iberus*).

This species competes with the invasive mosquitofish (*Gambusia holbrooki*) in most lowland waterbodies. In La Pletera both species coexist, with high saline conditions favoring the Iberian toothcarp.

The Kentish Plover (*Charadrius alexandrinus*) is a bird that builds a cryptic nest on the sand. Overfrequentation and trampling caused a dramatic decrease on their populations that recovered after restoration.

Can you find the nest ?

NATURE'S CONTRIBUTIONS TO PEOPLE AND MEASURED INDICATORS

AQUATIC BIODIVERSITY

SPECIES RICHNESS
Aquatic plants : **47**
Water birds : **104**
Amphibians : **4**
Dragonflies : **3**
Families of invertebrates : **17**

AMOUNT OF
Conservation priority species : **6**
Species in the Directive Habitat Annexe : **6***
Aphanius iberus, Epidalea calamita, Hyla meridionalis, Pelobates cultripes, Emys orbicularis, Mauremys leprosa.
Invasive alien species : **5**

CONTRIBUTION TO REGIONAL RICHNESS

Only few species adapted to the changing conditions of temperature, salinity and nutrient composition are able to colonize these salt marshes. These species, however, have a very reduced distribution due to the destruction and urbanization of these coastal habitats. With the presence of these rare species, these ecosystems make important contribution to regional diversity.

SUCCESS STORY AND TRANSFERABILITY

2.RECOVERY OF THE ECOLOGICAL FUNCTIONING AND ADAPTATION TO CLIMATE CHANGE

The restored saltmarsh has been built maintaining the characteristic hydrology and nutrient dynamics of these habitats, thus guaranteeing the conservation of the typical community structure of Mediterranean coastal ponds. The newly created habitat responds effectively to the predicted effects of climate change, that include higher sea levels and more frequent severe sea storms.

This recovery strategy is easily applicable to other degraded coastal areas.

La Pletera after a strong flooding event (January 2020), flooded but with no significant damage or erosion to the coast.

NATURE'S CONTRIBUTIONS TO PEOPLE AND MEASURED INDICATORS

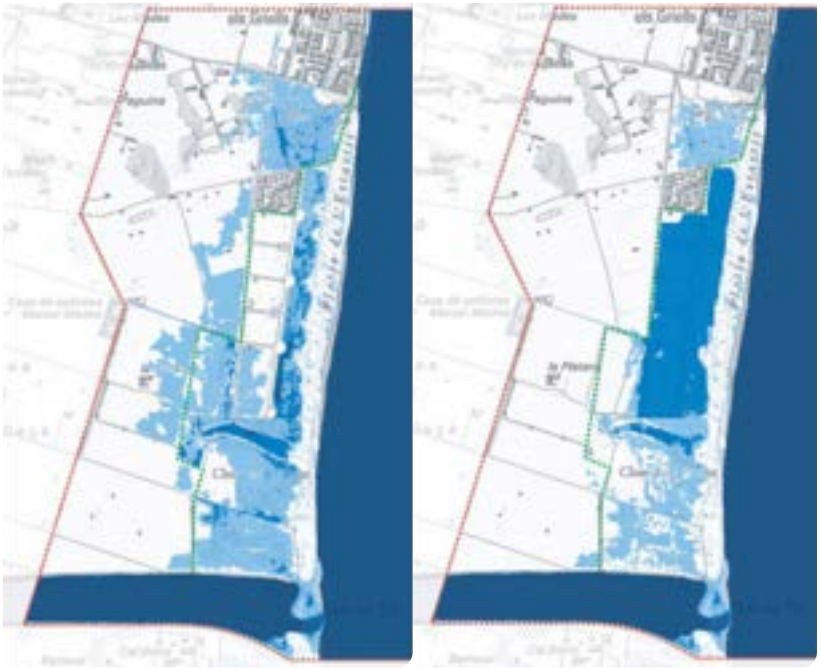
REGULATION OF SEA WATER FLOODINGS

Hydraulic model of sea water intrusions after a strong sea storm during urbanised (left) and after the removal of the indrastructures (right).

Sea water flooding (in blue) hardly breaches the saltmarsh limits (green dashed line) after restoration.

Before restoration, man made infrastructures forced sea water to flood fields beyond the saltmarsh.

Red line, limits of the Nature 2000 network.



SUCCESS STORY AND TRANSFERABILITY

3. COEXISTENCE OF NATURAL HABITATS AND TOURISM

The conservation of biodiversity is compatible with a high frequentation and the enjoyment of nature by people if they respect the limits of the protected areas.

NATURE'S CONTRIBUTIONS TO PEOPLE AND MEASURED INDICATORS

PHYSICAL AND PSYCHOLOGICAL EXPERIENCE

Number of people/walkers visiting the pondscape (leisure, tourism, fishing, nature watching etc.) (number/year) **94'500**

31'600 Number of bicycles circulating per year

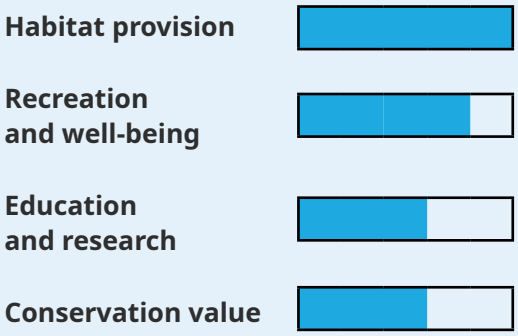
Self-reported satisfaction well-being (scale 1 to 5) before (2014), immediately after (2018) and 5 years after (2022) the restoration :

3.99 → 4.29 → 4.64

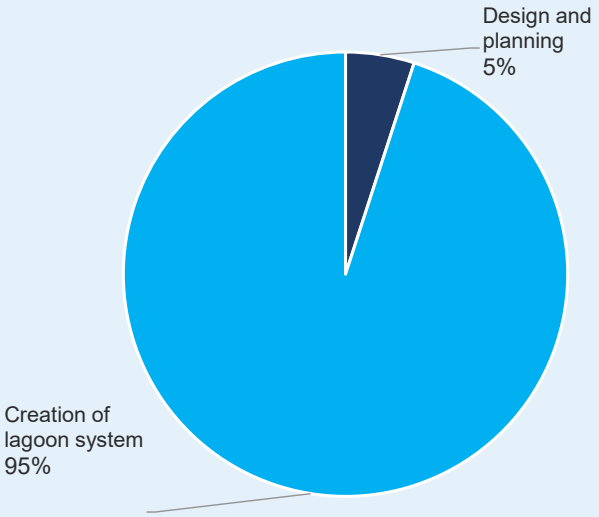
COSTS AND BENEFITS ANALYSIS

OVERALL COSTS ASSESSMENT

BENEFITS ASSESSMENT



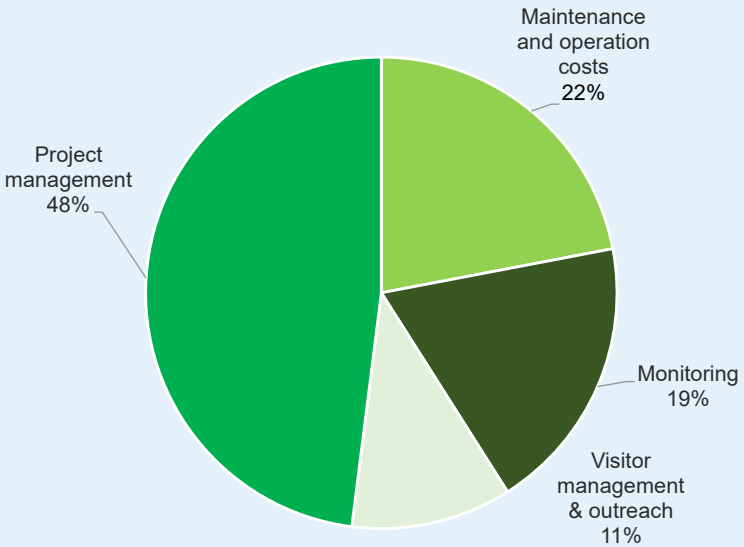
SHARE OF COSTS FOR NBS ACTION



Relative cost of NbS creation measures

SUITABLE FINANCE INSTRUMENTS TO REDUCE THE GAP

- 1. Users fees
- 2. Developpement rights and leases
- 3. Sales of market goods and services
- 4. Grants



Relative cost of ongoing NbS management measures

FUNDING GAP ASSESSMENT

HANDBOOK :

APPENDIX :

PHOTOS CREDITS

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Charadrius alexandrinus and nest p.6 © PN del Montgri.
Walkaway, hides, joggers p.8 © D. Lindoso
Sand, p.8 © X. Quintana
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First page's layout inspired by freepik.com

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2024

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PONDS FOR CLIMATE

CATALUNYA

MARESMA DE LA PLETERA

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

QUÈ ÉS UN PAISATGE AMB ESTANYS?

DEFINICIÓ

Un paisatge amb estanys és una xarxa de basses i aiguamolls propers els uns dels altres ("connectivitat") i la matriu d'espais naturals i humanitzats que hi ha al seu entorn.

Els límits d'un paisatge amb estanys poden estar determinats per entorns físics o ecològics (una vall, una conca, un conjunt d'estanys en una reserva natural) o també per criteris socials o polítics (basses en entorns urbans o fronteres administratives).

PRESSIONS/AMENACES SOBRE ELS ESTANYS I ELS PAISATGES AMB ESTANYS

Durant el darrer segle els països europeus han perdut entre el 50 i el 90% dels seus estanys. A més, els estanys han estat oblidats en les polítiques i estratègies nacionals i de la UE relacionades amb l'aigua i la natura, inclosa la Directiva Marc de l'Aigua (EU-WFD).

PER QUÈ ÉS IMPORTANT VALORAR-LOS?

MILLORA DE LA BIODIVERSITAT

En gran part descuidats i generalment infravalorats, els estanys són molt importants per a la conservació de la biodiversitat. Els estanys representen punts calents de biodiversitat.

REDUCCIÓ DE RISCOS

Els estanys i els paisatges amb estanys tenen un paper fonamental per mitigar les inundacions i també son reserva d'aigua per combatre incendis.

SALUT HUMANA

Els estanys i els paisatges amb estanys proporcionen un ampli ventall de beneficis per a la societat, com ara la seva contribució a la salut humana i la qualitat de vida. Aporten espais aptes per a la realització d'activitats físiques o la interacció social, però també experiències estètiques i activitats educatives i recreatives.

ADAPTACIÓ AL CANVI CLIMÀTIC

Donada la seva abundància i la seva alta productivitat, els estanys influeixen notablement en el cicle del carboni, actuant com a embornals i com a font de carboni.

GESTIÓ DE L'AIGUA

Els estanys proporcionen una reserva d'aigua que és especialment important en un context d'escassetat hidrica. Són especialment útils com a reservoris d'aigua per als animals i el reg.

CONTEXT

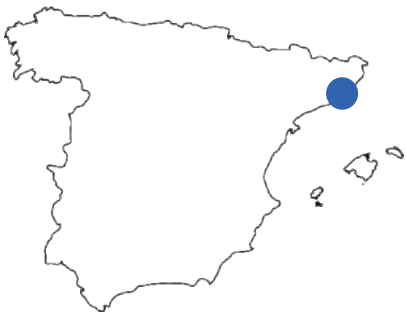
Nom del paisatge amb estanys : La Pletera
Nom del nucli urbà proper més gran (en un radi de 15 km) :
Torroella de Montgrí (12.000 habitants)
Zona bioclimàtica : Mediterrània

Ús predominant de l'espai :
Paisatge amb estanys - aiguamolls costaners
Entorn - urbanitzacions d'ús turístic, agricultura

Superfície del paisatge amb estanys : 0,6 km^2
Número de basses : 20
densitat : 33 per km^2
superfície de les basses : 150 a 17.000 m^2
fondàries : 0 a 4 m
creació : 5 a 20 anys (algunes basses son naturals)

Propietari de l'espai : Gobierno de España
Gestor de l'espai : Parc Natural del Montgrí, les Illes Medes i el Baix Ter
Accés públic : Itineraris perifèrics i tota la platja accessible
Equipaments públics : xarxa d'itineraris i alguns miradors

Un projecte de deconstrucció on un intent d'urbanització fallit s'ha substituït per un sistema de maresma costanera plenament funcional



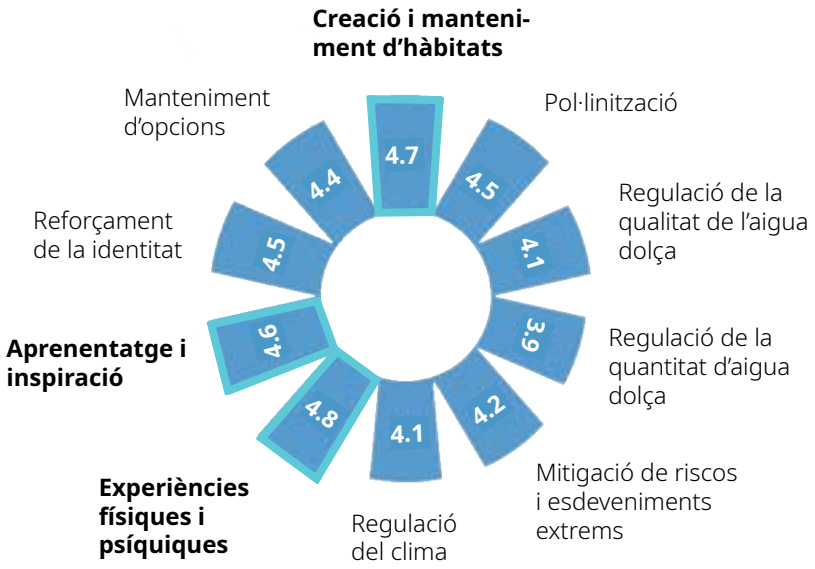
Latitud : 42.032043°
Longitud : 3.1090959°

ESPECTATIVES DE LA COMUNITAT LOCAL

Les 11 contribucions de la natura a la societat (NCPs)

Escala : puntuació d'1 a 5

Públic (=223)



Les expectatives es basen sobretot en (i) la provisió d'hàbitats per a la biodiversitat i (ii) l'ús lúdic d'aquests espais naturals per part de la gent (experiències físiques i psíquiques).

POLÍTIQUES LOCALS

El paisatge amb estanys de la Pletera ha estat l'escenari de dos projectes LIFE, que han restaurat prop de **60 ha d'hàbitats de maresma**, en particular de llacunes costaneres.

Es van restaurar dues llacunes naturals i se'n van crear 18, tant permanents com temporànies. Aquest és un hàbitat clau per a l'*Aphanius iberus*, peix en perill d'extinció.

18

La zona es va urbanitzar parcialment a principis de la dècada de 1990. Els projectes de restauració han retirat les infraestructures urbanes, han restaurat la funcionalitat ecològica de la maresma, i han creat **12 ha d'Hàbitats d'Interès Comunitari (prioritaris).**

12ha

En els dos primers anys després de les actuacions de restauració, el sistema dunar ha augmentat una mitjana del **71% el seu volum de sorra i 1 m d'alçada de duna.**

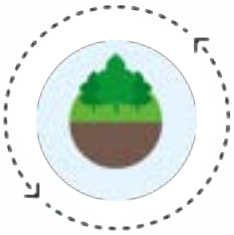
71%

La Pletera té un estatus consistent de protecció legal. El 100% està classificat com a Reserva Natural Parcial dins del Parc Natural del Montgrí, les Illes Medes i el Baix Ter. També forma part de la Xarxa Natura 2000 i està inclosa en el Domini Públic Marítimo-Terrestre (DPMT), que prohibeix la urbanització i l'ús agrícola. A més, la Pletera està inclosa en el Pla d'Espais d'Interès Natural.

100%

El Parc Natural i l'Ajuntament de Torroella de Montgrí són tots dos responsables de la gestió del conjunt de la Pletera, gestió que inclou actuacions de control i adequació d'accessos, manteniment d'infraestructures (camins, miradors, senyalització, etc.), gestió d'espècies protegides, educació ambiental i altres activitats de divulgació.
La persistència de diversos usos intensius del sòl en el seu entorn immediat, en particular el turisme i l'agricultura, constitueix la principal amenaça per al compliment dels objectius de conservació. La col·laboració entre el Parc Natural, l'Ajuntament de Torroella de Montgrí i la Universitat de Girona és un factor clau per a la implementació efectiva de Solucions Basades en la Natura a la Pletera.

PRINCIPALS REPTES I OBJECTIUS



MILLORA DE LA BIODIVERSITAT

Vegetació de maresma, peix endèmic (*Aphanius iberus*), ocells amenaçats (e.g. *Charadrius alexandrinus*).

SALUT HUMANA

Un lloc per passejar i relaxar-se i una eina educativa i lúdica.

ADAPTACIÓ AL CANVI CLIMÀTIC

Embornal de carboni, que contribueix a l'Estratègia catalana d'adaptació al canvi climàtic.

GESTIÓ DE L'AIGUA

Un regulador i amortidor del flux d'aigua de mar a la maresma que redueix el risc d'inundació durant temporals de mar.

SOLUCIONS BASADES EN LA NATURA (SBN)

El canvi en els usos del sòl, la restauració de les llacunes existents i la **creació de noves llacunes** són les Solucions Basades en la Natura posades en pràctica a la Pletera per abordar els quatre reptes socials identificats.

URBANITZACIÓ TURÍSTICA → ***ECOSISTEMA COSTANER FUNCIONAL***

1983	1987-1993	1988-2001	1999-2002	2004	2010	2014-2018
Qualificació de 83 ha com a espai urbanitzable	Construcció dels primeres cases	Revisió del pla d'urbanisme: requalificació com a espai natural	Primer projecte LIFE. Creació d'algunes noves llacunes	Inclusió de 60 ha en el Domini Públic Marítimo Terrestre	Inclusió en el Parc Natural acabat de crear	Segon projecte LIFE per a la restauració definitiva

GESTIÓ DELS ESTANYS I DEL PAISATGE AMB ESTANYS

- Espai protegit
- Eliminació dels acúmuls de la construcció abandonats
- Creació i restauració de llacunes
- Recuperació d'un hàbitat costaner format per llacunes paral·leles a la costa voltades de vegetació de maresma
- Restauració d'un sistema dunar plenament funcional
- No intervenció humana en la dinàmica hídrica i de nutrients

- Canvi en els usos del sòl
- Camins perifèrics i accés obert a la platja, però no a les dunes o a la maresma per prevenir la pressió humana sobre els espais naturals.

- Recuperació de la capacitat de la maresma d'amortir les inundacions durant els temporals de mar.
- Prevenció de l'erosió del sistema dunar.
- Adaptació de la línia costanera al canvi climàtic.

DISSENY TÈCNIC

PRINCIPALS ACCIONS DE RESTAURACIÓ

1. **Retirada del passeig i l'escullera**
2. **Retirada dels carrers i accessos**
3. **Restauració del front dunar**
4. **Retirada dels talussos que limiten el desbordament de les llacunes**

CRITERIS ECOLÒGICS APLICATS EN EL DISSENY DE LA RESTAURACIÓ

A. Recuperació de la funcionalitat ecològica del sistema costaner

B. Millora de la població de fartet (*Aphanius iberus*)

C. No intervenció en les àrees que encara conserven vegetació de maresma

D. Recuperació de la cota topogràfica d'abans del procés d'urbanització

E. Un disseny de distribució de llacunes que en el futur recordi que hi havia hagut un procés d'urbanització inacabat

AMENACES POTENCIALS

Problemes abordats en la restauració

- Destrucció i degradació de l'hàbitat causades per les obres d'urbanització.
- Reducció de les zones de laminació de l'aigua de mar durant els temporals de mar, provocant intrusió marina. Poca capacitat de desbordament de les llacunes.
- Degradació del sistema dunar i pèrdua de sorra amb risc d'acumulació de sorra a la maresma.

Problemes parcialment abordats i millorats

- Eutrofització de l'aigua i condicions anòxiques per confinament.
- Presència d'espècies invasores, com la gambúsia (*Gambusia holbrooki*).
- Excés de freqüentació.

CAS D'ÈXIT I EXEMPLE PER A ALTRES ESPAIS

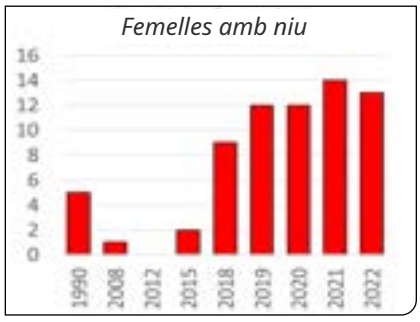
1. CREACIÓ I CONSERVACIÓ DE L'HÀBITAT PER A LA CONSERVACIÓ DE LA BIODIVERSITAT

Aphanius iberus

La creació de noves llacunes afavoreix la conservació de les poblacions de fartet (*Aphanius iberus*). Aquesta espècie endèmica competeix amb la gambúsia *(Gambusia holbrooki)*, espècie invasora, a la majoria de masses d'aigua de la terra baixa. A la Pletera totes dues espècies conviuen en aigües d'alta salinitat, condicions que afavoreixen el fartet.

Charadrius alexandrinus

El corriol camanegre (*Charadrius alexandrinus*) és un ocell que construeix un niu críptic sobre la sorra. La sobrefreqüentació i el trepig han provocat una dràstica disminució de la seva població, que s'ha recuperat després de la restauració.



Has trobat el niu?

CONTRIBUCIÓ DE LA NATURA A LES PERSONES I INDICADORS MESURATS

BIODIVERSITAT AQUÀTICA

RIQUESA D'ESPÈCIES
Plantes aquàtiques : **47**
Ocells aquàtics : **104**
Amfibis : **4**
Libèl·lules: **3**
Famílies d'invertebrats : **17**

QUANTITAT DE
Espècies de conservació prioritària : **6**
Espècies recollides a l'annex de la Directiva Hàbitats : **6*** *Aphanius iberus, Epidalea calamita, Hyla meridionalis, Pelobates cultripes, Emys orbicularis, Mauremys leprosa.*
Espècies exòtiques invasores : **5**

CONTRIBUCIÓ A LA DIVERSITAT REGIONAL

Només unes poques espècies adaptades a les condicions canviants de temperatura, salinitat i composició de nutrients són capaces de colonitzar aquestes ambients costaners. Aquestes espècies, però, tenen una distribució molt restringida a causa de la destrucció i urbanització del seu hàbitat. Amb la presència d'aquestes espècies tan escasses, aquests ecosistemes fan una important contribució a la diversitat regional.

CAS D'ÈXIT I EXEMPLE PER A ALTRES ESPAIS

2.RECUPERACIÓ DE LA FUNCIONALITAT ECOLÒGICA I ADAPTACIÓ AL CANVI CLIMÀTIC.

La maresma ha estat restaurada mantenint la hidrologia i dinàmica dels nutrients característiques d'aquests hàbitats, garantint així la conservació de l'estructura de la comunitat típica de la maresma de la costa mediterrània. El nou hàbitat respon eficaçment als efectes predits del canvi climàtic, que inclouen nivells del mar més alts i temporals de mar més freqüents i més forts. Aquesta estratègia de recuperació és fàcilment aplicable a altres àrees degradades del litoral.

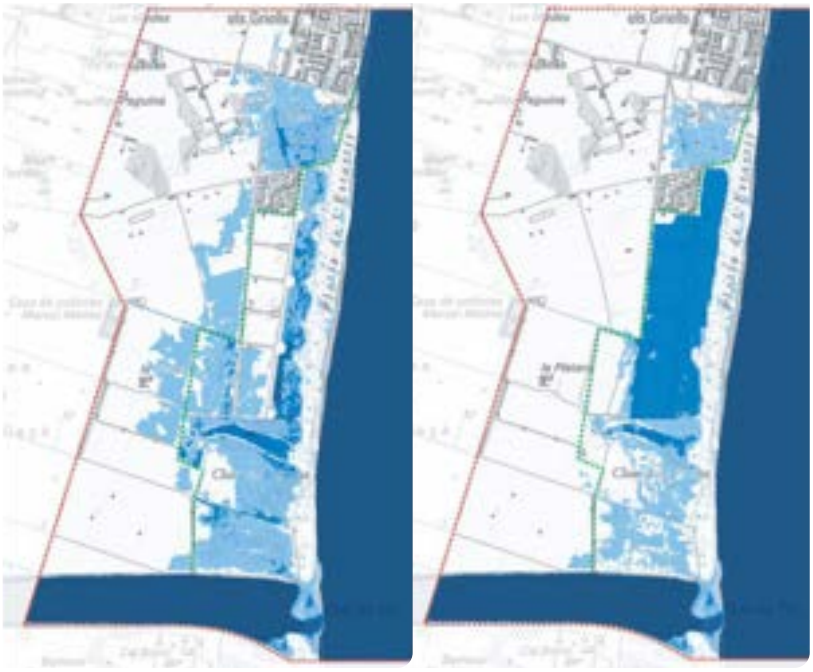
La Pletera després d'un episodi intens de precipitació (gener de 2020), inundada, però sense erosió o danys significatius a la costa.

CONTRIBUCIÓ DE LA NATURA A LES PERSONES I INDICADORS MESURATS

REGULACIÓ DE LA INUNDACIÓ DURANT ELS TEMPORALS DE MAR

Model hidràulic d'intrusió marina després d'un temporal de mar intens amb l'espai urbanitzat (esquerra) i després de l'eliminació de les infraestructures (dreta). Les inundacions amb aigua de mar (en blau) difícilment arriben més enllà dels límits de la maresma (línia discontínua verda) després de la restauració.

Tot al contrari, les infraestructures fetes per l'acció humana forcen l'aigua de mar a inundar els camps més enllà de la maresma. Línia vermella, límits de la xarxa Natura 2000.



CAS D'ÈXIT I EXEMPLE PER A ALTRES ESPAIS

3. COEXISTÈNCIA DELS HÀBITATS NATURALS I EL TURISME.

La conservació de la biodiversitat és compatible amb una alta freqüentació i amb el gaudi de la natura per part de la gent si es respecten els límits de les superfícies protegides.

CONTRIBUCIÓ DE LA NATURA A LES PERSONES I INDICADORS MESURATS

EXPERIÈNCIES FÍSIQUES I PSÍQUIQUES

Nombre de visitants (oci, turisme, pesca, natura, observació, etc.) (nombre/any)

94.500

31.600 Nombre de bicicletes que hi circulen per any

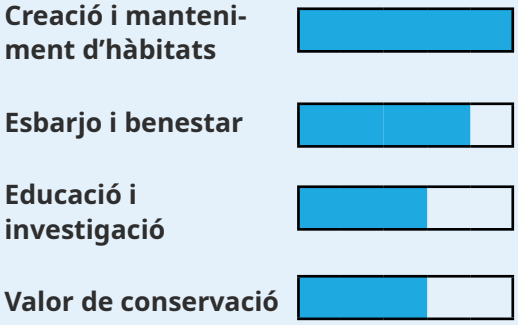
Valoració de l'espai per part dels visitants (escala de l'1 al 5) abans (2014), immediatament després (2018) i 5 anys després (2022) de la restauració

3,99 → 4,29 → 4,64

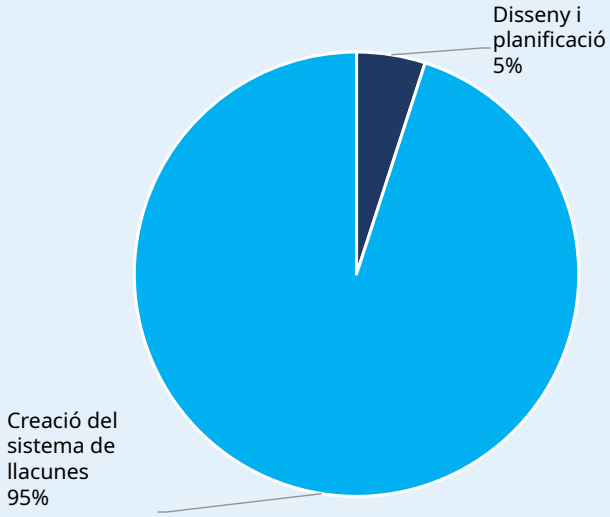
ANÀLISI DE COST-BENEFICI

AVALUACIÓ DEL COST GLOBAL

AVALUACIÓ DELS BENEFICIS



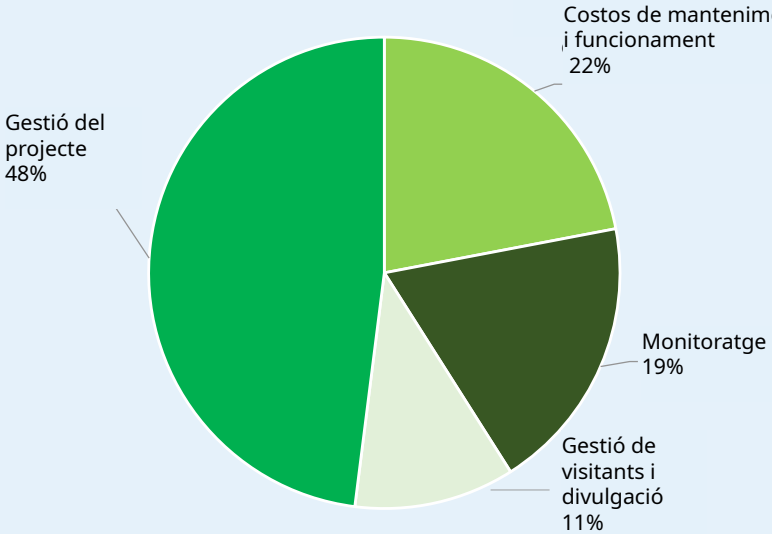
DISTRIBUCIÓ DELS COSTOS DE LES ACCIONS



Cost relatiu de les accions de creació de SbN

INSTRUMENTS FINANCERS ADE-QUATS PER REDUIR EL DÈFICIT

- ☑ 1. Tarifes dels usuaris
- ☑ 2. Drets d'ús i arrendaments
- ☑ 3. Venda de béns i serveis de mercat
- ☑ 4. Subvencions



Cost relatiu del manteniment de les SBN creades

AVALUACIÓ DEL DÈFICIT FINANCER

HANDBOOK :

APPENDIX :

CRÈDITS DE LES FOTOS

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Foto, contraportada © J. Pascual

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2024

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http://www.ponderful.eu

Ponderful
PONDS FOR CLIMATE

CATALONIA, SPAIN

PONDSCAPE : ESTANYS DE L'ALBERA

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 pond losses in European countries over the past 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

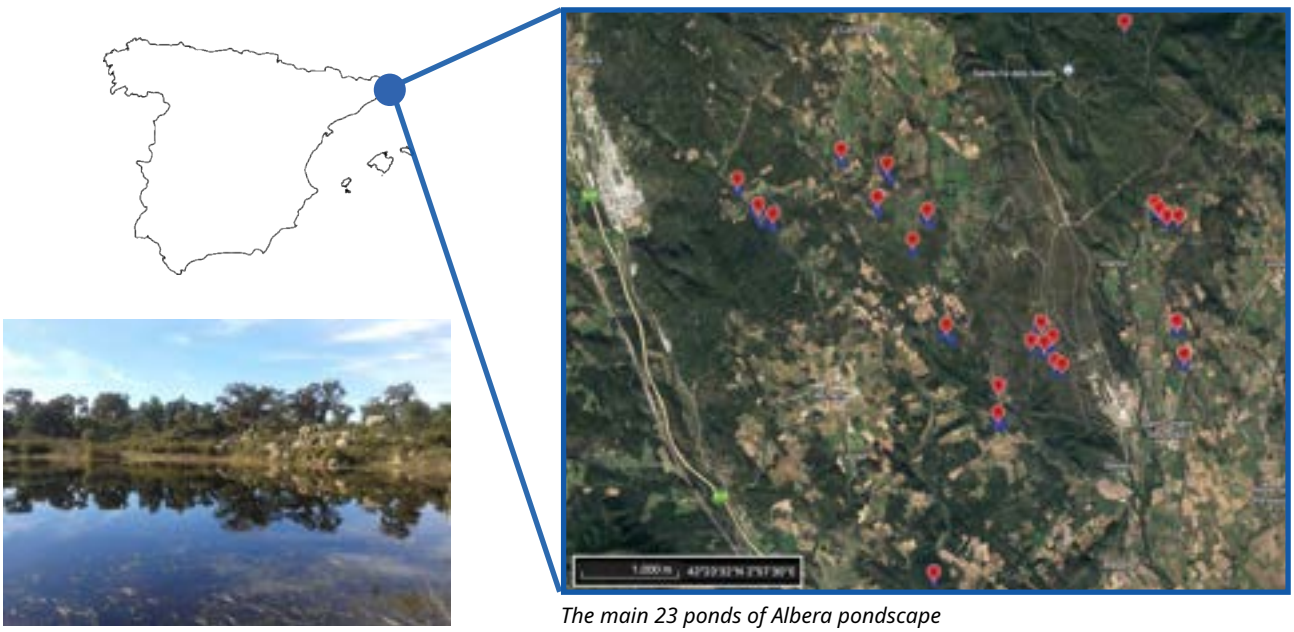
Albera ponds are situated at the foot of Albera mountains. The climate and vegetation of this area is typically Mediterranean. Although there are 23 main ponds, the pondscape consists of 241 floodable depressions with different degree of flooding (called hydroperiod), all of them of natural origin. All ponds are very shallow and temporary, some with relatively short hydroperiods (from around 2 to 9 months), and some years all the ponds can remain completely dry due to lack of rainfall. In the past, several of these ponds were drained for agricultural purposes. Nowadays low intensity agriculture is practiced in the region, mostly vineyards and olive groves. The main pressures on the pondscape are some pig farms and livestock farming, mostly cows.
Some of these ponds are priority habitats of European Habitat Directive: «3170 Mediterranean temporary ponds» and «3130 Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae and/or of the Isoeto-Nanojuncetea*». This pondscape plays an important role in biodiversity conservation because: i) it is home to priority plants for conservation, ii) it is an important amphibian breeding site, iii) it supports specialist aquatic invertebrates of temporary waters and iv) it is located on the path of one of the most important bird migratory routes across the Pyrenees.

Name of the pondscape : Estanys de l'Albera
Name of neighboring large town (in a 30 km radius): Figueres (45'000 habitants)
Bioclimatic zone : Meditterranean

Dominant land use :
Mediterranean scrub

Pondscape area : 25 km^2
Pond : number: 23 (+218 floodable depressions)
density: 0.9 ponds/km^2 (9.6 floodable depressions/km^2)
surface areas : 460 to 62'000 m^2
depths : 0.4 to 1.5 m

Land owner : Private land owned by inhabitants of neighboring villages (La Jonquera, Cantallops, Capmany, Sant Climent Secebes, Espolla)
Land manager : Catalan Government
Public access : 70 % of the area is accessible
Public amenities : several footpaths

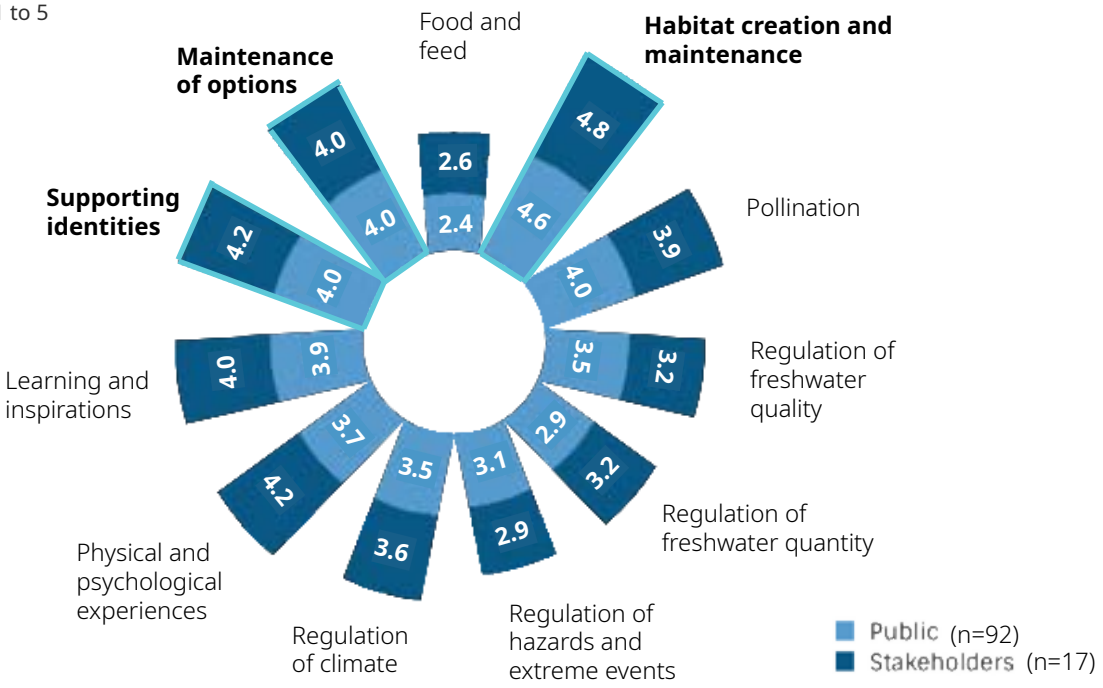


The main 23 ponds of Albera pondscape

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 direct use of these natural areas by people (physical and psychological experiences, supporting identities, learning).

LOCAL POLICIES

- 31% of 2'500 ha is protected, as a PEIN (Plan of areas of natural interest in Catalonia) and Natura 2000. **31%**

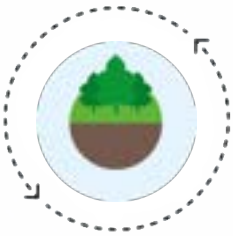
- 20 Albera ponds are within the Catalan Inventory of Wetlands, however many other ponds are not included in the inventory. **20**

- Passages under roads were built near two ponds to protect the amphibian population, in the context of the Catalan Green Infrastructure **2**

3 Albera ponds are monitored: every three years by the Catalan Water Agency, in the context of European Water Framework Directive, to evaluate their ecological status. **3**

The pondscape has no management team or management plan, or an annual budget to support management actions.
Albera ponds, which are priority habitats according to the European Habitats Directive, are catalogued as agricultural land (in the GIS-PAC system, according to the Common Agricultural Policy), as they are dry most of the time. This is a serious contradiction and problem for their management and conservation.

MAIN CHALLENGES AND OBJECTIVES



BIODIVERSITY ENHANCEMENT

Especially aquatic plants, amphibians, and birds.

HUMAN HEALTH

A peaceful place to walk and relax. Supporting identities for the local community.

WATER MANAGEMENT

Buffer the water flow in lowlands, reducing the risk of flooding in downstream areas.

NATURE BASED SOLUTIONS (NBS)

Protection, restoration and management are the Nature-based Solutions (NbS) implemented in this pondscape to address three societal challenges identified.

1992 First partial protection with the approval of the PEIN

1994 A private owner restored Sendo Pond

2006 Increase of area protected and inclusion in Natura 2000

2010 Start of the agreements between private landlords and environmental NGOs to protect and manage some ponds.

2012 Approval of the Catalan Inventory of Wetlands (including 20 ponds in Albera)

2014 Catalan Water Agency starts monitoring 3 Albera ponds every three years.

2015 Restauration of Prat de Rosers Pond.

2017 Approval of Catalan Green Infrastructure Plan with some actions planned in Albera pondscape. Underpasses for amphibians were built in two ponds.

2017-TO NOW continuous monitoring the water temperature and level of 4 ponds

PONDS AND PONDSCAPE MANAGEMENT

- Protection status
- Ponds restoration
- Measures to provide connectivity for amphibian populations

- Creation and maintenance of trails and nature observation points
- Creation and maintenance of information boards

- Ponds restoration to retain water
- Monitoring the ecological status of ponds

NATURE CONTRIBUTIONS TO PEOPLE AND MEASURED INDICATORS

AQUATIC BIODIVERSITY

SPECIES RICHNESS
Aquatic plants : **68**
Amphibians : **10**
Water birds : **22**
Dragonflies : **27**
Families of invertebrates : **12**

AMOUNT OF
Species on Habitat Directive Annexes : **10***
Marsilea strigosa (aquatic plants), Mauremys leprosa (reptiles), Triturus marmoratus, Alytes almogavarii, Discoglossus pictus, Pelobates cultripes, Epidalea calamita, Hyla meridionalis (amphibians), Oxygastra curtisii (dragonflies), Lutra lutra (mammals)

CONTRIBUTION TO REGIONAL RICHNESS

FLAGSHIP SPECIES :


Elatine alsinastrum


Pelobates cultripes


Mauremys leprosa


Burhinus oedicnemus

SUPPORTING IDENTITIES

Number of dolmens and menhirs within Albera pondscape **24**

For the local community, ponds and megalithic heritage are essential components of their identity. During the eighties, members of local hiker club discovered and restored several dolmens and menhirs. Most of them were assigned names related to ponds (e.g. Menhir Estanys I, Dolmen Estanys II).

Inhabitants of Albera restoring the «Menhir Estanys II» (November 1987)

NATURE CONTRIBUTIONS TO PEOPLE AND MEASURED INDICATORS

PHYSICAL AND PSYCHOLOGICAL EXPERIENCE

Number of people visiting the pondscape (leisure, tourism, fishing, nature watching etc.) (number/year)

62'000

70% Area inside the pondscape accessible to the public

Self-reported satisfaction well-being (scale 1 to 5)

4

Most popular activities :
wildlife observation (28%), hiking (24%) and leisure (21%)

WATER QUANTITY

180'000m³ Volume of water stored during a severe flood event (m^3)

WATER QUALITY

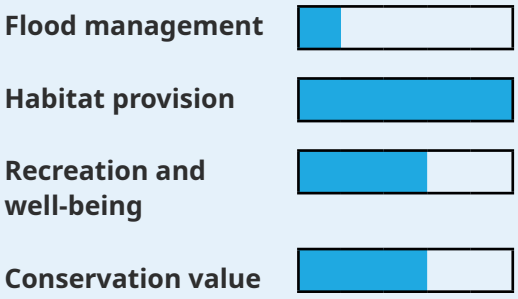
Nutrients : **GOOD**

Although most of Albera ponds could be considered pristine or in good ecological status, some of them have high nutrients concentrations due to presence of cattle around them.

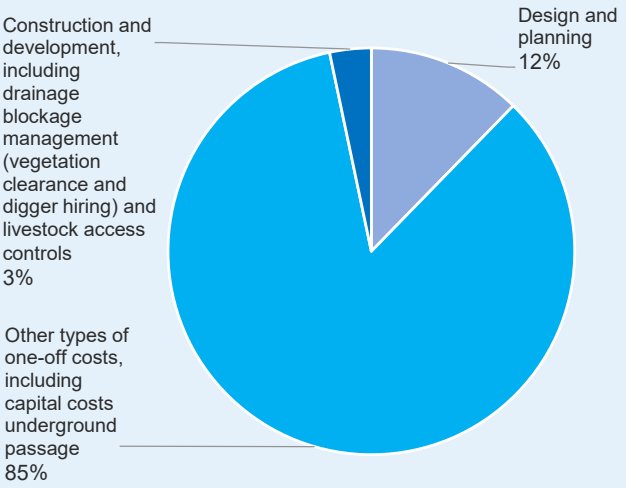
COSTS AND BENEFITS ANALYSIS

OVERALL COSTS ASSESSMENT

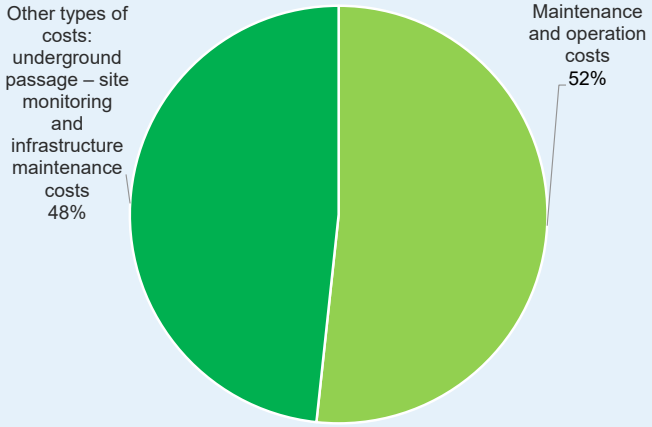
BENEFITS ASSESSMENT



SHARE OF COSTS FOR NBS ACTION



Relative cost of NbS creation measures



Relative cost of ongoing NbS management measures

SUITABLE FINANCE INSTRUMENTS TO REDUCE THE GAP

- 1. Voluntary contributions /donations
- 2. Grants

FUNDING GAP ASSESSMENT

REMAINING THREATS

1. Changes in hydrology linked to climate change, including the timing and quantity of rainfall. Low rainfall reduces the hydroperiods of Albera ponds and smaller ponds are likely to be lost.

2. Many wind power stations are planned within the pondscape and around of it. The biodiversity and functioning of hydrological system of ponds could be impacted by the earthworks to construct wind turbines, electrical evacuation lines and new forest trails because some of them were planned under or near floodable depressions within the Albera pondscape.

3. Albera ponds are catalogued as agricultural land (in the GIS-PAC system, according to the Common Agricultural Policy). This is a serious problem for their management and conservation. For example, many ponds are used as pastures for herds with high density of cows during all the year and other ponds areand cultivated as part of arable fields.

4. The pondscape has no management team or management plan, or funding to support conservation action.

SUCCESS STORY AND TRANSFERABILITY

RESTAURATION OF NATURAL HYDROLOGICAL FUNCTIONING THROUGH DRAINAGE REMOVAL

For centuries, inhabitants have built drainage systems to avoid water retention in the Albera pondscape. This has led to the disappearance of many ponds and the reduction of the length of time that the ponds are flooded. Some initiatives have reversed this situation by restoring the natural functioning of ponds.

In 1994, the owner of the Sendo Pond (or North Cardonera) funded the restoration of the pond's natural hydroperiod by blocking the drainage system.

In 2015, a project financed by the Andrena Foundation and developed by Gutina Cellar, IAEDEN, Geoserveis and UVic-UCC, made it possible to locate and block an underground drainage that has allowed the recovery of Prat de Rosers pond.

In both cases, these actions have allowed the recovery of a habitat of community interest with its associated flora and fauna species. Moreover, these restored ponds are peaceful places to walk and relax, and to educate people about nature.

UNDERPASSES TO PROTECT AMPHIBIANS

The road GI-602 was built in the middle of 20th century close by Pous pond and through the middle of the Cardonera pond. This caused catastrophic mortality of amphibians (frogs, toads and newts). In 2017, underpasses were built in both ponds, which have significantly reduced amphibian mortality. The action was requested by the Catalan Society of Herpetology and financed by the Catalonian Government in the context of Catalan Green Infrastructure Plan.

SUCCESS STORY AND TRANSFERABILITY

LAND USE MANAGEMENT IN THE PONDSCAPE

The conservation status of ponds not only depends on possible direct impacts on ponds, but it also strongly depends on the land uses in the whole pondscape and its catchment.

From 2010, IAEDEN, an environmental NGO, has set up agreements with 29 private landowners (14 hectares). In this collaborative framework, low-impact agricultural management is promoted and different projects for environmental conservation are developed.

For example, vineyards and olive groves are cultivated using nature-friendly techniques, without herbicides and insecticides. The grasslands are cut by scything rather than grazed by livestock. This allows for the conservation of the natural plant community and reduces nutrient inputs into ponds.

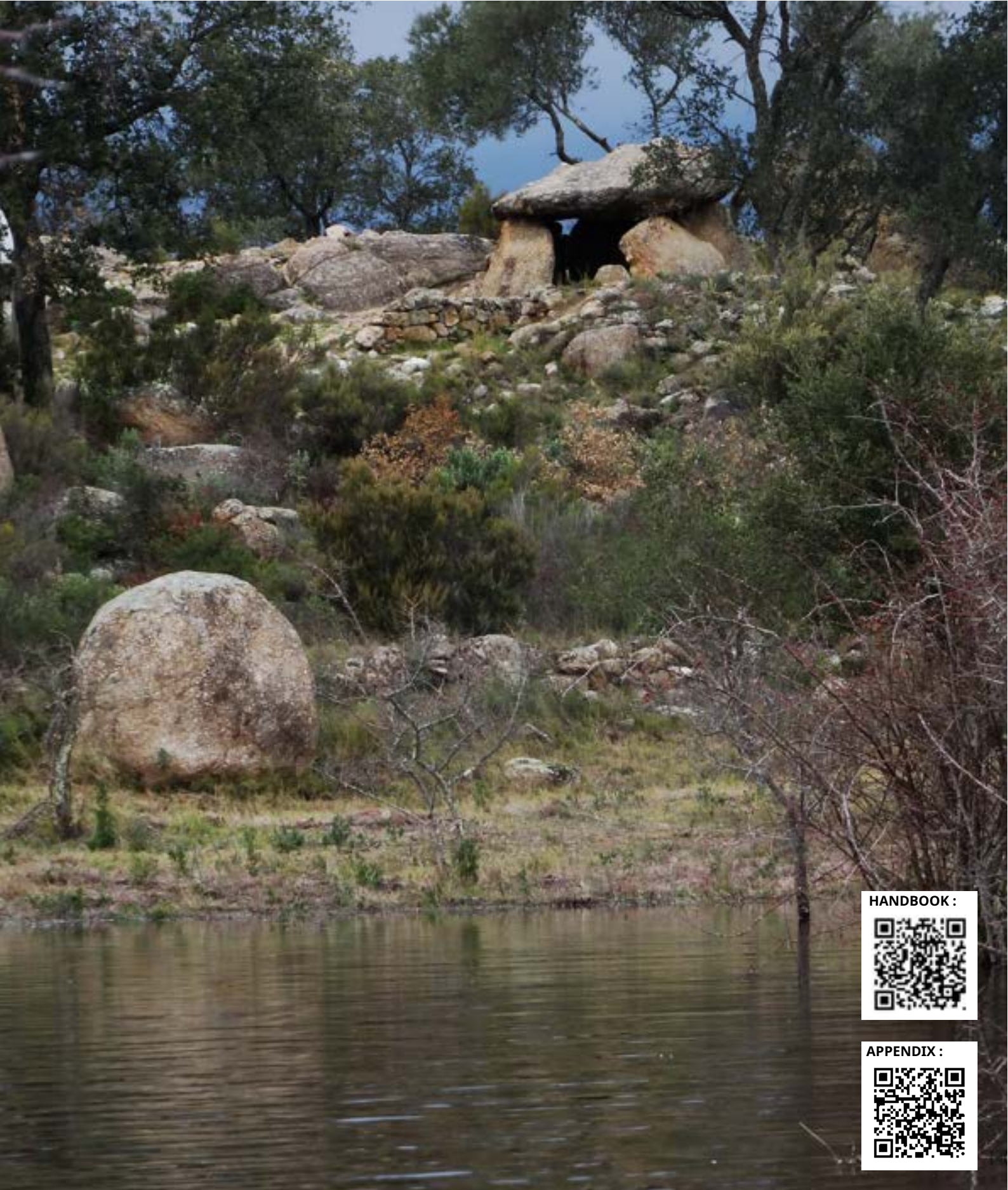
SUPPORTING IDENTITIES

The local community of Albera have a strong cultural identity linked to the landscape. This region has been inhabited for thousands of years.

Throughout of Albera pondscape there are many ponds and flooded depressions as well as many historical monuments, including 24 menhirs and dolmens (3500-1800 B.C.), seven Romanic churches (9 to 12th century) and hundreds of kilometers of stone walls. For the inhabitants of this region, ponds and the romanic and megalithic heritage are essential components of their identity.

There are several organisations who restore, maintain and disseminate information about this heritage (e.g. Empordanès Excursionist Club, Art and Work Group, Jonquerenc Excursionist Club, Cantallops Cultural Action Association). Some megalithic monuments were assigned names related to ponds (e.g. Menhir Estanys I, Dolmen Estanys II).

Similary one Romanic church (Santa Cristina de Canadal) shares name with two ponds (Canadal petit pond, Canadal Gran pond). Moreover, the most important trail in the area is called «Itinerari dels estanys» (i.e. itinerary of lakes/ponds), showing how central ponds are to the cultural heritage of the Albera region.



HANDBOOK :

APPENDIX :

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First page's layout inspired by freepik.

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2024

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CATALUNYA

ESTANYS DE L'ALBERA

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

QUÈ ÉS UN PAISATGE AMB ESTANYS ?

DEFINICIÓ

Un paisatge amb estanys és una xarxa de basses i aiguamolls amb proximitat en l'espai (connectivitat) i la matriu d'espais naturals i humanitzats que hi ha al seu entorn.

Els límits d'un paisatge amb estanys poden estar determinats per entorns físics o ecològics (una vall, una conca, un conjunt d'estanys en una reserva natural) o també per criteris socials o polítics (basses urbanes o fronteres provincials o nacionals).

PRESSIONS/AMENACES SOBRE ELS ESTANYS I ELS PAISATGES AMB ESTANYS

Durant el darrer segle s'han perdut el 50-90% dels estanys en els països europeus. A més, els estanys han estat oblidats en les polítiques i estratègies nacionals i de la UE relacionades amb l'aigua i la natura, inclosa la Directiva Marc de l'Aigua.

PER QUÈ ÉS IMPORTANT VALORAR-LOS?

MILLORA DE LA BIODIVERSITAT

En gran part oblidats i generalment infravalorats, els estanys són molt importants per a la conservació de la biodiversitat. Els estanys representen punts calents de biodiversitat.

REDUCCIÓ DE RISCOS

Els estanys i els paisatges amb estanys tenen un paper fonamental per mitigar les inundacions i també son reserva d'aigua per combatre incendis.

SALUT HUMANA

Els estanys i els paisatges amb estanys proporcionen una àmplia gamma de beneficis per a la societat, com ara la seva contribució a la salut humana i la qualitat de vida. Aporten espais per a activitats físiques o interacció social, però també experiències estètiques i activitats educatives i recreatives.

ADAPTACIÓ DAL CANVI CLIMÀTIC

Donada la seva abundància i la seva alta productivitat, els estanys influeixen notablement en el cicle del carboni actuant com a embornals i com a font de carboni.

GESTIÓ DE L'AIGUA

Els estanys proporcionen una reserva d'aigua que és especialment important en un context d'escassetat d'aigua. Són especialment útils com a reservoris d'aigua per animals i per al reg.

CONTEXT

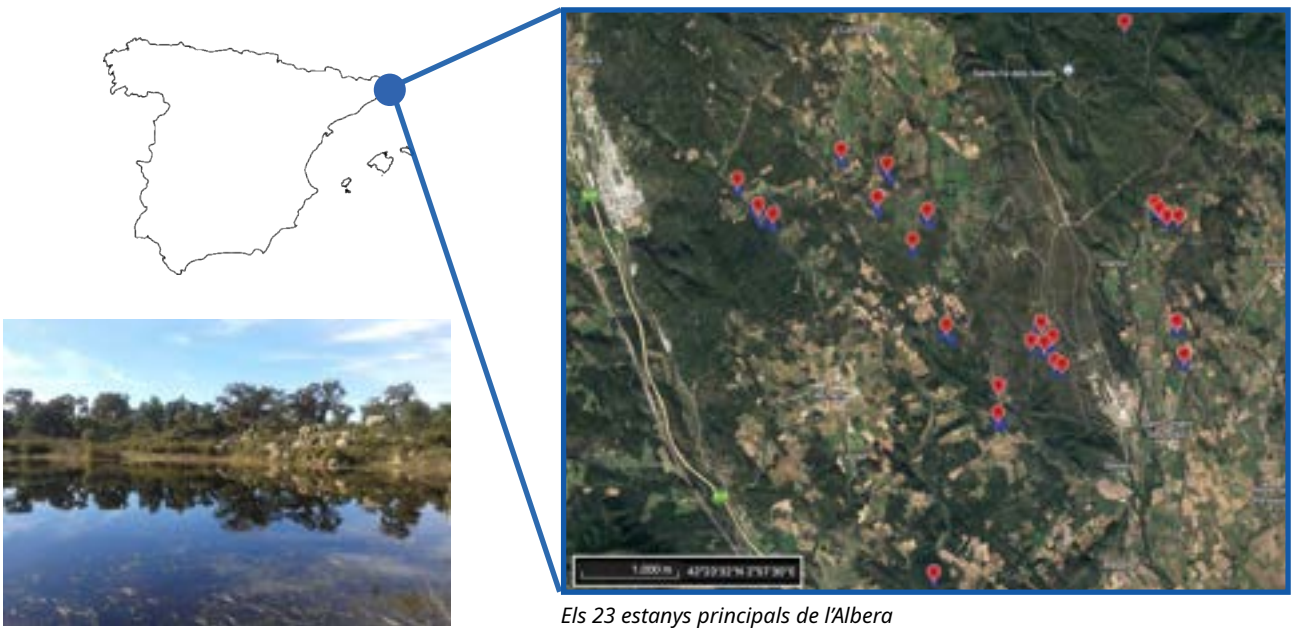
Els estanys de l'Albera estan situats al peu de mont de l'Albera. El clima i la vegetació d'aquesta zona són típicament mediterrani. Tot i que hi ha 23 estanys principals, la zona consta de 241 depressions inundables amb diferents graus d'inundació, totes elles d'origen natural. Tots els estanys són poc profunds i temporanis amb períodes d'inundació (hidroperíodes) relativament curts (entre 2 i 9 mesos amb aigua). Alguns anys tots els estanys poden romandre completament secs per falta de pluges. En el passat, es van construir sistemes de drenatge per evitar la inundació d'aquestes zones i poder-les aprofitar per conrear. Actualment l'agricultura és de baixa intensitat, amb cultius de vinyes i oliveres majoritàriament. Les principals pressions agrícoles són ramats de vaques i algunes granges porcines.
Alguns d'aquests estanys són hàbitats prioritaris de la Directiva Europea d'Hàbitats: «3170 Basses i tolls temporers mediterranis « i » 3130 Aigües estancades, oligotròfiques o mesotròfiques amb vegetació de *Littorelletea uniflorae i/o Isoeto-Nanojuncetea*». Els Estanys de l'Albera tenen un paper important en la conservació de la biodiversitat perquè: i) hi ha presència de plantes prioritàries ii) és una zona rellevant per la reproducció d'amfibis iii) tenen invertebrats aquàtics particulars a causa del seu hidroperíode temporani iv) es troba en una de les rutes migratòries d'aus més importants per travessar els Pirineus.

Nom del paisatge d'estanys : Estanys de l'Albera
Nom de la ciutat propera més gran (30 km):
Figueres (45.000 habitants)
Zona bioclimàtica : Mediterrània

Habitat dominant:
brolla mediterrània

Àrea del paisatge d'estanys : 25 km^2
Nombre de estanys: 23 (+ 218 depressions inundables)
Densitat: 0,9 basses/km^2 (9,6 depressions inundables/km^2)
Superfície dels estanys : 460 a 62.000 m^2
Profunditat dels estanys : 0,4 a 1,5 m

Propietaris : habitants de la zona (La Jonquera, Cantallops, Capmany, Sant Climent Secebes, Espolla)
Gestor de la part protegida: Generalitat de Catalunya
Accés lliure : 70% de la zona és accés lliure
Equipaments públics : diferents senders

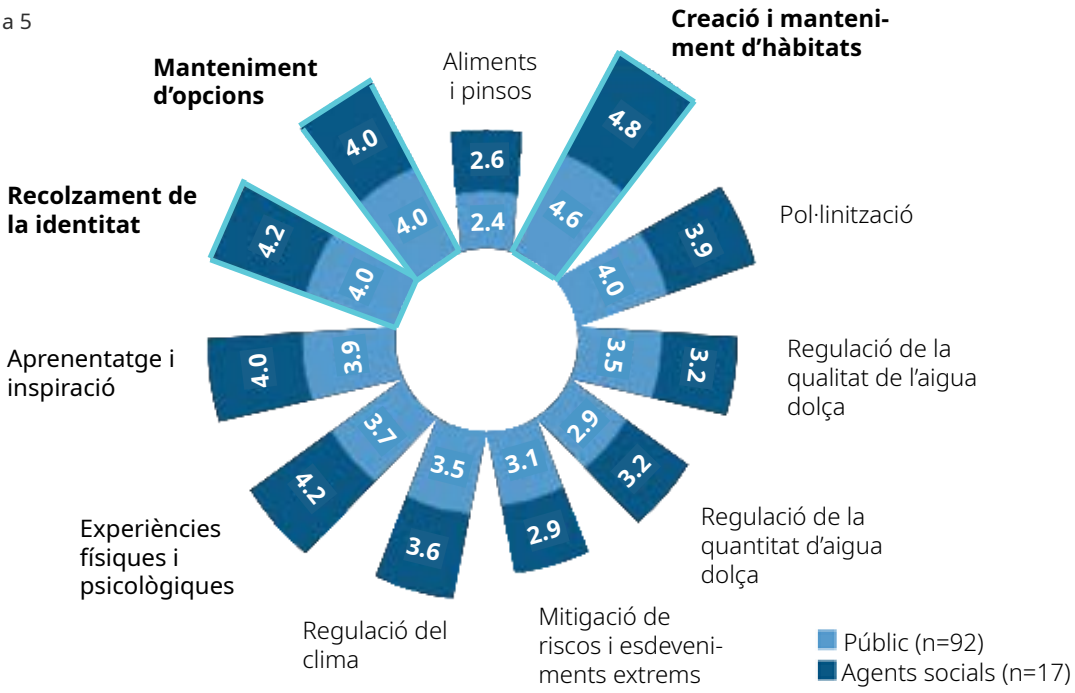


Els 23 estanys principals de l'Albera

ESPECTATIVES DE LA COMUNITAT LOCAL

Les 11 contribucions de la natura a la societat (NCPs)

Escala : puntuació d'1 a 5



Les expectatives es centren principalment en (i) la provisió d'hàbitats per a la biodiversitat i (ii) l'ús directe d'aquests espais naturals per part de les persones (experiències físiques i psicològiques així com suport a la creació i manteniment de la identitat dels habitants de l'Albera).

POLÍTIQUES LOCALS

- El 31% de les 2.500 ha de la zona dels Estanys de l'Albera estan protegides com a PEIN (Pla d'espais d'interès natural de Catalunya) i Xarxa Natura 2000. **31%**

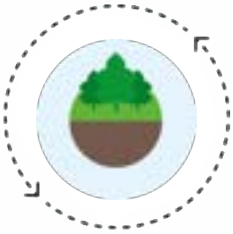
- 20 estanys de l'Albera formen part de l'Inventari de Zones Humides de Catalunya, però moltes d'altres no hi consten. **20**

- Es van construir passos sota la carretera que transcorre a prop de dos estanys per evitar l'atropellament d'amfibis, en el marc del Pla d'Infraestructura Verda de Catalunya. **2**

3 estanys de l'Albera són estudiats cada tres anys per l'Agència Catalana de l'Aigua, en el context de la Directiva Europea Marc de l'Aigua, per avaluar-ne el seu estat ecològic. **3**

Aquest espai natural no té equip gestor, ni pla de gestió, ni pressupost anual assignat.
Els estanys de l'Albera, que són hàbitats prioritaris segons la Directiva Europea d'Hàbitats, estan catalogats com a sòl agrícola (en el sistema SIG-PAC, segons la Política Agrària Comuna). Això és una greu contradicció i genera un important problema per a la seva gestió i conservació.

PRINCIPALS REPTES I OBJECTIUS



MILLORA DE LA BIODIVERSITAT

Especialment per la vegetació aquàtica, amfibis i ocells.

SALUT HUMANA

Un lloc per passejar i relaxar-se. Dona suport a la identitat dels habitants de la zona

GESTIÓ DE L'AIGUA

La zona regula i alenteix el flux d'aigua, reduint el risc d'inundació aigües avall.

SOLUCIONS BASADES EN LA NATURA (SBN)

Les Solucions Basades en la Natura (SBN) que s'han posat en pràctica per abordar els tres reptes socials identificats han estat la protecció, la restauració i la gestió.

1992 Primera protecció parcial amb l'aprovació del PEIN (Pla d'espais d'interès natural de Catalunya)

1994 Un propietari privat va restaurar l'estany d'en Sendo.

2006 Increment de la superfície protegida i inclusió a Xarxa Natura 2000.

2010 Inici dels convenis entre propietaris privats i la IAEDEN per a la protecció i gestió d'algunes basses i prats de dall.

2012 Aprovació de l'Inventari de Zones Humides de Catalunya (incloent 20 basses de l'Albera).

2014 L'Agència Catalana de l'Aigua comença el seguiment de 3 estanys de l'Albera cada tres anys.

2015 Restauració de l'Estany del Prat de Rosers.

2017 Aprovació del Pla d'Infraestructura Verda de Catalunya amb algunes actuacions previstes als Estanys de l'Albera. Es construeixen passos subterranis en carreteres properes a dos estanys per protegir les poblacions d'amfibis.

2017-Actualitat Seguiment continu del nivell i temperatura de l'aigua de 4 estanys.

GESTIÓ

- Nivells de protecció
- Restauració d'estanys
- Mesures per proporcionar connectivitat a les poblacions d'amfibis

- Creació i manteniment de senders i punts d'observació de la natura
- Creació i manteniment de plafons informatius

- Restauració d'estanys per retenir el flux de l'aigua.
- Seguiment de l'estat ecològic de les basses.

CONTRIBUCIÓ DE LA NATURA A LES PERSONES I INDICADORS MESURATS

BIODIVERSITAT AQUÀTICA

RIQUESA D'ESPÈCIES
Plantes aquàtiques : **68**
Amfibis : **10**
Aus aquàtiques : **22**
Libèl·lules : **27**

QUANTITAT DE
Espècies dins dels Annexos de la Directiva Hàbitats : **10***
Marsilea strigosa, Mauremys leprosa, Triturus marmoratus, Alytes almogavarii, Discoglossus pictus, Pelobates cultripes, Epidalea calamita, Hyla meridionalis, Oxygastra curtisii, Lutra lutra

CONTRIBUCIÓ A LA RIQUESA DE CATALUNYA :

ESPÈCIES BANDERA :


Elatine alsinastrum


Pelobates cultripes


Mauremys leprosa


Burhinus oedicnemus

SUPORT A LA CREACIÓ I MANTENIMENT DE LA IDENTITAT

Nombre de dòlmens i menhirs dins la zona dels Estanys de l'Albera **24**

Pels habitants del peu de mont de l'Albera els Estanys i el patrimoni megalític són components essencials de la seva identitat. Durant els anys vuitanta, membres d'entitats de la zona van descobrir i restaurar diversos dòlmens i menhirs. A molts d'ells se'ls va assignar noms relacionats amb Estanys d'Albera (p. ex. Menhir Estanys I, Dolmen Estanys II).

Habitants de l'Albera redreçant el «Menhir Estanys II» (novembre de 1987).

CONTRIBUCIÓ DE LA NATURA A LES PERSONES I INDICADORS MESURATS

EXPERIÈNCIES FÍSIQUES I PSICOLÒGIQUES

Nombre de persones que visiten els estanys de l'Albera (plaer, turisme, observació de la natura, etc.) (persones/any)

62.000

70% Superfície de l'espai d'accés lliure.

Satisfacció i benestar pels visitants (escala de l'1 al 5)

4

Activitats més populars:
observació de la fauna (28%), senderisme (24%) i oci (21%)

QUANTITAT D'AIGUA

180.000m³

Volum d'aigua retinguda en un moment d'inundació màxima (m^3)

QUALITAT DE L'AIGUA

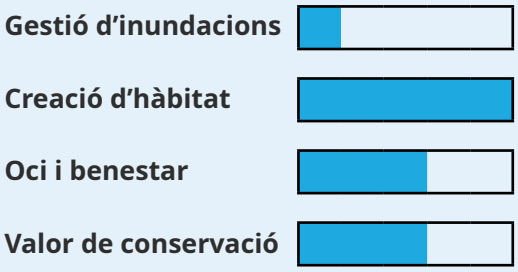
Nutrients : **BO**

Tot i que la majoria dels estanys de l'Albera es podrien considerar prístins o en molt bon estat ecològic, alguns d'ells presenten altes concentracions de nutrients per la presència de bestiar al seu voltant.

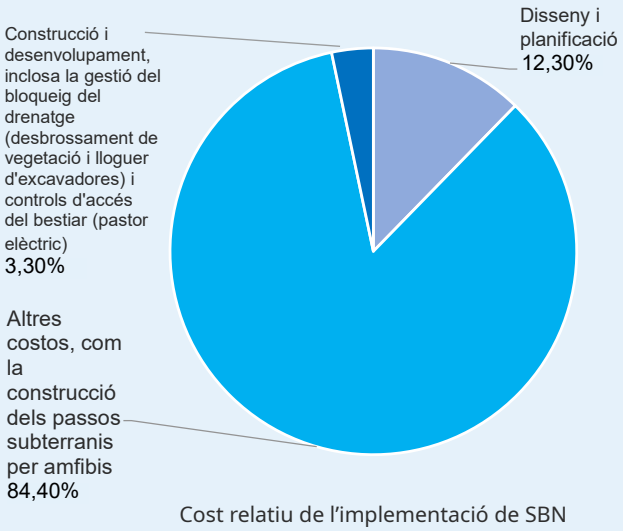
ANÀLISI DE COSTOS I BENEFICIS

AVALUACIÓ DEL COST GLOBAL

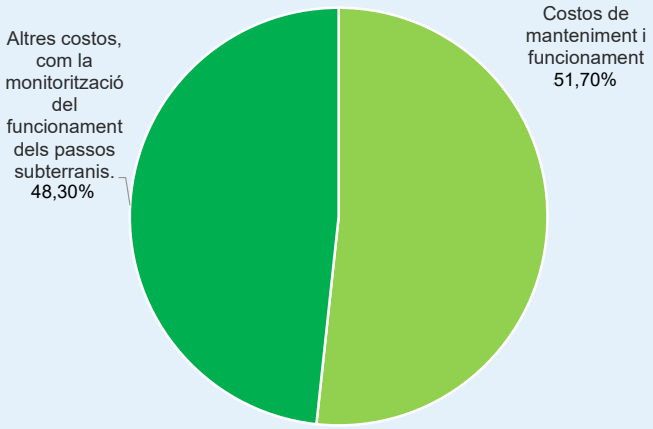
AVALUACIÓ DELS BENEFICIS



DISTRIBUCIÓ DELS COSTOS DE LES ACCIONS DE SBN



Cost relatiu de l'implementació de SBN



Cost relatiu del manteniment de les SBN implementades

INSTRUMENTS FINANCERS ADEQUATS PER REDUIR EL DÈFICIT

- **1. Aportacions/ donacions voluntàries**
- **2. Subvencions**

AVALUACIÓ DE LA MANCA DE FINANÇAMENT

AMENACES POTENCIALS

1. El canvi climàtic comporta modificacions en la hidrologia dels estanys, com a conseqüència d'un canvi del règim de precipitació, alterant el moment i la quantitat de pluges. Hi ha una reducció dels períodes d'inundació dels estanys i és probable que les més petites acabin desapareixent.

2. Hi ha diversos projectes de parcs eòlics a la zona dels Estanys de l'Albera i al seu entorn. La biodiversitat i el funcionament del sistema hidrològic dels estanys es podrien veure afectades pels moviments de terres per a la instal·lació d'aerogeneradors, línies d'evacuació elèctrica i noves pistes forestals.

3. Els Estanys de l'Albera estan catalogats com a sòl agrícola (en el sistema SIG-PAC, segons la Política Agrària Comuna). Aquest és un greu problema per a la seva gestió i conservació. Per exemple, molts estanys s'utilitzen com a zones de pastura per a ramats de vaques durant tot l'any i altres estanys es llauren i conreen com a camps de cultiu.

4. Aquest espai natural no té equip gestor, ni pla de gestió, ni pressupost anual assignat.

CAS D'ÈXIT I EXEMPLE PER A ALTRES ESPAIS

RESTAURACIÓ DEL FUNCIONAMENT HIDROLÒGIC NATURAL MITJANÇANT L'ELIMINACIÓ DEL DRENATGE

Durant segles, els habitants de la zona han construït sistemes de drenatge per evitar la inundació dels estanys de l'Albera amb l'objectiu de poder aprofitar la terra per fer cultius. Això ha provocat la desaparició de moltes basses i, de forma general, la reducció del temps d'inundació. Algunes iniciatives han revertit aquesta situació recuperant el funcionament natural d'alguns estanys.

L'any 1994, el propietari de l'Estany d'en Sendo (o Cardonera Nord), assumint directament el cost de l'actuació, va bloquejar el drenatge superficial que tenia la bassa i d'aquesta manera es van recuperar els hidroperíodes naturals.

L'any 2015, un projecte finançat per la Fundació Andrena i desenvolupat pel Celler de la Gutina, IAEDEN, Geoserveis i UVic-UCC, va permetre localitzar i bloquejar un drenatge subterrani recuperant d'aquesta manera l'Estany del Prat dels Rosers.

En ambdós casos, aquestes actuacions han permès la recuperació d'hàbitats d'interès comunitari amb les seves espècies de flora i fauna associades. A més, aquests estanys recuperats són llocs tranquils per passejar i relaxar-se, i per educar la gent sobre la natura.

PASSOS SUBTERRANIS PER PROTEGIR ELS AMFIBIS

La carretera GI-602 es va construir a mitjans del segle XX prop de l'Estany d'en Pous i pel mig de l'Estany de la Cardonera. Això provocava una mortalitat catastròfica d'amfibis (granotes, gripaus i tritons). L'any 2017 es van construir passos subterranis en ambdues basses, que han reduït notablement l'atropellament d'amfibis. L'actuació va ser sol·licitada per la Societat Catalana d'Herpetologia i finançada per la Generalitat de Catalunya en el marc del Pla d'Infraestructura Verda de Catalunya.

CAS D'ÈXIT I EXEMPLE PER A ALTRES ESPAIS

GESTIÓ DELS USOS DEL SÒL

L'estat de conservació dels estanys no només depèn dels possibles impactes directes sobre ells sinó que, amb molta mesura, també depèn dels usos del sòl que es realitzen al seu entorn.

Des del 2010, la IAEDEN, té conveni amb 29 propietaris privats de la zona (que cobreixen 14 hectàrees). En aquest marc de col·laboració es promou una gestió agrícola de baix impacte i es desenvolupen diferents projectes de conservació del medi ambient.

Per exemple, les vinyes i les oliveres es conreen amb tècniques ecològiques, sense herbicides ni insecticides. Els prats de dall es procura que mantinguin el cicle de dall corresponent i s'evita la sobrepastura de vaques. Aquestes actuacions permeten conservar el cicle natural de la flora dels prats de dall i evitar l'augment de nutrients a les basses properes. Aquests acords de custòdia agrària permeten garantir l'ús correcte del sòl en diverses zones del peu de mont de l'Albera.

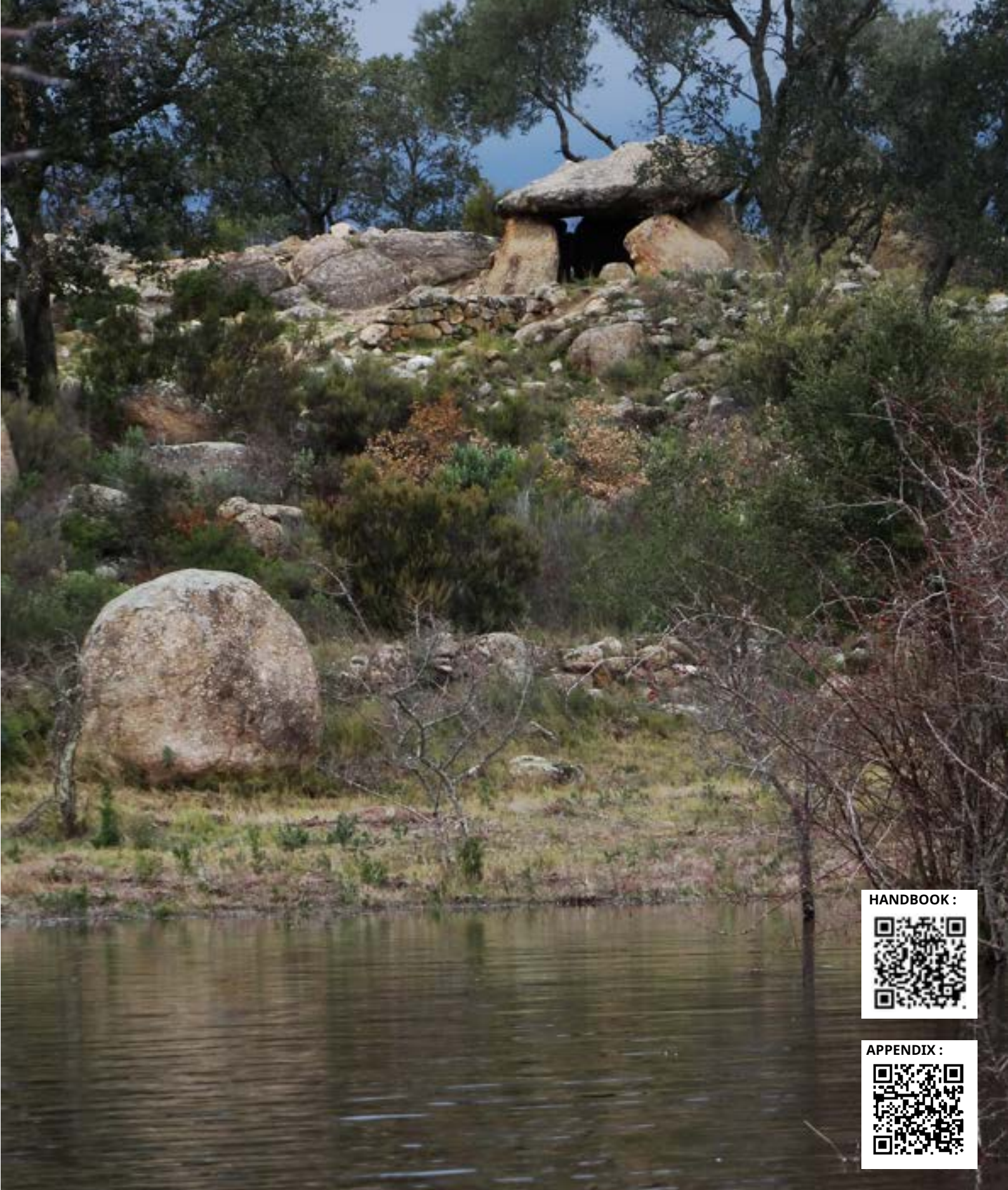
SUPORT A LA CREACIÓ I MANTENIMENT DE LA IDENTITAT

Els habitants de l'Albera estan molt identificats i arrelats al seu territori. Des de fa mil·lennis aquesta terra ha estat habitada. Al llarg del peu de mont de l'Albera, enmig d'aquestes basses i depressions inundables, hi ha 24 menhirs i dòlmens (3500-1800 a.C.), 7 esglésies romàniques (segles IX-XII) i centenars de quilòmetres de marges de pedra seca.

Per als habitants d'aquesta zona, els estanys, el patrimoni romànic i megalític són components essencials de la seva identitat. Hi ha algunes entitats culturals que recuperen, mantenen i difonen aquest patrimoni (p. ex. Centre Excursionista Empordanès, Grup d'Art i Treball, Centre Excursionista Jonquerenc, Associació Acció Cultural Cantallops).

En alguns elements megalítics se'ls va assignar noms relacionats amb els estanys (per exemple, Menhir Estanys I, Dolmen Estanys II).

A més, una església romànica (Santa Cristina de Canadal) comparteix nom amb dos estanys (Canadal Petit, Canadal Gran). També cal mencionar que el sender més important d'aquesta zona s'anomena «Itinerari dels Estanys».



HANDBOOK :

APPENDIX :

CRÈDITS DE LES FOTOS

Marsilea strigosa, cover ©D. Vilasis
Elatine alsinastrum, p.5 ©J. Font
Pelobates cultripes, p.5 ©J. Ferrer
Mauremys leprosa, p.5 ©J. Budó
Burhinus oedicnemus, p.5 ©A. Burgas
Wildlife observation, p.6 ©IAEDEN
Menhir Estanys II, p.6 ©L. Casteys
Underpasses, p.8 ©I. Pérez
Prat dels Rosers, back cover © J.M. Dacosta

First page's layout inspired by freepik.

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2024

http://www.ponderful.eu

Ponderful
PONDS FOR CLIMATE

TÜRKIYE

PONDSCAPE : LAKE MOGAN PONDSCAPE

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 pond losses in European countries over the past 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

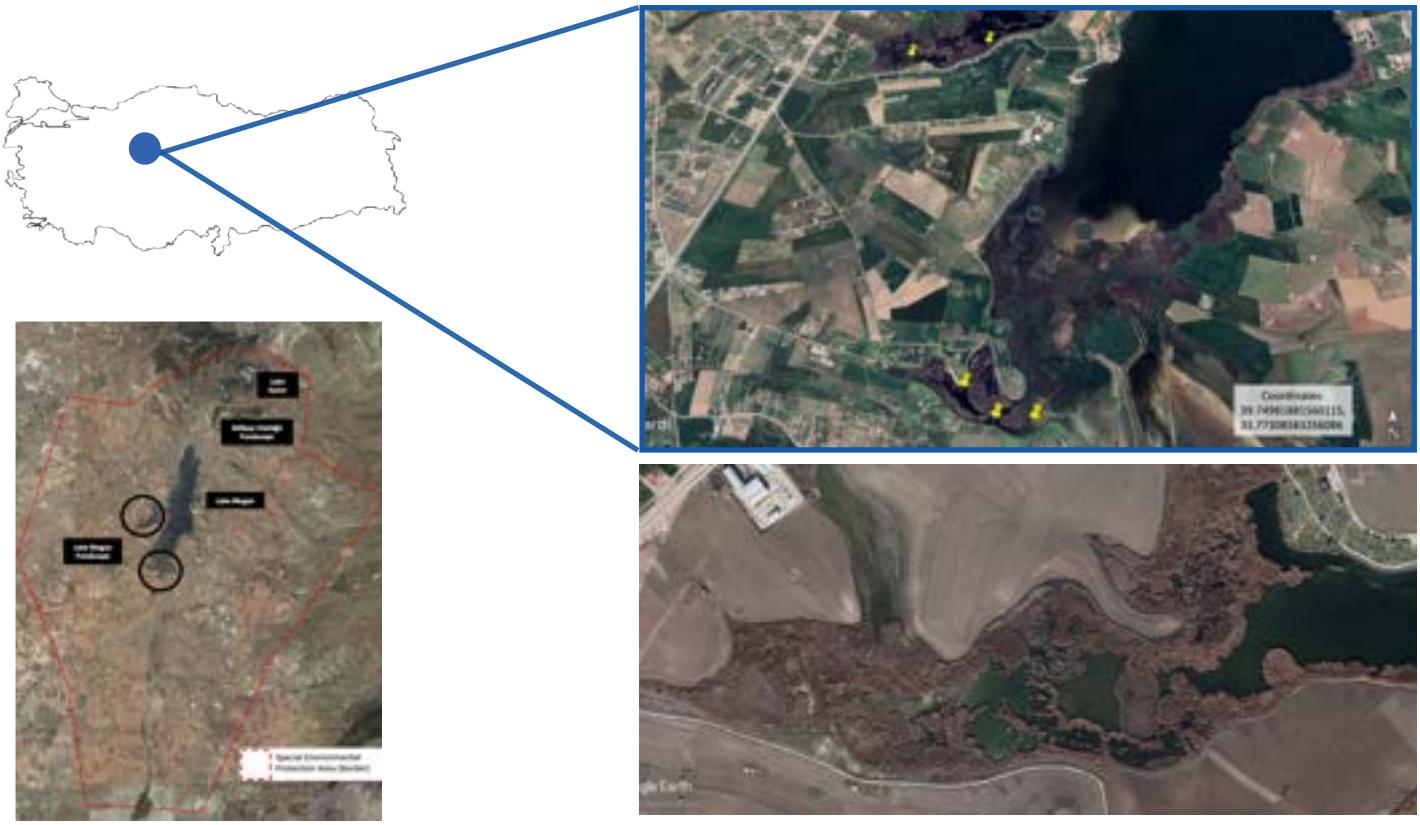
Along the western and southern shores of Lake Mogan there are several lake littoral ponds called Lake Mogan pondscape that were formed by a drop in water level. This is the most upstream pondscape . Lake Mogan and the ponds are fed by the water carried from the Çökek Wetland and streams from the south and the west, which are densely covered with reedbeds. In addition to their great importance in protecting water quality, reedbeds are also ideal for sheltering and as a breeding areas for many animal species, especially water birds. Together with Lake Mogan, this pondscape is under the legislation of Special Environmental Protection Area (SEPA), and was declared an "Important Bird Breeding & Shelter Area". The west ponds are called Dikkuyruk ponds, named after the endangered white-headed duck (*Oxyura leucocephala*) that breeds and shelters there. They are managed by the Gölbaşı District Municipality.

Name of the pondscape : Lake Mogan, Dikkuyruk, ponds
Name of neighboring large town (in a 30 km radius):
Bala, Haymana, Mamak, Çankaya and Gölbaşı (1.826.672 habitants)
Bioclimatic zone : Central-Anatolian cold arid steppe climate

Dominant land use :
Pondscape - nature reserve
Surrounding environment - urban

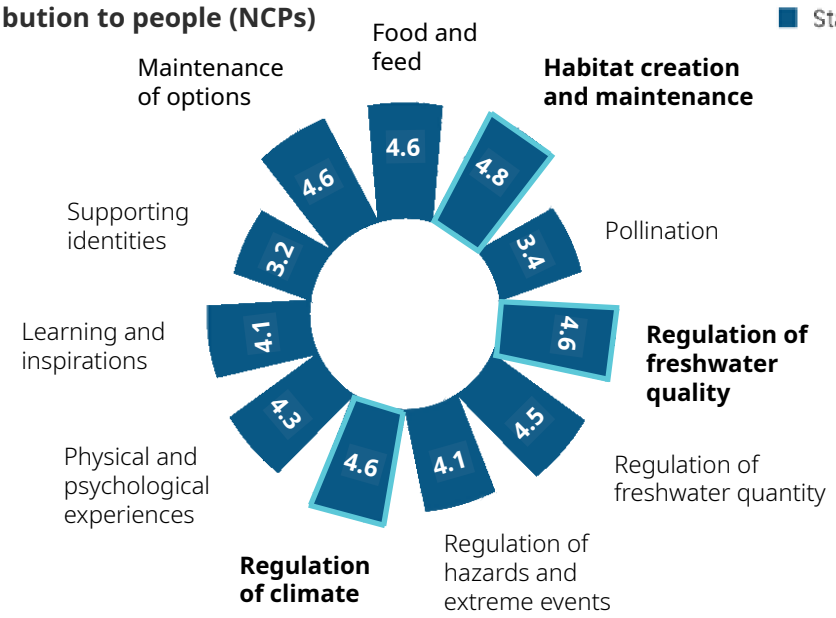
Pondscape area : 1.83 km^2
Pond : number: ~ 15 - 20 (Sampled Pond Number: 5)
density: 2.73/km^2
surface areas : 1'140 to 44'300 m^2
depths : 26 to 130 cm
ages : NA

Water owner : Treasury of the Republic of Türkiye (Public ownership)
Land owner : Diverse private owners
Land manager : District Municipality of Gölbaşı
Public access : 100 % of the area is accessible
Public amenities : several foot paths, bycyle roads



LOCAL COMMUNITY EXPECTATIONS

The 11 Nature-contribution to people (NCPs)
Scale : scores from 1 to 5



The stakeholder expectations rely mainly on (i) habitat creation and maintenance, (ii) freshwater quality, (iii) regulation of climate, (iv) food and feed (ie., winterwheat production in the greater area), (v) maintenance of options and (iv) regulation of freshwater quantity.

LOCAL POLICIES

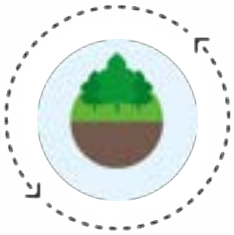
Along the western and southern shores of Lake Mogan there are several Lake littoral ponds called Lake Mogan pondscape that were formed because of a decrease in water level. This is the most upstream pondscape and it is part of the Gölbaşı Special Environmental Protection Area (Gölbaşı SEPA), which was established in 1992 to curb the urbanisation of the peri-urban area of Ankara and protect its high biodiversity value. The area is also one of the 184 designated «Important Bird Areas» and has been declared an «Important Bird Breeding and Shelter Area». In addition, Lake Mogan pondscape and the lake is one of the 122 Important Plant Areas (IPA) in Türkiye. SEPA requires protection and conservation of the ecological characteristics of the area.
The recent management plan for SEPA specifically prioritises the protection of waterbird nesting sites and accordingly, during the breeding period of birds from March 15th to July 15th, no activities other than monitoring, research, and protection activities can be carried out in the area. It is forbidden to engage in fishing of any kind during that time. It is important to note that any activities that may disrupt the water regime or result in drying out of waterbodies are strictly prohibited. The Gölbaşı SEPA Management Plan (2015-2019) was made as part of the «Determining Sensitive Areas and Water Quality Targets on Basins «. The region is divided into two areas: Sensitive A and Sensitive B. The Sensitive A area includes Lake Mogan pondscape, Çökek Wetland (which is the major water source to Lake Mogan and the ponds), reed areas of Gölbaşı Plain, and the habitat of the endemic plant Centaurea tchihatcheffii. According to the management plan, Sensitive A areas must be protected at any cost.
The effective implementation of either SEPA's management plan is challenging. Initially, the introduction of SEPA helped to reduce the construction of hotels along the shore of Lake Mogan, and existing tourism facilities were removed. However, in the catchment of the lake and near the ponds, there is currently a major real-estate development (especially small bungalow-type houses with gardens), low-intensity agriculture (winter wheat cultivation), and recreational areas (restaurants and cafes). Establishing recreational areas near ponds increases pedestrian traffic, negatively impacting habitat quality for plants and waterbird. Studies have shown that an increase in pedestrian traffic led to a decline in the habitats of the endemic plant species Centaurea tchihatcheffii and a reduction in the population density of waterbird species in the area.

-100% of the pondscape is protected by SEPA, Special Environment Protection Area, which aims to protect sensitive areas and their surroundings, both above and underwater. **100%**

- Important bird breeding, feeding & shelter area of National Importance: 7 species of herons observed in Türkiye utilise the area for breeding, wintering, or during migration. **7**

-Lake Mogan pondscape and the lake is one of **122 Important Plant Areas (IPA)** in Türkiye. **122**

MAIN CHALLENGES AND OBJECTIVES



BIODIVERISTY ENHANCEMENT

Especially waterbirds, amphibians, and aquatic plants.

HUMAN HEALTH

An urban blue-green space for walking, socialising, relaxing, and educating people about nature.

NATURE BASED SOLUTIONS (NBS)

Pondscape scale land use and management actions are the Nature-based Solutions put in practice to address the four identified societal challenges.

1990

The implementation of a large protected area (Gölbaşı SEPA)

1992

Preparation of an Environmental Plan at a scale of 1:25,000

2015

Gölbaşı SEPA Management Plan (2015 – 2019)

PONDS AND PONDSCAPE MANAGEMENT

-Protection Status given to a large area (Gölbaşı SEPA) due to high ecologic value of the Lakes Mogan and Eymir, reeds and the ponds.
-Prohibition of the construction of closed areas, excavation and filling.
-Declaration of "Sensitive A" zone for Lake Mogan pondscape (Absolute protection of reeds and ponds).
-Declaration of "Important Bird Breeding & Shelter Area" for Lake Mogan Pondscape.
-Changes in the zoning plan to reduce the density of construction and expropriation of private lands within Sensitive A.
- Prohibition of fishing (SEPA).
- Removal of existing tourism facilities that were previously in place.
- Cleaning of fish nets and solid waste, especially to protect White-headed Duck (*Oxyura leucocephala*).
- Regular monitoring and recording of bird species breeding in the SEPA area (Especially Ferruginous Duck (*Aythya nyroca*) and White-headed Duck (*Oxyura leucocephala*)).
- Closing breeding areas to human activities during the breeding period (except for monitoring, research, and protection activities).
- Regularly monitoring of the species *Centaurea tchihatcheffii*, protecting densely populated areas, and fencing them based on property status.

- Assessing the potential for water-based recreational activities while maintaining a balance between conservation and usage.
- Determination of landscape viewing and bird observation points.
- Collection of solid waste from daily use areas.

NATURE CONTRIBUTIONS TO PEOPLE AND MEASURED INDICATORS

AQUATIC BIODIVERSITY

SPECIES RICHNESS

Aquatic plants (SEPA Area, including Gölbaşı Düzlüğü and Lake Eymir) : **51**

Waterbirds (Observed in the pondscape) : **83**

Waterbirds (SEPA Area, including Gölbaşı Düzlüğü and Lake Eymir) : **249**

Dragonflies (Genus) (SEPA Area, including Gölbaşı Düzlüğü and Lake Eymir) : **13**

Families of invertebrates (SEPA Area, including Gölbaşı Düzlüğü and Lake Eymir): **17**

AMOUNT OF

Species in Global IUCN (2022) Red List (Categories CR, EN, VU, NT) (Lake Mogan and the environment): **5** (*Centaurea tchihatcheffii* (CR), *Oxyura leucocephala* (EN), *Branta ruficollis* (VU), *Aythya nyroca* (NT), *Marmaronetta angustirostris* (NT))

Conservation priority species for Türkiye (Rare and endangered) (Lake Mogan and the environment): **9** (*Centaurea tchihatcheffii* (CR), *Oxyura leucocephala* (EN), *Branta ruficollis (*VU), *Aythya nyroca* (NT), *Marmaronetta angustirostris* (NT), *Chroicocephalus genei* (LC), *Microcarbo pygmaeus* (LC), *Botaurus stellaris* (LC), *Ixobrychus minutus* (LC)

Invasive alien species (N): **1**

FLAGSHIP SPECIES :

Centaurea tchihatcheffii (CR)

Oxyura leucocephala (EN)

Pelophylax Ridibundus

Marmaronetta angustirostris (NT)

NATURE CONTRIBUTIONS TO PEOPLE AND MEASURED INDICATORS

PHYSICAL AND PSYOCHOLOGICAL EXPERIENCE

Number of people visiting the pondscape (leisure, tourism, fishing, nature watching etc.) (nb/year) **7'500-18'000**

100% Area inside the pondscape accessible to the public

Self-reported satisfaction well-being (scale 1 to 5) **3.8**

Most popular activities :
wildlife observation (22%), landscape aesthetics (21%), possibility to practice a desired activity (18%)

LEARNING AND INSPIRATION

2 Number of groups of people visiting the pondscape, especially for bird watching (nb/year).

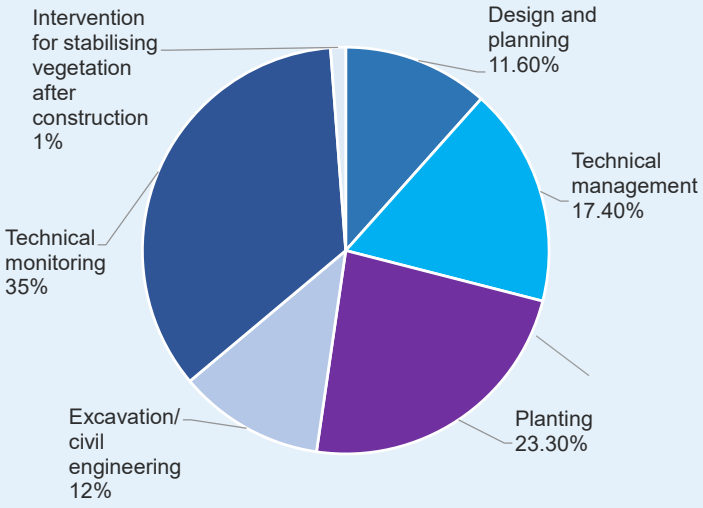
WATER QUALITY

3 Generally, the water is clear but there is garbage and litter around and inside water in some of the ponds (scale 1 to 5).

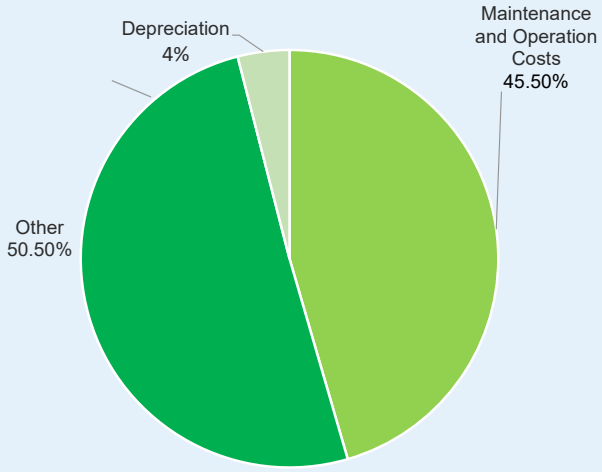
COSTS AND BENEFITS ANALYSIS

OVERALL COSTS ASSESSMENT

SHARE OF COSTS FOR NBS ACTION

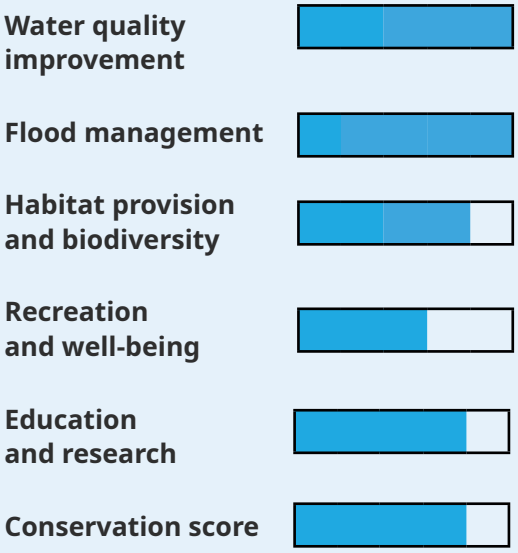


Relative cost of NbS creation measures



Relative cost of ongoing NbS management measures

BENEFITS ASSESSMENT



SUITABLE FINANCE INSTRUMENTS TO REDUCE THE GAP

- **1. Income instruments**

  Development Rights and Leases
- **2. Voluntary contributions /donations**

  Philanthropic contributions, Voluntary beneficiary contributions, Crowdfunding
- **3. Grants**

FUNDING GAP ASSESSMENT

REMAINING THREATS

Increasing real estate development, pedestrian and car traffic, water abstraction, and reed cutting, sediment removal, and improper waste disposal threaten Lake Mogan and the pondscape. In addition, housing construction in the southern and western sides of the lake and the ponds also poses a threat.

It appears that there may be some challenges in the area with the effective implementation of SEPA (see Local Policies section). There may be room for improvement regarding coordination between the organisations responsible for managing the lake and ponds, and SEPA. There is also need for ongoing efforts to balance conservation goals with recreational activities, while ensuring effective coordination among the pondscape stakeholders area so that it becomes a good example of NbS.

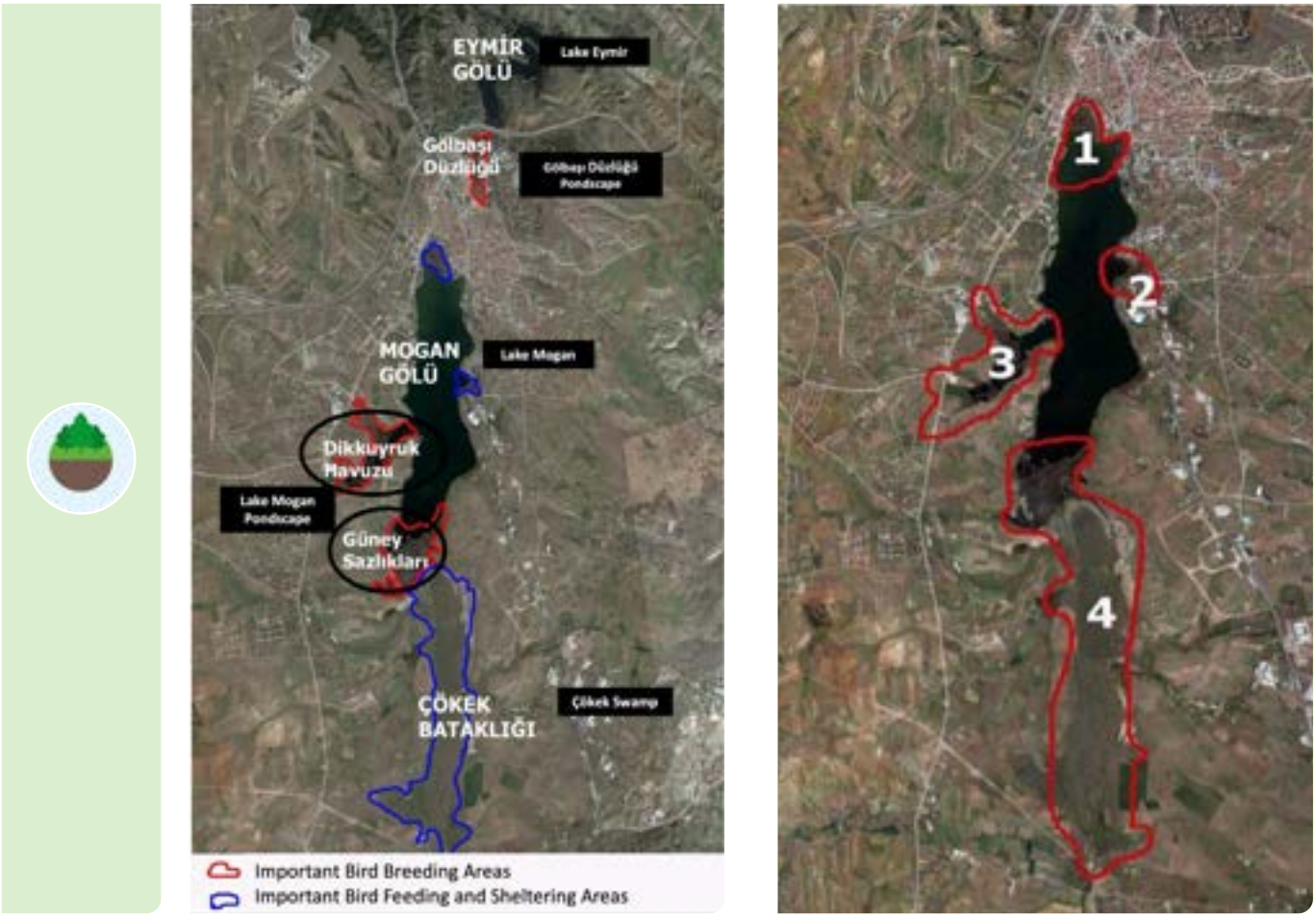
The ponds should be restored according to the CLIMA ponds principles, for which biodiversity enhancement is the primary focus but climate as well as society-related benefits are also considered.

SUCCESS STORY AND TRANSFERABILITY

LAKE LITTORAL PONDS PROVIDE AN INVALUABLE HABITAT FOR WATERBIRD COMMUNITIES AND OTHER SPECIES

Lakes Mogan and Eymir and the pondscapes (both Lake Mogan pondscape and Gölbaşı Düzlüğü) are home for thousands of birds of different species that feed, breed and shelter there. Lake Mogan is one of the 184 important bird areas (IBAs) in Türkiye. Around 249 bird species have been identified in the SEPA region. The lake, and especially the lake littoral ponds to the West and South of the lake, gained status as an important bird area (see Figure 16) with Squacco Heron (*Ardeola ralloides*) (30 pairs), Red-crested Pochard (*Netta Rufina*), (50 pairs), Ferruginous Duck (*Aythya nyroca*) (10 pairs) and White-headed Duck (*Oxyura leucocephala* (2 breeding pairs). Among the species breeding in the area, White-headed Duck (*Oxyura leucocephala*) is globally endangered (EN) and the Ferruginous Duck (*Aythya nyroca*) is near-threatened (NT) species, according to IUCN categories.

The recent studies carried out on the birds of the SEPA area located four important regions for water birds, which can be seen in the figure below (Figure 17). Of these, areas number 1 (North of Lake Mogan) and 2 (east of Lake Mogan) have lost their importance to a great extent due to the construction of pedestrian walkways heavily used by pedestrians, and vehicle traffic around them. Number 3 and 4 are the Ponds in the Lake Mogan Pondscape and they are still important for birds for nesting, breeding and feeding. Ponds located in the western littoral zone of Lake Mogan is the most important breeding site for White-headed duck (*Oxyura leucocephala*), Great Bittern (*Botaurus stellaris*), Little Bittern (*Ixobrychus minutus*), Squacco Heron (*Ardeola ralloides*), Ferruginous Duck (*Aythya nyroca*), Red-crested Pochard (*Netta rufina*). Ponds located in the Southern littoral of Lake Mogan are also important bird breeding area for the same species and the relatively low human activity in these ponds provide a safer environment. Common Pochard (*Aythya ferina*), Ruddy Shelduck (Tadorna feruginea) and Mallard (*Anasplatyrhynchos*) are the duck species that are also commonly breed in the pondscape. Northern Pintail (*Anas acuta*), Northern Shoveler (*Spatula clypeata*), Green-winged Teal (*Anas crecca*), Gadwall (*Mareca strepera*), Eurasian Wigeon (*Mareca penelope*), Garganey (*Spatula querquedula*) and Tufted Duck (*Aythya fuligula*) are duck species that spend their migration and winter periods in the area.



LAKE LITTORAL PONDS PROVIDE AN INVALUABLE HABITAT FOR WATERBIRD COMMUNITIES AND OTHER SPECIES

All seven heron species in Türkiye have been observed in Lake Mogan during breeding, wintering or migration periods. Of these, the Squacco Heron (*Ardeola ralloides*) and the Black-crowned Night Heron (*Nycticorax nycticorax*) stay in the reeds and use the area as feeding and shelter. The Great Egret (*Egretta alba*), the Little Egret (*Egretta garzetta*), the Gray Heron (*Ardea cinerea*), the Purple Heron (*Ardea purpurea*) and the Western Cattle Egret (*Bubulcus ibis*) spend their winter and migration period in Lake Mogan and in ponds.

Of the shorebirds, the Northern Lapwing (*Vanellus vanellus*) (NT) and the Black-winged Stilt (*Himantopus himantopus*) are important species that breed in the Lake Mogan pondscapes. In addition to these, 30 species of coastal and seabirds use the area, especially the Common Ringed Plover (*Charadrius hiaticula*), Little Ringed Plover (*Charadrius dubius*), the Little Stint (*Calidris minuta*), Spotted Redshank (*Tringa erythropus*) and the Black-headed Gull (*Chroicocephalus ridibundus*).In addition, in late autumn and before spring, Red-crested Pochard (*Netta rufina*) (max. 673), Ferruginous Duck (*Aythya nyroca*) (max. 200) and Eurasian Coot (*Fulica Atra*) form large groups in the lake. In past counts, there have been years when more birds than 70,000 (max. 78,590) were counted in autumn in the general SEPA region.

A recent study was carried out in the pondscape to monitor the breeding population of the White-headed ducks, supported by the Nature Association (NGO), Simurg Bird Nest Association (NGO), French Embassy and the French Cultural Center in Türkiye. According to their observations, 46 and 33 White-headed Ducks were sighted in two consequent observations. Many other duck species, such as Red-crested Pochard, Northern Pintail, Common Pochard, Northern Shoveler and Eurasian Wigeon were also observed in the pondscape during the same study.

Another study was carried out to identify plant and animal species in the catchment and also to track and safeguard delicate habitats for endangered endemic plant species *Centaurea tchihatcheffii*, which is listed as «Critically Endangered» (CR) (Figure 19) according to the IUCN criteria (Figure 20). A total of 494 plant species were identified. Additionally, 3 species of amphibians, 12 species of reptiles, and 25 species of mammals were identified within the SEPA.

IMPORTANCE OF INCREASING INTER-INSTITUTIONAL COORDINATION: EXAMPLE OF THE ENDEMIC SPECIES SEVGI ÇIÇEĞI NATIONAL GARDEN

Sevgi Çiçeği National Garden was planned to be built in a catchment close to the Lake Mogan pondscape and at a distance that could affect both the endangered Oxyura leucocephala and other species in the ponds. Through negotiations, the National Garden has been re-located to a place further away from the pondscape. Through this, the negative impact of the proposal for the wildlife of the ponds have been limited. This is an example of good practice owing to increased coordination between academic, NGO and practitioners.

HANDBOOK :

APPENDIX :

PHOTOS CREDITS

Maps of : Special Environmental Protection Area and the Lake Mogan Pondscape, p.2, Important Bird Breeding, Feeding and Sheltering Areas in Gölbaşı Sepa, p. 8 The distribution of Centaurea tchihatcheffii, p.9 © SEPA Environmental Layout Plan (2022)
Centaurea tchihatcheffii, Oxyura leucocephala, Pelophylax Ridibundus, Marmaronetta angustirostris p. 9 © Wikipedia
Collage of photos of some of the important species in Gölbaşı Düzlüğü Pondscape © Greater Ankara Municipality

First page's layout inspired by freepik.com

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2024

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PONDS FOR CLIMATE

TÜRKIYE

GÖLCÜK AĞININ ADI: MOGAN GÖLÜ GÖLCÜK AĞI

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

GÖLCÜK AĞI NEDIR ?

TANIMLAR

Bir gölcük ağı, bağlantılılık içinde aynı peyzaj matrisi ile birbirine bağlı gölcüklerin oluşturduğu bir ağdır.

Bir gölcük ağının sınırları, fiziksel veya ekolojik koşullar tarafından (bir vadi, bir havza, aynı doğa rezervindeki bir dizi gölcük) veya toplumsal veya siyasi kriterlere göre (kent gölcükleri, il sınırı veya ulusal sınırlar içerisindeki gölcükler) belirlenebilir.

GÖLCÜK VE GÖLCÜK AĞLARI ÜZERİNDEKİ BASKILAR VE TEHDİTLER

Avrupa ülkelerinde gölcük kayıplarının %50 ila %90'ı geçen yüzyılda yaşandı. Dahası, gölcükler genellikle su ve doğa ile ilgili ulusal ve Avrupa Birliği (AB) politika belgeleri ve stratejilerinde, AB Su Çerçeve Direktifi (EU-WFD) dahil olmak üzere, büyük ölçüde göz ardı edilmektedir.

GÖLCÜKLERİN VARLIĞI VE KORUNMASI NEDEN ÖNEMLİDİR ?

BIYOLOJIK ÇEŞITLILIĞI ARTIRMA

Genellikle göz ardı edilen ve ekolojik değeri hiçe sayılan gölcükler, biyoçeşitliliğin korunması açısından son derece önemlidir. Gölcük ağları ise, biyoçeşitliliği artırma açısından kritik bölgelerdir.

AFET RİSKİNİ AZALTMA

Gölcükler ve gölcük ağları, sel ve taşkınların etkilerini hafifletmede temel rol oynar ve aynı zamanda yangınla mücadele için önemli su rezervidirler.

İNSAN SAĞLIĞI

Gölcükler ve gölcük ağları, toplumlar için (diğer katkılarının dışında) insan sağlığına ve yaşam kalitesine destek sağlama, fiziksel aktiviteler veya sosyal etkileşim için alanlar sunma, estetik deneyimler, eğitim ve rekreasyonel faaliyetler gibi geniş bir yelpazede ek faydalar sunarlar.

İKLİM DEĞİŞİKLİĞİNİN AZALTILMASI VE UYUM

Gölcükler, dünya genelinde çok sayıda bulunmaları ve yüksek üretkenlikleri nedeniyle iklim değişikliği azaltılaması ve uyumda önemli rol oynarlar. Yüksek üretkenlikleri nedeniyle, gölcükler hem karbonu tutan (karbon yutak alanlar) hem de karbon ve metan kaynağı olan alanlardır ve bu nedenle karbon döngüsü üzerinde belirgin etkilere sahiptirler.

SU YÖNETİMİ

Gölcük ağları, özellikle su kıtlığında önemli su rezervleridir. Hayvanlara su ve sulama suyu sağlamadan önemlidirler.

GÖLCÜK AĞI HAKKINDA

Mogan Gölü'nün batı ve güney kıyılarında, su seviyesinin düşmesiyle oluşan Mogan Gölü gölcük ağı adı verilen göl kıyısı gölcükleri bulunmaktadır. Gölbaşı Düzlüğü ve İmrahor Vadisi gölcük ağına memba gölcük ağı olan Mogan Gölü gölcük ağı, Çökek Bataklığı'ndan taşınan sular ile güneyden ve batıdan gelen su kaynaklarından beslenir. Burada bulunan gölcükler yoğun olarak sazlıklarla kaplıdır ve bu nedenle gölcüklerin bir kısmına ulaşmak mümkün değildir. Gölcüklerin etrafında bulunan sazlıklar, su kalitesinin korunmasındaki büyük önemlerinin yanı sıra, başta su kuşları olmak üzere birçok hayvan türünün barınma ve üremesi için de ideal habitatlardır.

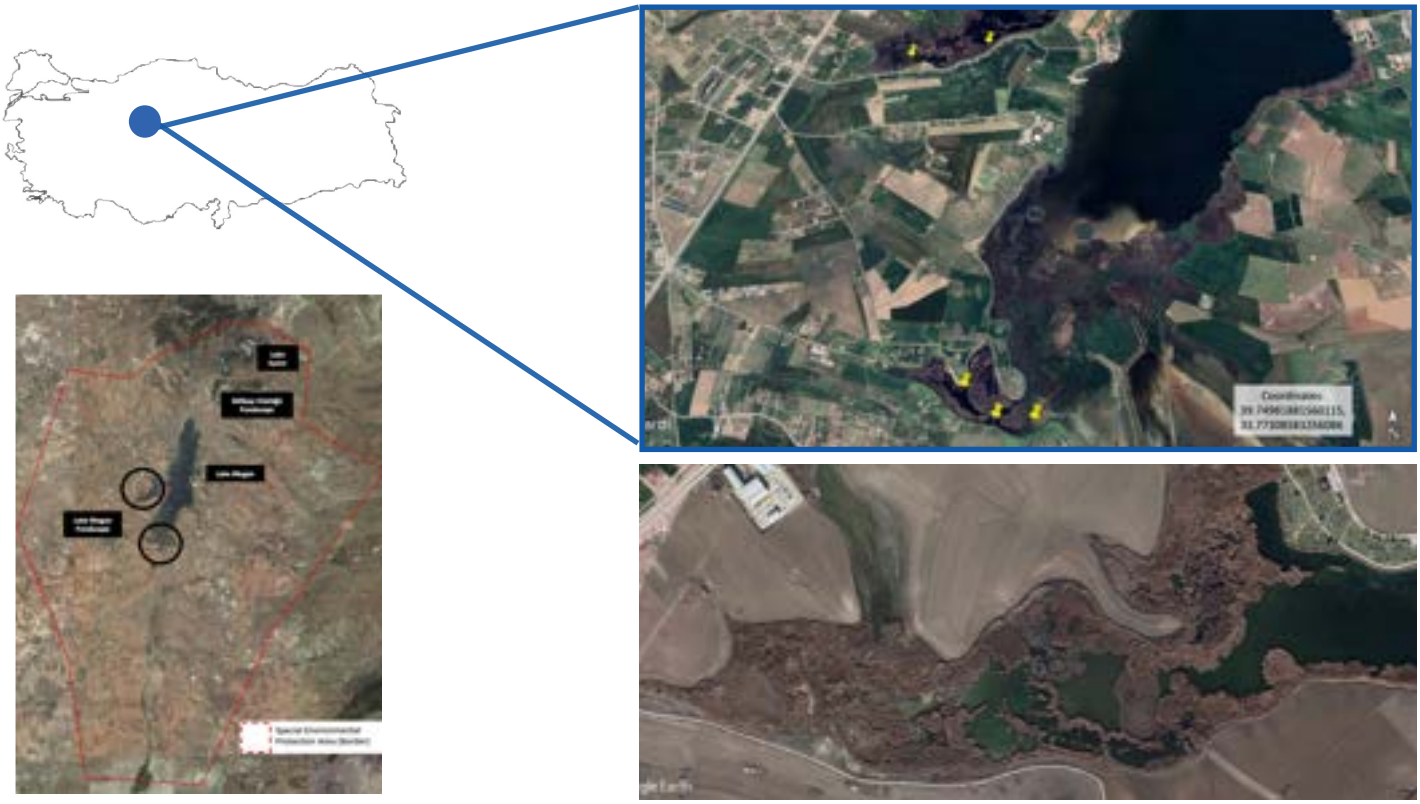
Mogan Gölü gölcük ağı, Mogan Gölü ve Gölbaşı Düzlüğü gölcük ağı ile birlikte Özel Çevre Koruma Alanı (ÖÇKB) mevzuatına tabidir ve bu kapsamda gölcük ağı, «Önemli Kuş Üreme, Beslenme ve Barınma Alanı» olarak ilan edilmiştir. Batıda bulunan gölcüklere, orada üreyen, barınan ve nesli tükenmekte olan Dikkuyruk (*Oxyura leucocephala*) ördeklerinin adı verilmiştir. Gölcük ağı, Gölbaşı Belediyesi tarafından yönetilmektedir.

Gölcük ağının adı: Mogan Gölü gölcük ağı
Komşu büyük ilçenin adı (30 km yarıçap içinde):
Bala, Haymana, Mamak, Çankaya ve Gölbaşı (1.826.672 kişi)
Biyoklimatik kuşak: İç Anadolu soğuk kurak bozkır iklimi

Baskın arazi kullanımı:
Gölcük ağı – doğa rezervi
Çevre – kent çeperi

Gölcük alanı : 1.83 km^2
Gölcük Sayısı: ~ 15 - 20 (Örneklenen Gölcük Sayısı: 5)
Yoğunluk : 2.73/km^2
Yüzey alanları : 1'140 ila 44'300 m^2
Derinlikler : 26 ila 130 cm
Yaş : NA

Arazi sahibi: Gölcükler: Türkiye Cumhuriyeti Hazinesi (Kamu mülkiyeti) /
Arazi: Özel ve kamusal mülkiyet
Arazi Yönetimi: Gölbaşı Belediyesi
Halka açık erişilebilir alan: %100
Halka açık olanaklar: çeşitli patikalar, bisiklet yolları



YEREL TOPLUMSAL BEKLENTILER

Doğanın İnsanlara 11 Katkısı (NCPs)

Ölçek: 1 ile 5 arasında bir puanlama

Paydaş beklentilerinde temel olarak (i) habitat oluşturma ve sürdürme, (ii) tatlı su kalitesi, (iii) iklimin düzenlenmesi, (iv) gıda ve yem (örneğin, kışlık buğday üretimi), (v) seçeneklerin sürdürülmesi ve (iv) tatlı su miktarının düzenlenmesi öne çıkmaktadır.

YEREL POLITIKALAR

Mogan Gölü'nün batı ve güney kıyıları boyunca, su seviyesinin düşmesiyle oluşan göl kıyısı gölcüklerine Mogan Gölü gölcük ağı adı verilir. Bu gölcük ağı, Gölbaşı Düzlüğü ve İmrahor Vadisi gölcük ağlarının yukarı havzasındadır. 1990 yılında Ankara'nın kent çeperinde kentleşmeyi sınırlamak ve bölgenin yüksek biyolojik çeşitlilik değerini korumak için, Gölbaşı Özel Çevre Koruma Bölgesi (Gölbaşı ÖÇKB) ilanı ile koruma altına alınmıştır. Alan aynı zamanda belirlenen 184 «Önemli Kuş Alanı'ndan biridir ve gölcük ağının olduğu kısımlar, «Önemli Kuş Üreme, Beslenme ve Barınma Alanı» ilan edilmiştir. Ayrıca Mogan Gölü gölcük ağının kıyısında bulunduğu Mogan gölü, Türkiye'deki 122 Önemli Bitki Alanından (ÖBA) biridir. Gölbaşı ÖÇKB Yönetim Planı (2015-2019)'a göre bölge, Hassas A ve Hassas B olmak üzere koruma değeri bakımından iki bölgede ele alınır. Hassas A alanı, Mogan Gölü gölcük ağı, Mogan Gölü ve gölcüklerin ana su kaynağı olan Çökek Bataklığı, Gölbaşı Düzlüğü' nün sazlık alanları ve bölgeye endemik bitki türü Centaurea tchihatcheffii' nin yetiştiği alanları içerir. Yönetim planına göre, Hassas A alanları ne pahasına olursa olsun korunmalıdır. ÖÇKB için hazırlanan son yönetim planı, özellikle su kuşlarının üreme, beslenme ve barınma alanlarının korunmasına öncelik vermektedir ve buna bağlı olarak, kuşların üreme dönemi olan 15 Mart-15 Temmuz tarihleri arasında alanda izleme, araştırma ve koruma faaliyetleri dışında herhangi bir faaliyetin yürütülmesini yasaklar. Ek olarak, ÖÇKB alanı içerisinde balıkçılık yapılmasına izin verilmez. Su rejimini bozabilecek veya su kütlelerinin kurumasına neden olabilecek her türlü uygulama da kesinlikle yasaktır.

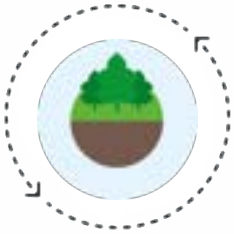
Bununla birlikte, ÖÇKB yönetim planının alanda etkin bir şekilde uygulanmasına dair bazı zorluklar vardır. Başlangıçta, ÖÇKB ilanı ile, Mogan Gölü kıyısında yer alan oteller kaldırıldı ve inşaat faaliyetleri kısıtlandı. Ancak, mevcut durumda gölün havzasında ve gölcüklerin yakınında, çeşitli gayrimenkul geliştirme projeleri (kooperatif tipi küçük evler) ve hobi bahçeleri yer almaktadır. Bu evlerin katı atıkları çevreyi kirletmekte, atık suları ise göl ve gölcüklere ulaşmaktadır. Yine, gölcüklerin çevresinde düşük yoğunluklu tarım (kışlık buğday ekimi) ve çok çeşitli günlük kullanımlık rekreasyon alanları (restoranlar ve kafeler) bulunmaktadır. Gölcüklerin yakınında rekreasyon alanları oluşturmak, yaya trafiğini artırarak bitkiler ve özellikle su kuşları için habitat kalitesini olumsuz etkiler. Çalışmalar ve yaya trafiğindeki artışın, endemik bitki türleri Centaurea tchihatcheffii' nin habitatlarında ve bölgedeki su kuşu türlerinin popülasyon yoğunluğunda bir azalmaya yol açtığını ortaya koymaktadır.

-Gölcük ağının %100'ü, ÖÇK (Özel Çevre Koruma) Bölgesi olarak korunmaktadır (Gölbaşı ÖÇKB). **100%**

-Ulusal Öneme Sahip Önemli Kuş Üreme, Beslenme ve Barınma Alanı: Türkiye'de gözlenen **7 balıkçıl tür** bu alanı üreme, beslenme, barınma amaçlı veya göç sırasında kullanmaktadır. **7**

-Mogan Gölü gölcük ağı ve Mogan gölü, **Türkiye'deki 122 Önemli Bitki Alanından** (ÖBA) biridir. **122**

TEMEL ZORLUKLAR VE HEDEFLER



BIYOÇEŞITLILIĞIN ARTIRILMASI

Özellikle su kuşları, amfibiler ve su bitkilerinin yaşam alanlarının korunması.

İNSAN SAĞLIĞI

Yürümek, sosyalleşmek, rahatlamak ve insanları doğa hakkında eğitmek için kentsel mavi-yeşil bir alan.

DOĞA TEMELLI ÇÖZÜMLER (NBS)

Gölcük ağı ölçeğinde arazi kullanımı ve yönetimine dair alınan önlemler, belirlenen temel zorlukları ele almak için uygulamaya konulan Doğa Temelli Çözümlerdir.

1990

"Özel Çevre Koruma Bölgesi» ilanı (Gölbaşı ÖÇKB)

1992

Gölbaşı ÖÇKB için "1/25.000 ölçekli Çevre Düzeni Planı»

2015

Gölbaşı ÖÇK Bölgesi Yönetim Planı (2015-2019)

GÖLCÜK VE GÖLCÜK AĞLARI YÖNETIMI

- Mogan ve Eymir Gölleri, sazlık alanlar ve gölcükleri içeren geniş bir alanda yüksek ekolojik değerine istinaden Koruma Statüsü (Gölbaşı ÖÇKB) verilmesi
- Kapalı alanların inşaatı, kazı ve dolgu yasaklanması
- Mogan Gölü Gölcük ağı için «Hassas A» bölgesi ilanı (Sazlık ve gölcüklerin mutlak korunması zorunluluğu)
- Su rejimini bozabilecek veya su kaynaklarında kurumaya neden olabilecek her türlü uygulamanın yasaklanması
- Mogan Gölü Gölcük Ağı için «Önemli Kuş Üreme, Beslenme ve Barınma Alanı» ilanı
- İmar planında yapılan değişiklikler ile yapılaşma yoğunluğunun azaltılması ve Hassas A sınırları içindeki özel arazilerin kamulaştırılması.
-Balıkçılık ve avcılık faaliyetlerinin yasaklanması
-ÖÇKB öncesinde var olan turizm tesislerinin kaldırılması.
- Özellikle Dikkuyruk'ları (Oxyura leucocephala) korumak için balık ağlarının ve katı atıkların temizlenmesi
- ÖÇKB bölgesinde üreyen kuş türlerinin düzenli olarak izlenmesi ve kayıt altına alınması (Özellikle Pasbaş Patka (Aythya nyroca) ve Dikkuyruk (Oxyura leucocephala)
- Su kuşlarının ürediği, beslendiği ve barındığı alanların üreme döneminde insan faaliyetlerine kapatılması (izleme, araştırma ve koruma faaliyetleri hariç).
- Endemik tür Centaurea tchihatcheffii'nin düzenli olarak izlenmesi, nüfusunun yoğun olduğu alanların korunması ve mülkiyet durumu uygunsa çitle çevrilmesi.

- Alanın korunması ve kullanımı arasındaki dengeyi gözeten rekreasyonel faaliyetlerin değerlendirilmesi.
- Manzara izleme ve kuş gözlem noktalarının belirlenmesi
- Günlük kullanım alanlarından katı atıkların toplanması

DOĞANIN İNSANLARA KATKILARI VE ILGILI GÖSTERGELER

SUCUL BIYOLOJIK ÇEŞITLILIK

TÜR ZENGINLIĞI

Su bitkileri (Tüm ÖÇKB Alanı; Gölbaşı Düzlüğü ve Eymir Gölü dahil) : **51**

Su kuşları (Sadece gölcük ağında gözlenen): **83**

Su kuşları (Tüm ÖÇKB Alanı; Gölbaşı Düzlüğü ve Eymir Gölü dahil) : **249**

Yusufçuklar (Familya) (Tüm ÖÇKB Alanı; Gölbaşı Düzlüğü ve Eymir Gölü dahil): **13**

Omurgasız familyaları (Gölcük ağıında gözlenen): **17**

MIKTAR

IUCN Kirmizi liste'de yer alan türlerin sayisi (KATEGORİLER : CR, EN, VU, NT) (Mogan Gölü ve çevresi): **5** (*Centaurea tchihatcheffii* (CR), *Oxyura leucocephala* (EN), *Branta ruficollis* (VU), *Aythya nyroca* (NT), *Marmaronetta angustirostris* (NT))

Türkiye için koruma önceliği bulunan türler (Mogan Gölü ve çevresinde nadir ve tehlike altında bulunan türler): **9** (*Centaurea tchihatcheffii* (CR), *Oxyura leucocephala* (EN), *Branta ruficollis* (VU), *Aythya nyroca* (NT), *Marmaronetta angustirostris* (NT), *Chroicocephalus genei* (LC), *Microcarbo pygmaeus* (LC), *Botaurus stellaris* (LC), *Ixobrychus minutus* (LC)

İstilacı türler (N): : **1**

SEMBOLIK TÜRLER :

Centaurea tchihatcheffii (CR)

Oxyura leucocephala (EN)

Pelophylax Ridibundus

Marmaronetta angustirostris (NT)

DOĞANIN İNSANLARA KATKILARI VE ILGILI GÖSTERGELER

FIZIKSEL VE PSIKOLOJIK DENEYIM

Eğlence, günübirlik turizm, balık tutma, doğa izleme gibi amaçlarla gölcük ağını ziyaret eden kişi sayısı (kişi/yıl)

7'500-18'000

100% Gölcük ağının halka açık olan alanı

Göcük ağına ilişkin memnuniyet (1 ila 5 arasında)

3.8

En popüler aktiviteler :
yaban hayatı gözlemi (% 22), peyzaj estetiği (% 21), istenen bir aktiviteyi uygulama imkanı (% 18)

ÖĞRENME VE ILHAM ALMA

2 Özellikle kuş gözlemciliği için gölcük ağını ziyaret eden insan grubu (grup/yıl).

SU KALITESI

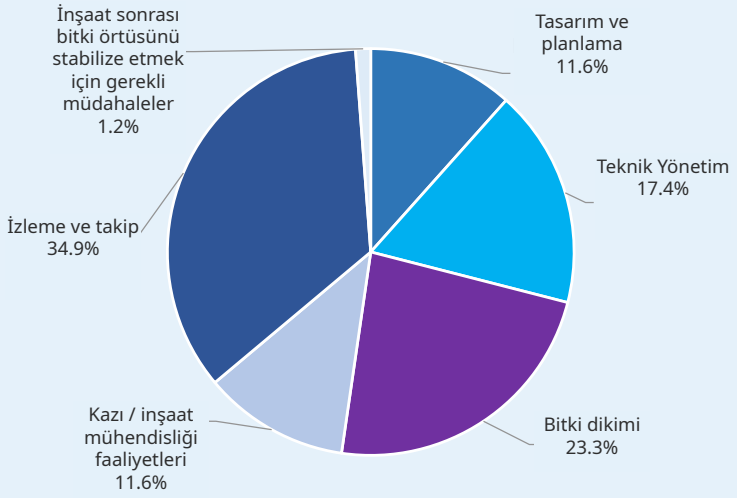
3 Genel olarak, su berraktır, ancak bazı gölcüklerde suyun etrafında ve içinde katı atıklar vardır (ölçek 1'den 5'e kadar).

MALIYET VE FAYDA ANALIZI

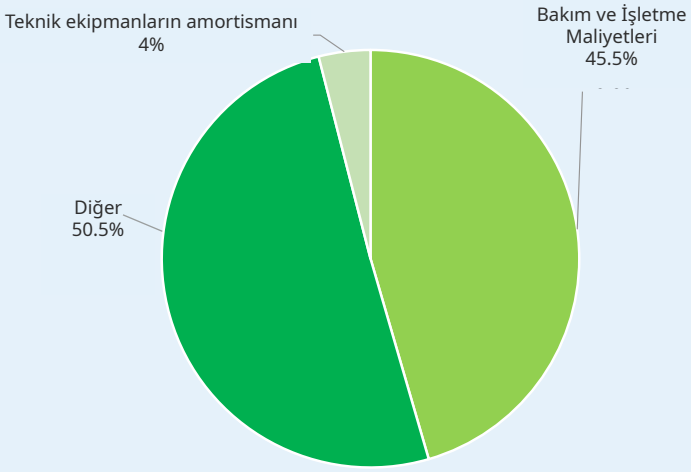
GENEL MALIYET DEĞERLENDIRMESI

€€€€

DOĞA TEMELLI ÇÖZÜMLER IÇIN MALIYET PAYI

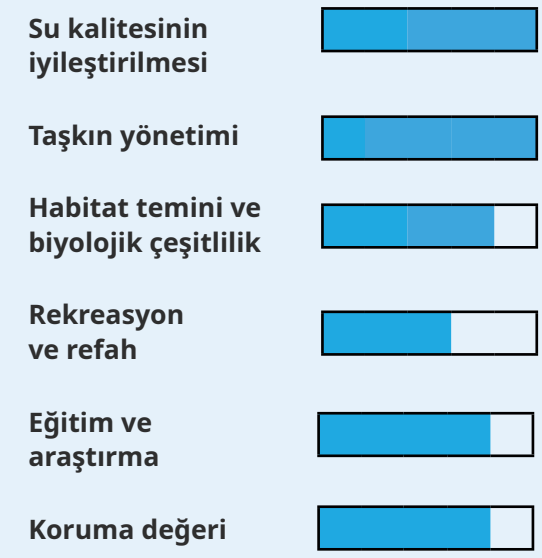


Doğa Temelli Çözümler oluşturmak için alınabilecek önlemlerin tek seferlik maliyet kalemleri



Doğa Temelli Çözümler oluşturmak için alınabilecek önlemlerin periyodik maliyet kalemleri

FAYDA DEĞERLENDIRMESI



FINANS AÇIĞINI AZALTMAK IÇIN UYGUN FINANSMAN ARAÇLARI

- **1. Gelir kaynakları**

  İmar Hakları ve Kiralamalar

- **2. Gönüllü katkılar/bağışlar**

  Sosyal sorumluluk, Gönüllü yararlanıcı katkıları, Kitle fonlaması

- **3. Hibeler**

FINANSMAN AÇIĞI DEĞERLENDIRMESI

€€€€€

TEHDITLER VE ÖNERILER

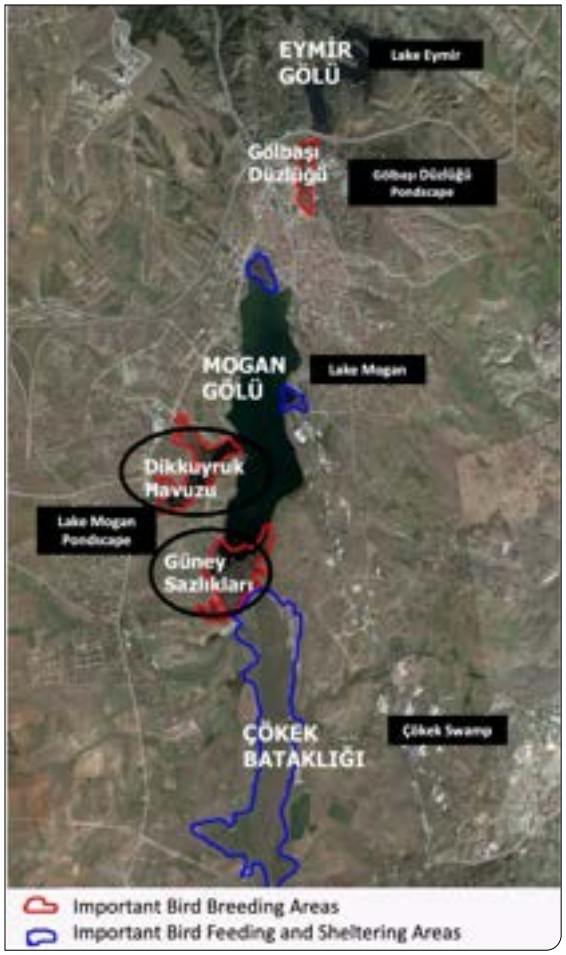
Kentleşme, kaçak konut inşaatı, yaya ve araba trafiğinin artması, gölcüklerden su çekimi, sazlık kesimi ve uygun olmayan atıkların bertaraf edilmesi, gölcük ağını tehdit etmektedir. ÖÇKB yönetim planının alanda etkin bir şekilde uygulanmasına dair bazı zorluklar vardır. Bölgeye dair paydaşların, bölgenin koruma değeri ve rekreasyon hedeflerini dengelemek için koordinasyon içinde olmaları gereklidir. Biyolojik çeşitliliğin öncelikli hedef olduğu "İKLİM gölcük" ilkelerine dayalı gölcük restorasyonu; aynı zamanda iklim değişikliği ve toplumsal faydaları da göz önünde bulundurarak, bölgenin potansiyelinin korunmasını ve artırılmasını sağlayacaktır.

BAŞARI HIKAYELERI

GÖL KIYISI GÖLCÜKLER, SU KUŞLARI VE DIĞER TÜRLER IÇIN PAHA BIÇILMEZ BIR YAŞAM ALANI SAĞLAR

Mogan ve Eymir Gölleri ile Mogan Gölü ve Gölbaşı Düzlüğü gölcük ağları, üremek, beslenmek ve barınmak için farklı türlerden binlerce kuşa ev sahipliği yapmaktadır. Mogan Gölü, Türkiye'deki 184 önemli kuş alanından (ÖKA) biridir. Bugüne kadar ÖÇK bölgesinde yaklaşık 249 kuş türü tespit edilmiştir. Göl ve özellikle gölün batı ve güneyinde yer alan göl kıyısı gölcükleri, Alacabalıkçıl (*Ardeola ralloides*) (30 çift), Macar ördeği (*Netta Rufina*), (50 çift), Pasbaş Patka (*Aythya nyroca*) (10 çift) ve Dikkuyruk Ördek (*Oxyura leucocephala*) (2 çift) tespiti ile önemli kuş alanı statüsü kazanmıştır (bkz. Şekil 16). IUCN kategorilerine göre, alanda üreyen türler arasında nesli küresel ölçekte tehlikede (EN) Dikkuyruk ördek (*Oxyura leucocephala*) ve tehlike altına girmeye yakın (NT) türlerden Pasbaş patka (*Aythya nyroca*) bulunmaktadır.

ÖÇK bölgesindeki kuşları gözlemleyen son çalışmalara göre, bölge içinde su kuşları için 4 önemli bölge belirlenmiştir (Şekil 17). Bunlardan 1 (Mogan Gölü'nün kuzeyi) ve 2 (Mogan Gölü'nün doğusu) numaralı alanlar, yaya yürüyüş yollarının yapılması ve yayalar tarafından yoğun olarak kullanılması ve yine yakınlarındaki araç trafiği nedeniyle önemini büyük ölçüde yitirmiştir. 3 ve 4 numara, Mogan Gölü gölcük ağın dahilinde bulunan gölcüklerdir ve kuşların beslenmesi, üremesi ve barınması için halen uygun habitatlardır. Mogan Gölü'nün batı kıyı bölgesinde yer alan gölcükler, Dikkuyruk Ördek (*Oxyura leucocephala*), Balaban (*Botaurus stellaris*), Küçük Balaban (*Ixobrychus minutus*), Alacabalıkçıl (*Ardeola ralloides*), Pasbaş Patka (*Aythya nyroca*) ve Macar Ördeği (*Netta rufina*) için en önemli üreme alanıdır. Mogan Gölü'nün güney kıyısında yer alan gölcükler de aynı türler için önemli kuş üreme alanlarıdır ve bu gölcüklerdeki nispeten düşük insan aktivitesi, su kuşları için güvenli bir ortam sağlar. Elmabaş (*Aythya ferina*), Angıt (*Tadorna feruginea*) ve Yeşilbaş (*Anasplatyrhynchos*) da gölcük ağında yaygın olarak gözlemlenen türlerdir. Kılkuyruk (*Anas acuta*), Kaşıkgaga (*Spatula clypeata*), Çamurcun (*Anas crecca*), Boz ördek (*Mareca strepera*), Fiyu (*Mareca penelope*), Çıkrıkçın (*Spatula querquedula*) ve Tepeli Patka (*Aythya fuligula*) göç ve kış dönemlerini bölgede geçiren diğer türlerdir.



GÖL KIYISI GÖLCÜKLER, SU KUŞLARI VE DİĞER TÜRLER IÇIN PAHA BIÇILMEZ BIR YAŞAM ALANI SAĞLAR

Türkiye'de görülen yedi balıkçıl türünün hepsi üreme, kışlama veya göç dönemlerinde Mogan Gölü'nde gözlenmiştir. Bunlardan Alacabalıkçıl (Ardeola ralloides) ve Gece balıkçılı (Nycticorax nycticorax) sazlıklarda kuluçkaya yatmaktadır. Bu iki balıkçıl, alanı beslenmek ve barınmak için kullanmaktadır. Büyük Akbalıkçıl (Egretta alba), Küçük Akbalıkçıl (Egretta garzetta), Gri Balıkçıl (Ardea cinerea), Erguvani Balıkçıl (Ardea purpurea) ve Sığır Balıkçılı (Bubulcus ibis) ise kışlarını ve göç dönemlerini Mogan Gölü'nde ve gölcüklerde geçirirler.

Kıyı kuşlarından Kızkuşu (Vanellus vanellus) (NT) ve Uzunbacak (Himantopus himantopus), Mogan Gölü gölcük ağlarında kuluçkaya yatan önemli türlerdir. Bunlara ek olarak, Halkalı Cılıbıt (Charadrius hiaticula), Küçük Halkalı Cılıbıt (Charadrius dubius), Küçük Kumkuşu (Calidris minuta), Kara Kızılbacak (Tringa erythropus) ve Karabaş Martı (Chroicocephalus ridibundus) başta olmak üzere 30 tür kıyı ve deniz kuşu Mogan Gölü'nü kullanmaktadır. Ayrıca sonbaharın sonlarında ve ilkbahardan önce Macar Ördeği (Netta rufina) (maks. 673), Pasbaş Patka (Aythya nyroca) (maks. 200) ve Sakarmeke (Fulica Atra) gölde büyük topluluklar oluşturur. Geçmiş sayımlarda, ÖÇK bölgesinde sonbaharda 70.000'den (maks. 78.590) daha fazla kuşun sayıldığı yıllar olmuştur.

Geçtiğimiz yıllarda, Dikkuyruk Ördeklerin (Oxyura leucocephala) üreme popülasyonunu izlemek için gölcük ağında Doğa Derneği (STK), Simurg Kuş Yuvası Derneği (STK), Fransa Büyükelçiliği ve Türkiye'deki Fransız Kültür Merkezi tarafından desteklenen bir çalışma yapılmıştır. Bu çalışma sürecinde art arda yapılan iki gözlemde 46 ve 33 adet Dikkuyruk Ördek (Oxyura leucocephala) gözlemlendi. Macar Ördeği (Netta rufina), Kılkuyruk (Anas acuta), Elmabaş Patka (Aythya ferina), Kaşıkgaga (Spatula clypeata) ve Fiyu (Mareca penelope) gibi diğer birçok ördek türü de aynı çalışma sırasında gölcük ağıında gözlemlendi.

Yeşilbaş
(*Anas platyrhynchos*)

Sakarmeke
(*Fulica atra*)

Küçük Batağan
(*Tachybaptus ruficollis*)

Elmabaş Patka
(*Aythya ferina*)

IUCN kriterlerine göre nesli kritik tehlikede olan (CR) (Şekil 19) endemik bitki türü Centaurea tchihatcheffii (Şekil 19) gözlemi ve koruma altına alınması için, ve yine havzadaki diğer bitki ve hayvan türlerini belirlemek ve hassas habitatları izlemek ve korumak için bir çalışma yapılmıştır (Şekil 20). Yapılan bu çalışmada toplam 494 bitki türü gözlemlenmiştir. Buna ek olarak, ÖÇK bölgesi içinde 3 amfibi, 12 sürüngen ve 25 memeli türü tespit edilmiştir.

KURUMLAR ARASI KOORDINASYONU ARTIRMANIN ÖNEMI: SEVGI ÇIÇEĞI MILLET BAHÇESI

Sevgi Çiçeği Millet Bahçesi'nin Mogan Gölü gölcüklerine yakın bir konumda ve hem nesli tükenmekte olan Dikkuyruk Ördek (Oxyura leucocephala) hem de gölcüklerdeki diğer türleri etkileyebilecek bir mesafede inşa edilmesi planlanmıştır.

Sivil toplum (STK'lar) ve Üniversiteler tarafından gerçekleştirilen müzakereler yoluyla, Millet Bahçesi, gölcük ağına olan etkilerin sınırlandırılması için, uygulama aşamasında Gölcük ağından daha uzak bir yere inşa edilmiştir. Bu sınırlama sayesinde gölcüklerdeki biyolojik çeşitlilik üzerindeki potansiyel olumsuz etki sınırlanmıştır. Bu örnek, sivil toplum, akademi ve uygulayıcıların arasında koordinasyonun sağlanması ve müzakerelerin, hem gölcük ağı için bütünsel ve uzun vadeli fayda sağlamış olması hem de alanın korunması ve kullanımı arasındaki dengeyi gözeten bir rekreasyon projesi olması nedeniyle iyi bir uygulama örneğidir.

HANDBOOK :

APPENDIX :

FOTOĞRAF KAYNAĞI

Özel Çevre Koruma Bölgesi ve Mogan Gölü Gölcük Ağı Haritaları, s.2, Gölbaşı ÖÇKB'daki Önemli Kuş Üreme, Beslenme ve Barınma Alanlarının Haritaları, s.8 ve Sevgi Çiçeği'nin (*Centaurea tchihatcheffii*) dağılımını gösteren harita, s.9 © ÖÇKB Çevre Düzeni Planı (2022)
Sevgi Çiçeği (*Centaurea tchihatcheffii*), Dikkuyruk (*Oxyura leucocephala*), Ova Kurbağası (*Pelophylax Ridibundus*), Yaz Ördeği (*Marmaronetta angustirostris*) s. 9 © Vikipedi
Mogan Gölü Gölcük Ağı'ndaki bazı önemli türlerin fotoğraflarından oluşan kolaj, © Ankara Büyükşehir Belediyesi

First page's layout inspired by freepik.com

YAZARLARI

Başoğlu Acet D., Avcı F., Kıran H., Akpınar M. B., Dolcerocca A., Akyürek Z., Beklioğlu M.

2024

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Ponderful
PONDS FOR CLIMATE

TÜRKIYE

PONDSCAPE : IMRAHOR RIVER VALLEY

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 pond losses in European countries over the past 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

The Imrahor River Valley, located southeast of Türkiye's capital city Ankara, and close to the city center and is home to a diverse and significant ecological heritage. Despite its location within the Ankara metropolitan area, it plays a crucial role in balancing urban and rural areas. The İmrahor River Valley starts at the outflow of Lake Eymir and ends at Incesu Creek, and it includes approximately one-third of the 3,300 km2 drainage area of Ankara Creek. The river follows an irregular pattern through the valley and reaches Incesu Water Detention Pond. Following that, there is a closed conduit at the exit of Incesu Water Detention Pond. Both infrastructures were built following a deadly flooding incident in Ankara city center in 1961.The valley is hydrologically connected to the upstream Lake Mogan and Lake Eymir and forms a significant sub-basin.

There are 12 ponds in Imrahor River Valley pondscape, some of which are temporary. Many of the ponds in the Valley were created for human use, primarily for water retention to prevent flooding in the downstream city centre, but also because of clay excavations for brick factories. In time, these ponds have not only served as water sources for industrial use but have also become vital habitats for biodiversity and recreation.

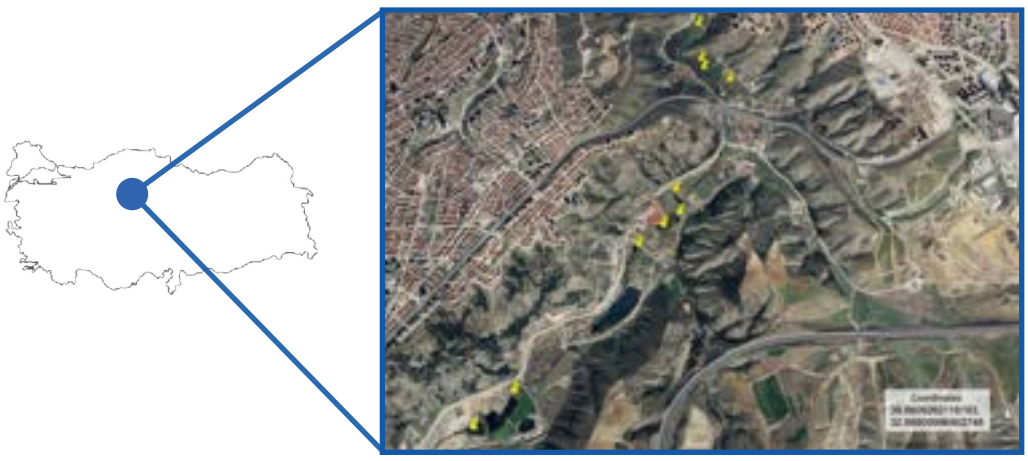
However, significant deterioration of the Imrahor River Valley over the years has occurred due to several factors including real estate development, road and canal constructions. This has resulted in changes to the character of the catchment and surface water availability. The process of heavy urbanisation led to some canalisation of surface water and a loss of the rural-natural character of the area. Construction projects initiated at the valley's base and towards the slopes have dramatically altered the land's morphology. The areas that used to collect surface runoff on the east-facing slopes of the valley have been replaced by high-density settlements and impermeable surfaces. This transformation has had a profound impact on the valley's hydrological dynamics, affecting its ability to sustain natural surface run off. In addition, skyscraper buildings already standing in the Imrahor Valley are in the way of migrating birds, decreasing the Valley's capacity to provide habitats for biodiversity and recreation.

Name of the pondscape : Imrahor River Valley
Name of neighboring large town (in a 30 km radius):
Bala, Haymana, Mamak, Çankaya and Gölbaşı (1.826.672 habitants)
Bioclimatic zone : Central-Anatolian cold arid steppe climate

Dominant land use :
pondscape - agriculture
surrounding environment - industry, heavy urbanization, unmanaged recreational use

Pondscape area : 2.07 km^2
Pond : number: 12 (Sampled Pond Number: 9)
density: 5.8/km^2
surface areas : 20 to 25'400 m^2
depths : 2 to 16.5 cm

Land owner : Ankara Metropolitan Municipality, privately owned
Land manager : Ankara Metropolitan Municipality
Public access : 100 % of the area is accessible
Public amenities : several foot paths, picnicking areas

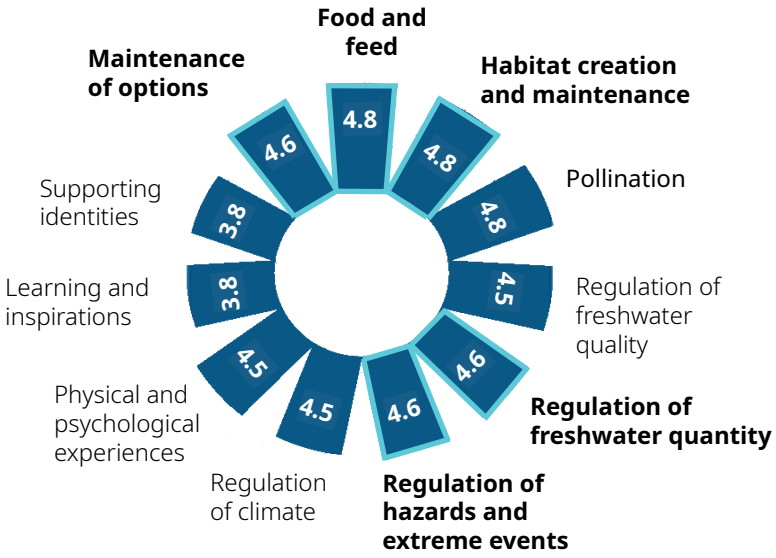


Imrahor river valley

LOCAL COMMUNITY EXPECTATIONS

The 11 Nature-contribution to people (NCPs)

Scale : scores from 1 to 5



The expectations of the stakeholders rely mainly on (i) the provision of habitats for biodiversity, (ii) pollination, (iii) food and feed, (iv) the regulation of freshwater quantity, (v) regulation of hazards and extreme events and (vi) maintenance of options.

LOCAL POLICIES

The three nearby pondscapes that include Lake Mogan, Gölbaşı Düzlüğü, and Imrahor River Valley are hydrologically connected though they are under the rules of different policies (see the Figure EXTRA1).

Lake Mogan pondscape is located upstream and is a part of a larger Special Environmental Protection Area (SEPA) together with Gölbaşı Düzlüğü pondscape. Imrahor River Valley pondscape is situated outside the protected area and closer to the city centre of Ankara and thus falls under the jurisdiction of the Greater Ankara Municipality. While there is potential for Imrahor River Valley to become a green and blue corridor for Ankara, the absence of protective/conservative or managerial legislation currently renders these areas vulnerable.

Recently, alterations to the governmental land zoning plans, transitioning from village to the creation of new real estate development area, has accelerated urbanization around the valley. As a result of these changes, numerous skyscrapers were built and are continued to be built in the Imrahor River Valley pondscape (See the Figure EXTRA 2). These skyscrapers currently obstruct prevailing winds and the migratory paths of birds, and may cause soil erosion that may fill in the ponds. In addition, some solid and water wastes from housing are discharged to ponds and in general to the pondscape.

With the amendments to the zoning plan, a canal project was designed to transform Imrahor River Valley into an amusement park, with a consequent impact on the pondscape. The project entails channeling the stream underground, creating an extensive concrete canal, and directing outflow of Lake Eymir into the canal. Luckily, the project was not completed because of opposition.

Moreover, it should be noted that most land in the Valley is privately owned and also some of the ponds are being used for industrial or commercial purposes. For example, the brick factory pumps water from the ponds for its operations and discharges the wastewater back into the pond. These kind of commercial interest in the pondscapes may impede the implementation of protective and managerial measures for the Valley and the pondscape.

-180% increase in constructed areas in the Valley (city structure, commercial area, highway, construction and mining sites) between the years, 2000 and 2018 (from 644 ha to 1162 ha), which has a direct impact on the pondscape.

180%

-Around 86,000 m3 capacity of volume of water that can be stocked during a severe flood event

86’000m³

- Out of the 387 identified taxa in Imrahor Valley, **30 of them are unique to the region, resulting in an endemism rate of 8.8%.**

8.8%

MAIN CHALLENGES AND OBJECTIVES

DISASTER MITIGATION	BIODIVERSITY ENHANCEMENT	HUMAN HEALTH	WATER MANAGEMENT
Buffer the water flow and reduce the risk of flooding in Ankara city center.	Amphibians, birds and aquatic plants.	Provision of recreational areas for experiencing and enjoying nature.	Important water resources for supporting agriculture, livestock, and industry.

NATURE BASED SOLUTIONS (NBS)

Pond restoration and their management are the Nature-based Solutions that has been put in practice to address the four identified societal challenges.

PONDS AND PONDSCAPE MANAGEMENT

- The restoration of pond ecosystems to prevent and mitigate flooding events (i.e., floodplain restoration) - Management of the Valley and the ponds to maximize flood protection capacity by: a) Making the pondscape a network of green infrastructures for flood mitigation (i.e., enhancing pondscape connectivity) and also for multifunctionality b) Land use planning that keeps storage/discharge capacities intact and limits the expansion of grey infrastructure areas (through zoning changes and giving special status to the floodplain)	- Removal of introduced non-native fish - Removal of alien plant species - Planting aquatic emergent vegetation for restoration -Planting trees, shrubs and sowing grasslands seeds in the vicinity of ponds - Threatened species reintroduction especially in the hills to stop land erosion and land slides - Investigation of protection options, e.g. protection by the municipality	-Waste and litter removal (for water quality as well as aesthetics) -Wastewater management (for water quality as well as aesthetics)

NATURE CONTRIBUTIONS TO PEOPLE AND MEASURED INDICATORS

AQUATIC BIODIVERSITY

SPECIES RICHNESS

Aquatic plants (Observed) : **24**
Waterbirds (Lake Eymir Region) : **67**
Dragonflies (Observed at Genus level) : **3**
Families of invertebrates (Observed) : **29**

AMOUNT OF

Species in Global IUCN (2022) Red List (Categories CR, EN, VU, NT) (Lake Eymir and the environment): **2** (*Oxyura leucocephala* (EN), *Aythya nyroca* (NT)
Conservation priority species for Türkiye (Rare and endangered) (Lake Eymir and the environment): **6** (*Oxyura leucocephala* (EN), *Aythya nyroca* (NT), *Chroicocephalus genei* (LC), *Microcarbo pygmaeus* (LC), *Botaurus stellaris* (LC), *Ixobrychus minutus* (LC)
Number of endemic taxa (Imrahor Valley Region): **30**
Invasive alien species (N): **1**

FLAGSHIP SPECIES :

Aythya nyroca

Sympetrum fonscolombii

Testudo graeca

NATURE CONTRIBUTIONS TO PEOPLE AND MEASURED INDICATORS

PHYSICAL AND PSYOCHOLOGICAL EXPERIENCE

Number of people visiting the pondscape (leisure, tourism, fishing, nature watching etc.) (nb/year) **5'000-6'000**

100% Area inside the pondscape accessible to the public

Self-reported satisfaction well-being (scale 1 to 5) **3.5**

Most popular activities :
landscape aesthetics (21%), fishing, hunting, biking, art and wildlife observation (20%)

WATER QUANTITY

86'000 m^3 Volume of water stocked during a severe flood event (m^3)

Total water volume (m^3) **172'000 m^3**

WATER QUALITY

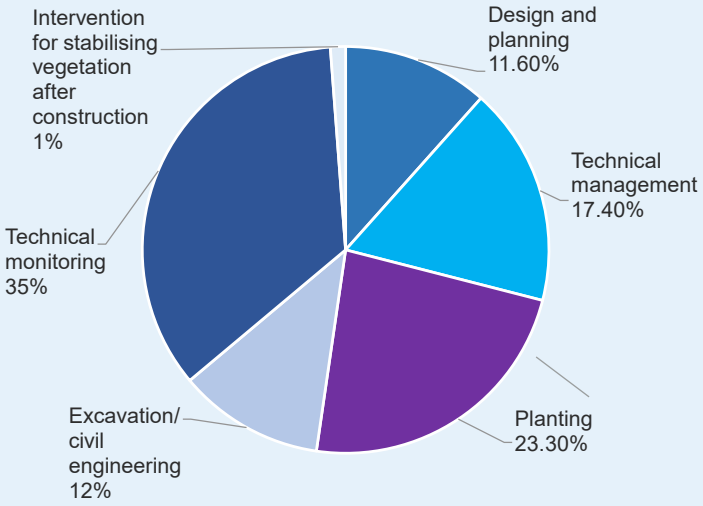
2

Wide range of pollution levels between ponds; some are pristine, and others are heavily eutrophicated owing to crop and animal farming, and wastewater discharge. Furthermore, there are also waste or litter disposals all around to the pondscape (from a scale 1 to 5).

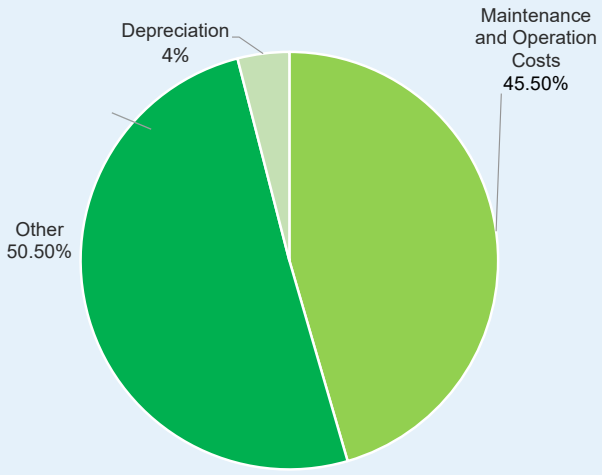
COSTS AND BENEFITS ANALYSIS

OVERALL COSTS ASSESSMENT

SHARE OF COSTS FOR NBS ACTION

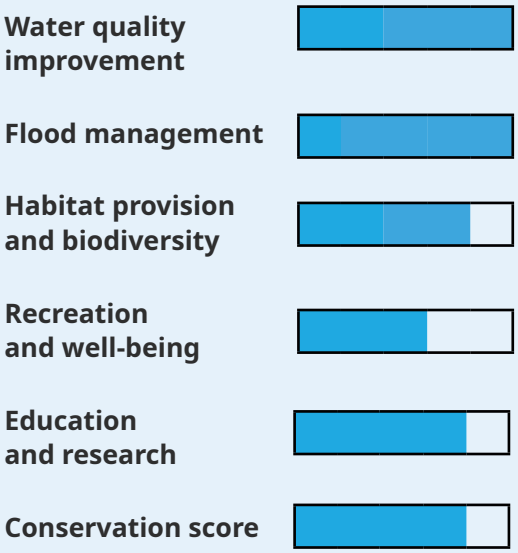


Relative cost of NbS creation measures



Relative cost of ongoing NbS management measures

BENEFITS ASSESSMENT



SUITABLE FINANCE INSTRUMENTS TO REDUCE THE GAP

- **1. Income instruments**

  Development Rights and Leases
- **2. Voluntary contributions /donations**

  Philanthropic contributions, Voluntary beneficiary contributions, Crowdfunding
- **3. Grants**

FUNDING GAP ASSESSMENT

REMAINING THREATS

Increasing urbanisation is one of the main threats to the pondscape, impacting flood protection capacity as well as biodiversity, particularly due to deterioration of pond water quality. Furthermore, climate change-induced changes in hydrology, such as altered rainfall patterns, may cause smaller ponds to disappear, further impacting biodiversity. The ownership status of the ponds also limits restoration efforts and their potential as Nature-based Solutions. The Imrahor River Valley pondscape has the potential to be a valuable asset in protecting the Ankara city center from major floods. However, it is important to note that the pondscape is currently facing challenges related to poor management and a lack of ecological protection. To ensure the continued effectiveness of the Imrahor Valley's flood prevention function, it is necessary to address the issues of continuous degradation of the hydrological network within the basin due to urbanisation and grey infrastructure. There is a need for a policy framework that allows for effective and successful protection and promotion of pondscape for habitat creation and flood management, as well as biodiversity enhancement and protection and recreational use. In addition, coordination between the municipality, government, NGOs, environmental consultancies, and landowners is important to highlight the multifunctionality of the pondscape. By working collaboratively towards Nature-based Solutions, it is possible to preserve nature's contributions to people and other benefits the pondscape provides.

HANDBOOK :

APPENDIX :

PHOTOS CREDITS

Aythya nyroca p.5 © Gamze Kaya
Sympetrum fonscolombii p.5 © elisabraz
Testudo graeca p.5 © Paul Cools

AUTHORS

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2024

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Ponderful
PONDS FOR CLIMATE

TÜRKIYE

PONDSCAPE : İMRAHOR VADISI GÖLCÜK AĞI

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

GÖLCÜK AĞI NEDIR ?

TANIMLAR

Bir gölcük ağı, bağlantılılık içinde aynı peyzaj matrisi ile birbirine bağlı gölcüklerin oluşturduğu bir ağdır.

Bir gölcük ağının sınırları, fiziksel veya ekolojik koşullar tarafından (bir vadi, bir havza, aynı doğa rezervindeki bir dizi gölcük) veya toplumsal veya siyasi kriterlere göre (kent gölcükleri, il sınırı veya ulusal sınırlar içerisindeki gölcükler) belirlenebilir.

GÖLCÜK VE GÖLCÜK AĞLARI ÜZERİNDEKİ BASKILAR VE TEHDİTLER

Avrupa ülkelerinde gölcük kayıplarının %50 ila %90'ı geçen yüzyılda yaşandı. Dahası, gölcükler genellikle su ve doğa ile ilgili ulusal ve Avrupa Birliği (AB) politika belgeleri ve stratejilerinde, AB Su Çerçeve Direktifi (EU-WFD) dahil olmak üzere, büyük ölçüde göz ardı edilmektedir.

GÖLCÜKLERİN VARLIĞI VE KORUNMASI NEDEN ÖNEMLİDİR ?

BIYOLOJIK ÇEŞITLILIĞI ARTIRMA

Genellikle göz ardı edilen ve ekolojik değeri hiçe sayılan gölcükler, biyoçeşitliliğin korunması açısından son derece önemlidir. Gölcük ağları ise, biyoçeşitliliği artırma açısından kritik bölgelerdir.

AFET RİSKİNİ AZALTMA

Gölcükler ve gölcük ağları, sel ve taşkınların etkilerini hafifletmede temel rol oynar ve aynı zamanda yangınla mücadele için önemli su rezervidirler.

İNSAN SAĞLIĞI

Gölcükler ve gölcük ağları, toplumlar için (diğer katkılarının dışında) insan sağlığına ve yaşam kalitesine destek sağlama, fiziksel aktiviteler veya sosyal etkileşim için alanlar sunma, estetik deneyimler, eğitim ve rekreasyonel faaliyetler gibi geniş bir yelpazede ek faydalar sunarlar.

İKLİM DEĞİŞİKLİĞİNİN AZALTILMASI VE UYUM

Gölcükler, dünya genelinde çok sayıda bulunmaları ve yüksek üretkenlikleri nedeniyle iklim değişikliği azaltılaması ve uyumda önemli rol oynarlar. Yüksek üretkenlikleri nedeniyle, gölcükler hem karbonu tutan (karbon yutak alanlar) hem de karbon ve metan kaynağı olan alanlardır ve bu nedenle karbon döngüsü üzerinde belirgin etkilere sahiptirler.

SU YÖNETİMİ

Gölcük ağları, özellikle su kıtlığında önemli su rezervleridir. Hayvanlara su ve sulama suyu sağlamadan önemlidirler.

GÖLCÜK AĞI HAKKINDA

Türkiye'nin başkenti Ankara'nın güneydoğusunda yer alan İmrahor Vadisi, şehir merkezine yakın konumuyla önemli bir ekolojik mirasa ev sahipliği yapmakta, kentsel ve kırsal arasında denge kurmada çok önemli bir rol oynamaktadır. İmrahor Vadisi, Eymir Gölü'nün çıkışından başlar ve İncesu Sel Kapanı'na kadar bir alanı kapsar. Sel kapanı çıkışında kapalı bir kanal bulunmaktadır. Her iki altyapı da 1961 yılında Ankara şehir merkezinde meydana gelen ölümcül bir taşkın olayının ardından inşa edilmiştir. Vadi, hidrolojik olarak yukarı havzasında bulunan Mogan ve Eymir Gölleri'ne bağlıdır ve bu göller için önemli bir alt havza oluşturur.
İmrahor Vadisi gölcük ağında, bazıları zaman zaman kuruyan 12 gölcük bulunmaktadır. Vadideki gölcüklerin çoğu, öncelikle şehir merkezini taşkınlardan korumak için ve ayrıca çevrede yerleşik tuğla fabrikalarının ihtiyacı doğrultusunda oluşturulmuştur. Zamanla, bu gölcükler sadece endüstriyel amaçlar için su kaynağı olarak hizmet vermekle kalmamış, aynı zamanda biyolojik çeşitlilik ve rekreasyon için önemli yaşam alanları haline gelmiştir.

Yıllar içinde gerçekleştirilen gayrimenkul geliştirme projeleri, yol ve kanal inşaatları nedeniyle İmrahor Vadisi havza karakterinde ve yüzey suyu mevcudiyetinde değişiklikler meydana gelmiştir. Yoğun kentleşme sonucunda bölgenin kırsal ve doğal alan olma karakteri kaybolmaya başlamıştır. Vadinin tabanında ve yamaçlara doğru başlatılan inşaat projeleri, arazinin morfolojisini önemli ölçüde değiştirmiştir. Vadinin doğuya bakan yamaçlarında bulunan doğal geçirimli alanlar yerini yüksek yoğunluklu yerleşimlere ve geçirimsiz yüzeylere bırakmıştır. Bu dönüşümün vadinin hidrolojik dinamikleri üzerinde derin bir etkisi olmuştur ve doğal yüzey akışını sürdürme yeteneği etkilenmiştir. Buna ek olarak, İmrahor Vadisi'nde halihazırda bulunan gökdelenler, göçmen kuşların göç yolları üzerinde bulunmakta olup, Vadi'nin biyolojik çeşitlilik ve rekreasyon için alan sağlama kapasitesini azaltmaktadır.

Gölcük ağının adı: İmrahor Vadisi Gölcük Ağı
Komşu büyük kasabanın adı (30 km yarıçap içinde):
Bala, Haymana, Mamak, Çankaya ve Gölbaşı (1.826.672 kişi)
Biyoklimatik kuşak: İç Anadolu soğuk kurak bozkır iklimi

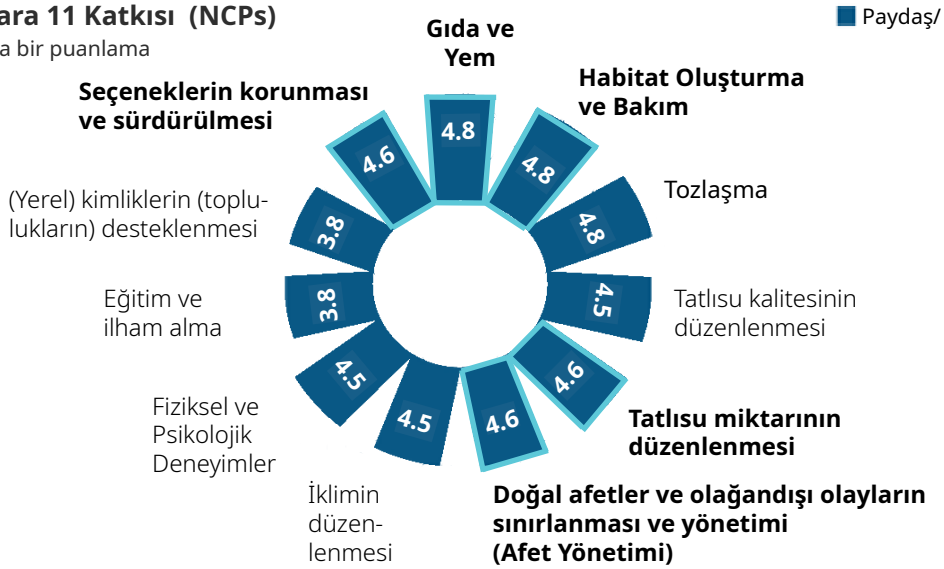
Baskın arazi kullanımı :
gölcük ağı – tarım
çevre – yoğun kentleşme, endüstriyel faaliyetler,
kontrolsüz rekreasyonel kullanım

Gölcük alanı : 2.07 km^2
Gölcük No: 12 (Örneklenen Gölcük Sayısı: 9)
Yoğunluk: 5.8/km^2
Yüzey alanları : 20 ila 25'400 m^2
Derinlikler : 2 ila 16.5 cm

Arsa Sahibi: Ankara Büyükşehir Belediyesi ve Özel Mülkiyete ait Araziler
Arazi yöneticisi: Ankara Büyükşehir Belediyesi
Genel erişilebilirlik: %100
Halka açık olanaklar: çoğunlukla kontrolsüz birkaç patika ve piknik alanları

YEREL TOPLUMSAL BEKLENTILER

Doğanın İnsanlara 11 Katkısı (NCPs)
Ölçek: 1 ile 5 arasında bir puanlama



Paydaşların beklentilerine göre temel olarak (i) biyolojik çeşitlilik için habitatların sağlanması, (ii) tozlaşma, (iii) gıda ve yem, (iv) tatlı su miktarının düzenlenmesi, (v) Doğal afetler ve olağandışı olayların sınırlanması ve yönetimi

YEREL POLITIKALAR

Mogan Gölü, Gölbaşı Düzlüğü ve İmrahor Vadisi gölcük ağları, hidrolojik olarak bağlantılı olmalarına ragmen, farklı politikalara göre yönetilir (bkz. Şekil EXTRA1).
Mogan Gölü gölcük ağı, Gölbaşı Düzlüğü ve İmrahor Vadisi gölcük ağlarının membasıdır ve Gölbaşı Düzlüğü gölcük ağı ile birlikte, Tabiat Varlıklarını Koruma Genel Müdürlüğü tarafından yönetilen Özel Çevre Koruma Bölgesi'nin (ÖÇKB) bir parçasıdır. İmrahor Vadisi gölcük ağı, bu koruma alanının dışında ve Ankara şehir merkezine daha yakın bir konumdadır ve Ankara Büyükşehir Belediyesi'nin yetki alanı dahilindiedir. İmrahor Vadisi'nin Ankara için önemli bir yeşil-mavi koridor olma potansiyeli vardır. Ancak hem vadinin hem de gölcük ağının koruma amaçlı bir yönetim mevzuatına dahil olmaması bu alanları savunmasız hale getirmektedir.
Son zamanlarda, Vadi için imar planlarında gerçekleştirilen değişiklikler (köy statüsünden mahalle statüsüne geçiş), gayrimenkul geliştirme alanlarının ortaya çıkmasına ve artışına neden olmuştur, bu şekilde vadi çevresindeki kentleşme hızlanmıştır. Bu değişikliklerin bir sonucu olarak, İmrahor Vadisi gölcük ağının çevresinde çok sayıda gökdelen inşa edilmiş ve halen inşa edilmektedir. (Bkz. Şekil EKSTRA 2). Bu gökdelen binaları şu anda göçmen kuşların göç yolları üzerindedir. Vadi boyunca inşa edilen evlere dair atıklar nedeniyle, gölcükler ve genel olarak gölcük ağı çevresel kirlilik baskısı altındadır. Buna ek olark, yüksek yapılaşma rüzgarın geçişini engellemekte ve yerel iklimin değişmesine, vadide bir toprak erozyonu gerçekleşmesine ve gölcük ağı içerisinde bulunan gölcüklerin dolmasına neden olabilir.

Geçtiğimiz yıllarda, imar planında yapılan değişikliklerle birlikte, İmrahor Vadisi'ni eğlence parkı veya cazibe noktasına dönüştürmek için bir kanal projesi tasarlanmıştır. Bu kanal projesinin gölcük ağı üzerinde önemli olumsuz etkileri vardır. Proje ile, yer üstünden akan suyun yeraltına verilmesi, doğal akış yolu üzerine kilometrelerce uzanan geniş bir beton kanal oluşturulması ve Eymir Gölü'nün çıkışının da bu kanala yönlendirilmesi planlanmıştır. Kanal projesi, sivil toplumun projeye güçlü muhalefeti nedeniyle tamamlanmamıştır.
İmrahor Vadisi'ndeki arazilerin çoğu özel mülkiyet alanıdır ve gölcük ağı içerisinde bulunan bazı gölcükler de endüstriyel veya ticari amaçlar için kullanılmaktadır. Gölcüklerin özel mülkiyet alanları içerisinde veya yakınında bulunması ve ticari kullanımları Vadi ve gölcük ağı için koruyucu ve yönetimsel önlemlerin uygulanmasını kısıtlamaktadır.

-2000-2018 yılları arasında **Vadi'deki yapılaşma alanlarında** (şehir yapısı, ticari alan, otoyol, inşaat ve maden sahaları) **gölcük ağına doğrudan etki eden %180 artış** (644 hektardan 1'162 hektara)

180%

-Şiddetli bir taşkın sırasında **86'000 m³ su tutma kapasitesi**

86'000m³

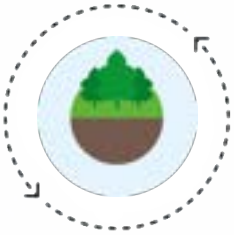
-İmrahor Vadisi'nde gözlemlenen 387 taksondan 30**'u bölgeye özgüdür ve buna göre endemizm oranı %8,8'dir.**

8.8%

TEMEL ZORLUKLAR VE HEDEFLER

AFET YÖNETIMI

Ankara şehir merkezinde taşkın riskini ve etkisini azaltması.



BIYOÇEŞITLILIĞIN ARTIRILMASI

Amfibiler, su kuşları ve su bitkileri için habitat sağlaması.

İNSAN SAĞLIĞI

Rekreasyonel alanlar sağlaması.

SU YÖNETIMI

Tarımı, hayvancılığı ve endüstriyi desteklemek için önemli su kaynakları olması.

NBS

Gölcük restorasyonu ve yönetimi ve gölcük ağı ölçeğinde arazi kullanımı ve yönetim eylemleri belirlenen dört toplumsal zorluğun üstesinden gelmek için uygulamaya konulabilecek Doğa Temelli Çözümlerdir.

GÖLCÜK VE GÖLCÜK AĞLARI YÖNETIMI

- Taşkın olaylarını önlemek ve azaltmak için gölcük ekosistemlerinin restorasyonu (taşkın yatağının restorasyonu)
- Taşkın koruma kapasitesini en üst düzeye çıkarmak için Vadi ve gölcüklerin yönetimi:
a) Gölcük ağı bağlantısını geliştirmek (gölcükler arasındaki bağlantıyı iyileştirmek)
b) Yapılaşma alanlarının genişlemesini sınırlayan arazi kullanım planlaması (imar değişiklikleri ve/veya taşkın yatağına özel koruma statüsü kazandırılması)

-İstilacı balıkların uzaklaştırılması
-İstilacı bitki türlerinin uzaklaştırılması
- Yeni bir gölcük yapımı veya bir gölcüğün restorasyonunda, bölgede yerel olarak bulunan su bitkilerinin kullanılması
-Tehdit altındaki türlerin koruma altına alınması
-Toprak erozyonunu ve kaymayı durdurmak için özellikle tepelerdeki göletlerin çevresine ağaçlar, çalılar dikilmesi ve otlak tohumları ekilmesi
- Koruma seçeneklerinin araştırılması, örn. belediye tarafından koruma

Su kalitesinin artması ve görsel estetik için;
-Atık ve çöplerin uzaklaştırılması
-Atık su yönetimi

NCP'LER VE ÖLÇÜLEN GÖSTERGELER

SUCUL BIYOÇEŞITLILIK

TÜR ZENGINLIĞI
Su bitkileri (Gözlenen) : **24**
Su kuşları (Eymir Gölü Çevresi, gözlemlenen) : **67**
Yusufçuklar (Familya, gözlenen) : **3**
Omurgasızlar (Familya, gözlenen): : **29**

MIKTAR
IUCN Kırmızı Liste'de yer alan türlerin sayısı (Kategoriler: CR, EN, VU, NT) (Eymir gölü ve çevresi) : **2** (*Oxyura leucocephala* (EN), *Aythya nyroca* (NT)
Türkiye için koruma önceliği bulunan türler (Eymir Gölü ve çevresinde nadir ve tehlike altında bulunan türler): **6** (*Oxyura leucocephala* (EN), *Aythya nyroca* (NT), *Chroicocephalus genei* (LC), *Microcarbo pygmaeus* (LC), *Botaurus stellaris* (LC), *Ixobrychus minutus* (LC)
Endemik takson sayısı (İmrahor Vadisi Bölgesi): **30**
İstilacı yabancı türler (N): **1**

SEMBOLIK TÜRLER :


Aythya nyroca


Sympetrum fonscolombii


Testudo graeca

NCP'LER VE ÖLÇÜLEN GÖSTERGELER

FIZIKSEL VE PSIKOLOJIK DENEYIM

Gölcük ağını ziyaret eden kişi sayısı (eğlence, turizm, balık tutma, doğa izleme vb.) (kişi/yıl)

5'000-6'000

100% Gölcük ağının içinde halka açık alan

Gölcük ağına ilişkin memnuniyet (1 ila 5 arasında)

3.5

En popüler aktiviteler :
peyzaj estetiği (%21), balıkçılık, avcılık, bisiklete binme, sanat ve yaban hayatı gözlemi (%20)

SU MIKTARI

86'000 m^3

Gölcük ağında şiddetli bir sel olayı sırasında su tutma kapasitesi (m^3)

Toplam su hacmi (m^3)

172'000 m^3

SU KALITESI

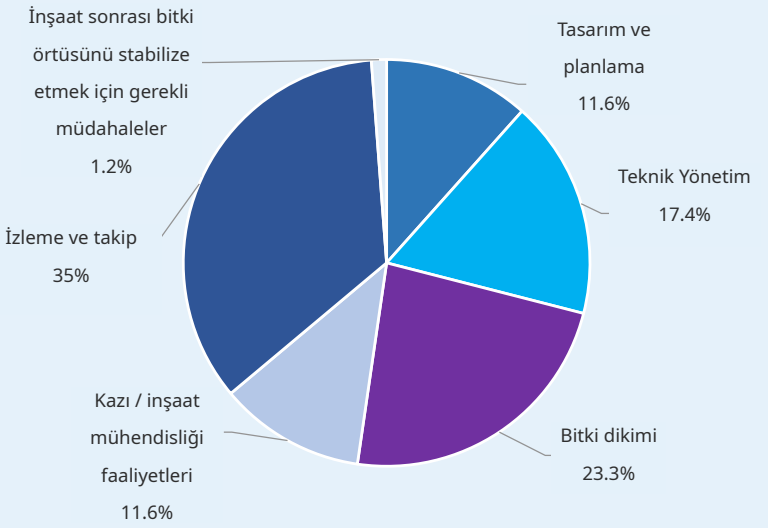
2

Gölcük ağı içerisindeki gölcükler arasında kirlilik seviyesi değişkenlik göstermektedir. Bazı gölcükler bozulmamış, bazıları ise tarım ve hayvancılık ile atık su deşarjı nedeniyle yoğun bir şekilde kirlenmiştir (ötrofikasyon).

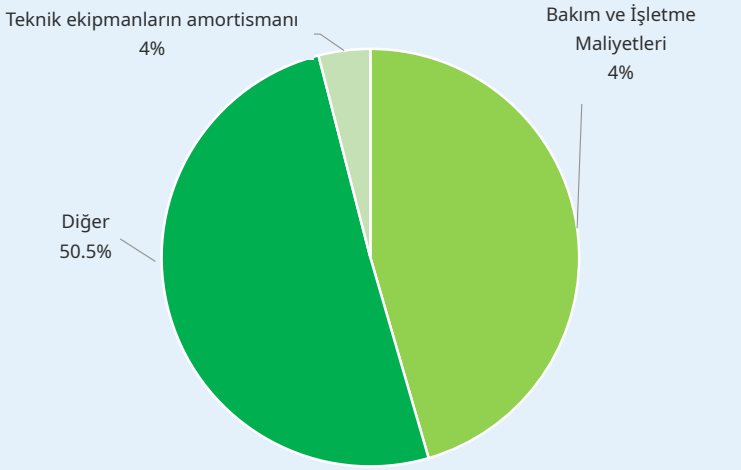
MALIYET VE FAYDA ANALIZI

GENEL MALIYET DEĞERLENDIRMESI

DOĞA TEMELLI ÇÖZÜMLER IÇIN MALIYET PAYI

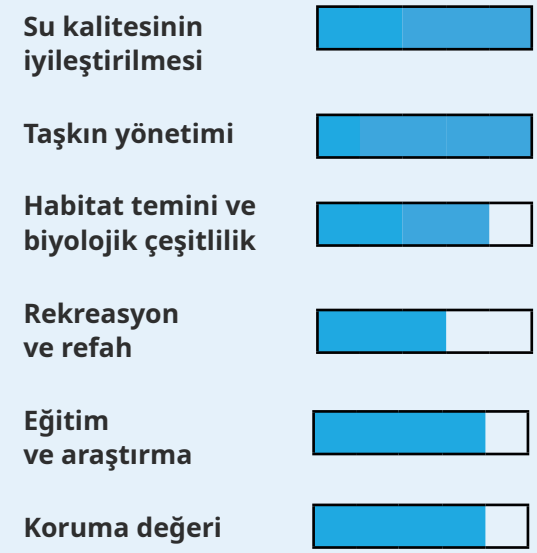


Doğa Temelli Çözümler oluşturmak için alınabilecek önlemlerin tek seferlik



Doğa Temelli Çözümler oluşturmak için alınabilecek önlemlerin periyodik

FAYDA DEĞERLENDIRMESI



FINANS AÇIĞINI AZALTMAK IÇIN UYGUN FINANSMAN ARAÇLARI

- **1. Gelir kaynakları**

  İmar Hakları ve Kiralamalar
- **2. Gönüllü katkılar/bağışlar**

  Sosyal sorumluluk, Gönüllü yararlanıcı katkıları, Kitle fonlaması
- **3. Hibeler**

FINANSMAN AÇIĞI DEĞERLENDIRMESI

TEHDITLER VE ÖNERILER

Günden güne hızlanan kentleşme; gölcüklerin su kalitesinin bozulmasına, biyolojik çeşitliliğin ve gölcük ağının taşkın önleme kapasitesinin azalmasına neden olmaktadır. Değişen yağış düzenleri gibi, iklim değişikliği kaynaklı etkiler, daha fazla küçük gölcüğün kaybolmasına neden olarak biyolojik çeşitliliği daha da olumsuz etkileyebilir. Gölcüklerin içinde bulunduğu arazilerin mülkiyet durumları ve gölcüklerin kullanım haklarının belirsizliği bölgede restorasyon çabalarını ve toplumsal zorluklar için doğa temelli çözümler olma potansiyellerini de sınırlamaktadır.

Gölcük ağı, mevcut durumda koruyucu ve yönetimsel eksiklikler nedeniyle çevresel ve toplumsal zorluklarla karşı karşıya kalmaktadır. Habitat oluşturma ve taşkın yönetiminin yanı sıra, biyolojik çeşitliliğin artırılması ve korunması, rekreasyon alanları oluşturulması ve yönetimi için gölcük ağının etkili ve başarılı bir şekilde korunmasını ve yönetilmesini sağlayan bir politika çerçevesine ihtiyaç vardır. Buna ek olarak, belediye, hükümet, sivil toplum ve arazi sahipleri arasındaki koordinasyon, gölcük ağının çok fonksiyonelliğini korumak ve öncelemek için önemlidir. Biyolojik çeşitliliğin öncelikli hedef olduğu "İKLİM gölcük" ilkelerine dayalı gölcük restorasyonu; aynı zamanda iklim değişikliği ve toplumsal faydaları da göz önünde bulundurarak, bölgenin potansiyelinin korunmasını ve artırılmasını sağlayacaktır.

HANDBOOK :

APPENDIX :

FOTOĞRAF KAYNAĞI

Aythya nyroca p.5 © Gamze Kaya
Sympetrum fonscolombii p.5 © elisabraz
Testudo graeca p.5 © Paul Cools

YAZARLARI

Başoğlu Acet D., Avcı F., Kıran H., Akpınar M. B., Dolcerocca A., Akyürek Z., Beklioğlu M.

2024

http://www.ponderful.eu

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Ponderful
PONDS FOR CLIMATE

TÜRKIYE

PONDSCAPE : GÖLBAŞI DÜZLÜĞÜ

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 pond losses in European countries over the past 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

The Gölbaşı Düzlüğü pondscape covers approximately 35 hectares with a length of about 1,300 meters and an average width of 280 meters. It lies between Lakes Mogan and Eymir and is characterised by dense reedbeds that also define the boundaries of the approximately 30 ponds found in this region. Along with Lakes Mogan and Eymir, the pondscape is also part of the Special Environmental Protection Area (SEPA). Historic maps from 1944 to the present show that this pondscape used be part of both lakes when water level was very high but during low water periods extensive wetlands with numerous ponds were revealed. However, due to several road construction works, the growth of Gölbaşı town, waste disposal and excessive water use in the catchment the pondscape reduced to its current size (see the figure below).

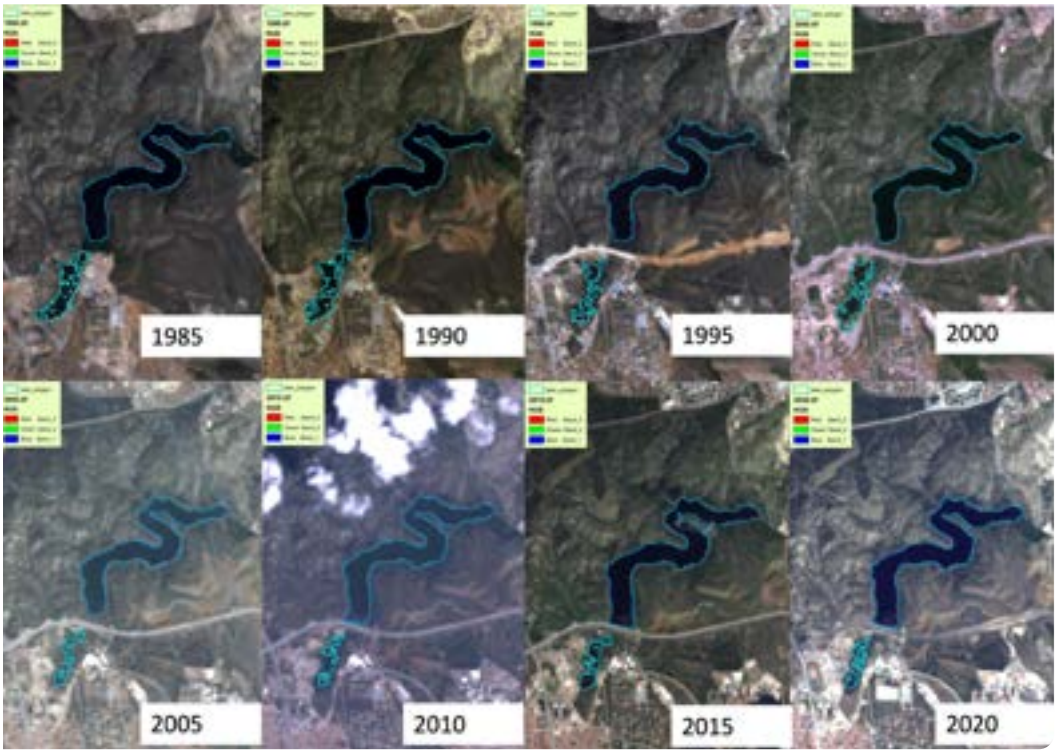
The water from upstream Lake Mogan goes through a concrete-lined channel between the two lakes, crosses the Gölbaşı Düzlüğü pondscape, and finally enters Lake Eymir. Gölbaşı Düzlüğü basin is the major water supplier of Lake Eymir (See Success Story) and contributes to the lake's water quality because water passes through reedbeds before reaching the lake.

Gölbaşı Düzlüğü pondscape has the capacity to store approximately 1,000,000 cubic meters of water during severe flooding events, thus contributing to the prevention of major floodings in low lying areas of Ankara municipality.

Since the ponds are surrounded by dense reeds, they provide high-quality shelter and breeding areas for birds. Almost all species that breed in the ponds of Lake Mogan pondscape also breed here.

Gölbaşı Düzlüğü is an important and valuable resource in terms of the natural landscape, but over time, a portion has been filled in by marble processing wastes. Unfortunately, a part of the filled area has been opened up for construction, despite environmental concerns. Furthermore, part of the area has also been used as garbage disposal sites, scrap yards, and small industrial sites. Gölbaşı Düzlüğü was once a neglected and unused area. However, in recent years, efforts have been made to restore and conserve the pondscape with a People's Park project. Rubbish has been cleared from the ponds and their surroundings and restoration work has turn the area into a promising urban pondscape. As a result of this work, there is increased expectation that the site can also deliver increased nature's contributions to people in the short term.

In summary, Gölbaşı Düzlüğü plays a vital role in preserving the habitat and maintaining the water regime and quality of Lake Eymir as well as contributing to prevention of major flooding in the low lying part of Ankara metropole. Therefore, it is essential to protect these areas from any activities that could disrupt the ecological balance of the region.



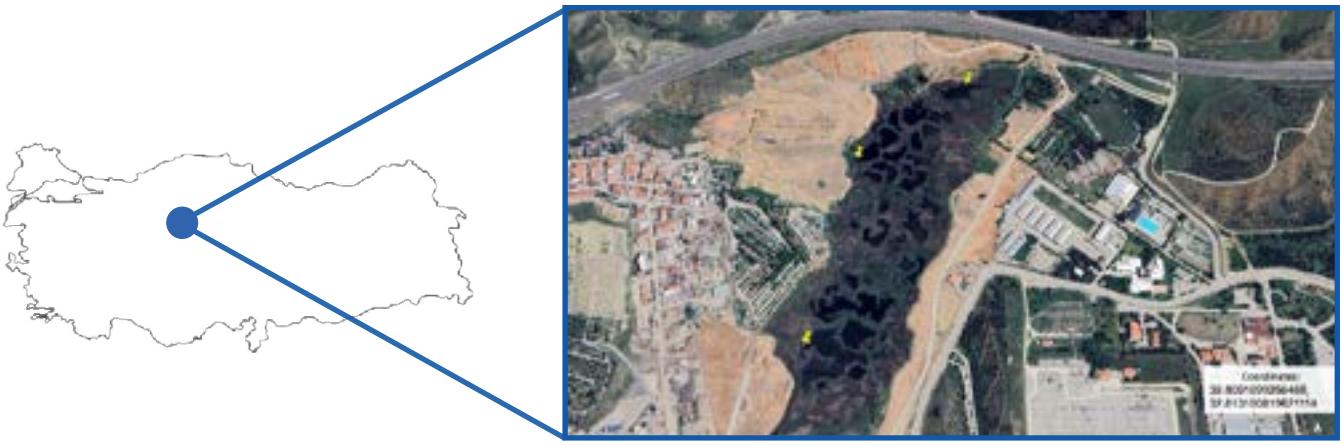
CONTEXT (CONTINUED)

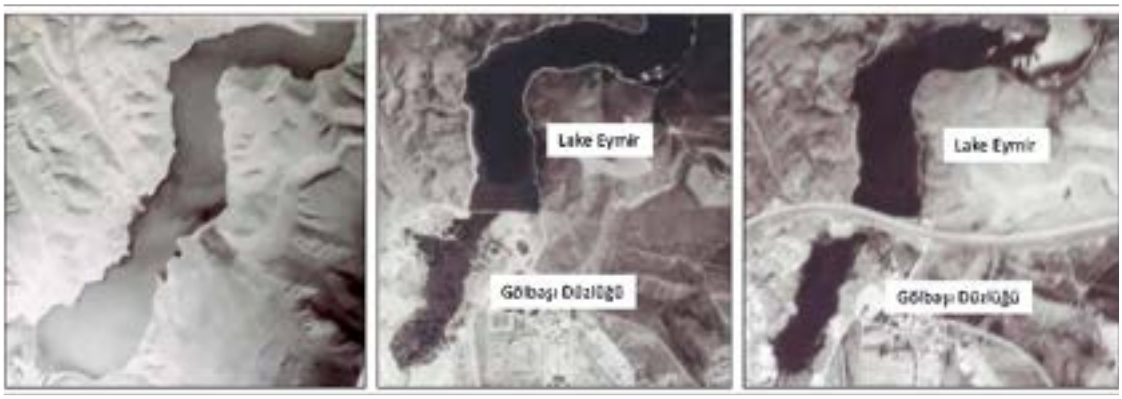
Name of the pondscape : Gölbaşı Düzlüğü
Name of neighboring large town (in a 30 km radius):
Bala, Haymana, Mamak, Çankaya and Gölbaşı (1'826'672 habitants)
Bioclimatic zone : Central-Anatolian cold arid steppe climate

Dominant land use :
pondscape - nature reserve
surrounding environment - urban

Pondscape area : 0.35 km^2
Pond : number: ~ 30 (Sampled Pond Number: 3)
density: 143/km^2
surface areas : 3'200 to 10'000 m^2
depths : 2.2 to 5.9 m
ages : > 40 years

Land owner : General Directorate for the Protection of Natural Assets
Land manager : Gölbaşı District Municipality
Public access : 100 % of the area is accessible
Public amenities : There will be several footpaths and other amenities when the People's Park Project is finished

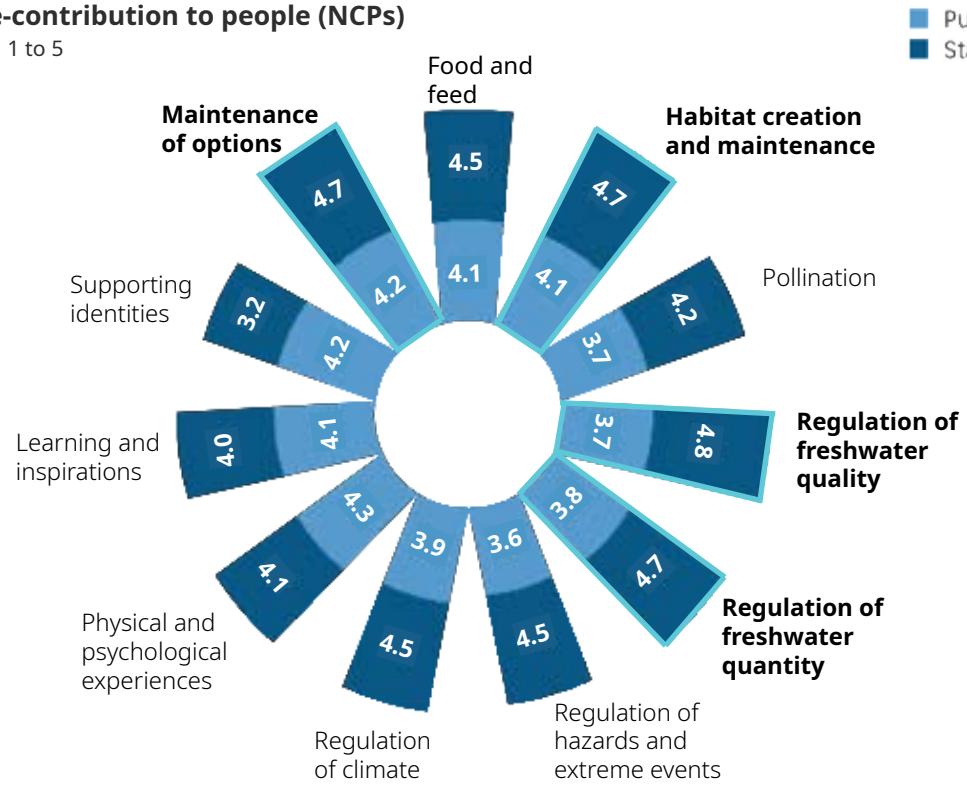




Lake Eymir (1944) Lake Eymir (1991) Lake Eymir (2015)

LOCAL COMMUNITY EXPECTATIONS

The 11 Nature-contribution to people (NCPs)
Scale : scores from 1 to 5



The expectations rely mainly on (i) freshwater quality, (ii) regulation of freshwater quantity, (iii) habitat creation and maintenance and (iv) maintenance of options.

LOCAL POLICIES

Along with Lakes Mogan and Eymir, Gölbaşı Düzlüğü pondscape is part of a Special Environmental Protection Area (SEPA) designated in 1992 and managed by the General Directorate for the Protection of Natural Assets. Though day-to-day management of the pondscapes has been delegated to the Gölbaşı District Municipality. Gölbaşı SEPA was established to curb urbanisation in the peri-urban area of Ankara and preserve the area's high biodiversity as well as NCPs (e.g. flood mitigation, protection of quality and quantity of water).

The most recent management plan for SEPA specifically prioritises the protection of bird nesting sites of Gölbaşı Düzlüğü and the ponds at the west and south of Lake Mogan (Lake Mogan Pondscape). SEPA requires the conservation of ecological character in the important bird breeding and shelter areas, and prohibits dumping of rubbish and rubble. Furthermore, it also mandates that any activity that may disrupt the local hydrology or result in drying out are strictly prohibited. Gölbaşı Düzlüğü is defined as one of the «Large Urban Green Areas» in the Current Environmental Plan of Ankara and together with the lakes, they have been designated as protected wetlands and sensitive areas under the Gölbaşı SEPA Management Plan (2015-2019).

The Gölbaşı SEPA Management Plan (2015-2019) was created as part of the «Determining Sensitive Areas and Water Quality Targets on Basin Basis in Türkiye Project». The region is divided into two areas: Sensitive A and Sensitive B. The reeds and the ponds of the pondscape are protected as part of Sensitive A areas, and the areas that have been filled in the past are Sensitive B areas. According to the management plan, Sensitive A areas must be protected. Wildlife monitoring and scientific research require permission from relevant institutions and various restrictions apply to construction.

LOCAL POLICIES

It appears that there may be some challenges in the area in terms of the effective implementation of either SEPA or the management plan. For example, the western, eastern and northern ends of the pondscape has been used for rubbish and rubble dumping. While activities disturbing the SEPA are prohibited, the area is surrounded by infrastructure (the Ankara ring road to the north, another main road to the south, and proto-industrial and artisanal activities to the east and west). It is practically an open-access area and has been used as a waste disposal for years. As a result, ponds have been filled with refuse from construction material (largely in the eastern part) and garbage from car repair and welding activities (in the western part).

For several years now, a People's Park project has been underway to conserve and restore the Gölbaşı Düzlüğü pondscape. The project was designed by landscape architects and financed by the central government. As part of this project, waste was removed from the ponds and the surrounding environment, and some industrial areas were displaced to make way for an urban park. This project aims to support biodiversity in the SEPA while raising awareness among citizens with the creation of a learning center nearby.

As a People's Park, pedestrian traffic is expected to increase, which may impact biodiversity and especially bird populations. Therefore, mitigating these impacts is a concern that needs to be addressed. On the other hand, it is also expected this will help protect the area's potential to mitigate floods and provide high-quality water downstream to Lake Eymir, thereby serving as a model for green infrastructure in the region. As a result, this urban pondscape is expected to provide more Nature's Contributions to People in the near future.

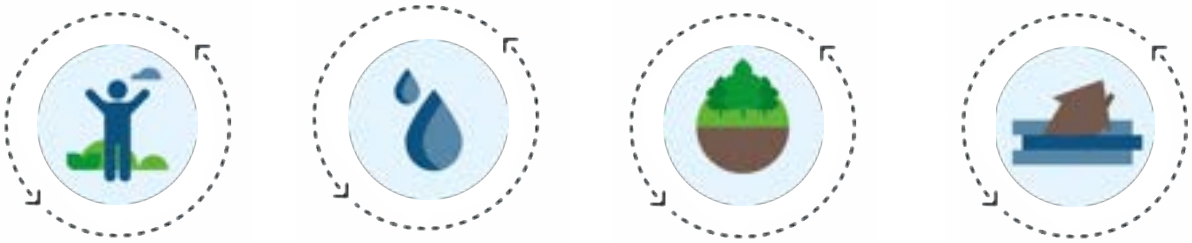
-100% of the pondscape is protected by SEPA, Special Environment Protection Area, which aims to protect sensitive areas and their surroundings, both above and underwater, for future generations.

100%

- The pondscape holds **special importance in terms of biodiversity and preserving the water regime and water quality** of Lake Eymir as well as contributing to flood mitigation in the low-lying Ankara city centre.

- Bird Breeding Area of National Importance: a habitat for diverse wildlife, including waterbirds, for feeding, shelter, and breeding.

MAIN CHALLENGES AND OBJECTIVES



HUMAN HEALTH	WATER MANAGEMENT	BIODIVERSITY ENHANCEMENT	DISASTER MITIGATION
A large urban blue-green space to walk, socialise, relax, and educate people about nature.	Water resource for Lake Eymir under changing climate conditions and increasing drought.	Water birds, amphibians and aquatic plants.	Buffer the water flow and reduces the risk of flooding.

NATURE BASED SOLUTIONS (NBS)

Pondscape scale land use and management actions are the Nature-based Solutions put in practice to address the four identified societal challenges.

1990 The implementation of a large protected area (Gölbaşı SEPA)

1992 Preparation of an Environmental Plan at a scale of 1:25,000

2015 Gölbaşı SEPA Management Plan (2015–2019), declaring Gölbaşı Düzlüğü as "Sensitive A" area

2020 Initiation of Gölbaşı Düzlüğü People's Park Project, which would prevent further deterioration of the wetland by filling in with garbage, industrial areas and other environmental burdens

PONDS AND PONDSCAPE MANAGEMENT

-Determination of bird observation points (2020 -)
-Raising awareness by determining a learning center in the pondscape (2020 -)
-Removal of waste from the ponds and the surrounding environment (2020 -)

-Prohibition of any applications that may disrupt the water regime or result in drying out

-Protection Status given to a large area (Gölbaşı SEPA) due to high ecologic value of the Lakes Mogan and Eymir, reeds and the ponds
-Prohibition of the construction of closed areas, the excavation and filling
-Declaration of "Sensitive A" zone for Gölbaşı Düzlüğü pondscape (Absolute protection of reeds and ponds)
-Declaration of "Sensitive B" zone for the areas that have been filled in the past (Protected areas in order to conserve wildlife and valley floors, which have lost their reedbed nature)
-Banning the dumping of garbage and determining a new excavation dumping area within Gölbaşı district
-Declaration of "Important Bird Breeding & Shelter Area" for Gölbaşı Düzlüğü Pondscape
-Prohibition of fishing
-Regular monitoring of bird species breeding in the SEPA area
-Closing areas to human activities during the breeding period (except for monitoring, research, and protection).
-Displacement of industrial areas away from the pondscape (2020 -)
- Removal of introduced non-native fish and alien plant species
- Planting aquatic emergent vegetation in newly created or restored ponds
- Threatened species reintroduction

- Management of the area to maximize protection against overflow of Lake Mogan and create a flooding into the Gölbaşı District by:
-Clearing the canal as well as enhancing its carrying capacity
-Clearing the connection between the pondscape and Lake Eymir
-Keeping the constructions in the People's Park at a safe distance from the ponds
- Cleaning and re-designing the canals that carry water downstream

NATURE CONTRIBUTIONS TO PEOPLE AND MEASURED INDICATORS

AQUATIC BIODIVERSITY

SPECIES RICHNESS

Aquatic plants (SEPA Area, including Lake Mogan and Eymir) : **51**

Waterbirds (Lake Eymir Region) : **67**

Dragonflies (Genus) (SEPA Area, including Lake Mogan and Eymir) : **13**

Families of invertebrates (SEPA Area, including Lake Mogan and Eymir): **14**

AMOUNT OF

Species in Global IUCN (2022) Red List (Categories CR, EN, VU, NT) (Lake Mogan and the environment): **3** (*Centaurea tchihatcheffii* (CR), *Oxyura leucocephala* (EN), *Aythya nyroca* (NT))

Conservation priority species for Türkiye (Rare and endangered) (Lake Eymir and the environment): **7** (*Centaurea tchihatcheffii* (CR), *Oxyura leucocephala* (EN), *Aythya nyroca* (NT), *Chroicocephalus genei* (LC), *Microcarbo pygmaeus* (LC), *Botaurus stellaris* (LC), *Ixobrychus minutus* (LC)

FLAGSHIP SPECIES :

Centaurea tchihatcheffii (CR)

Oxyura leucocephala (EN)

Aythya nyroca (NT)

Orthetrum cancellatum

NATURE CONTRIBUTIONS TO PEOPLE AND MEASURED INDICATORS

PHYSICAL AND PSYOCHOLOGICAL EXPERIENCE

Expected number of people visiting the pondscape (after the completion of the People's Park Project) (nb/year). Before the People's Park project, no one visited the area for recreation.

45'000-55'000

100% Area inside the pondscape accessible to the public

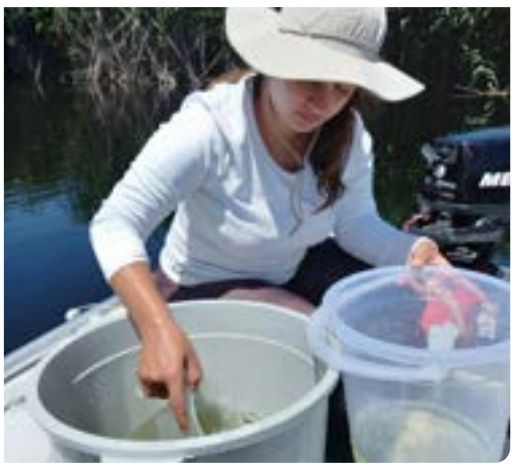
Self-reported satisfaction well-being (scale 1 to 5) **3.7**

Most popular activities :
hiking (23%), biking (23%), landscape aesthetics (21%), relaxation (21%)

WATER QUANTITY

1'000'000 m^3

volume of water that can be stocked during a severe flood event in whole pondscape (m^3)



WATER QUALITY

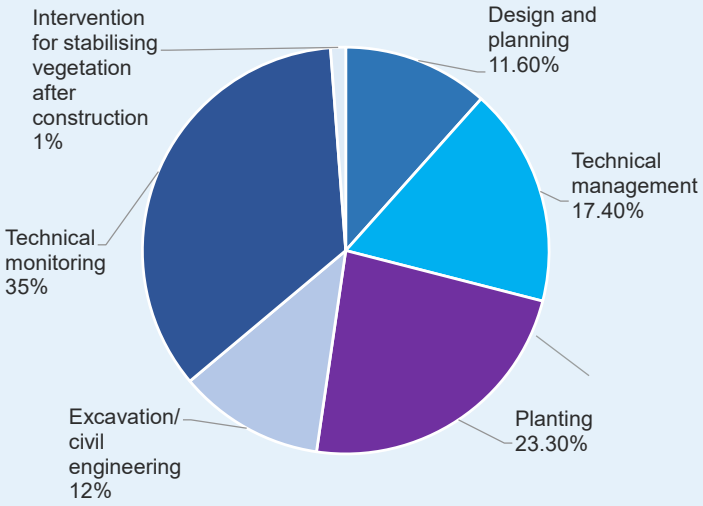
1 (BEFORE) / 2 (AFTER)

The water, as well as the environment around the pondscape were clear of rubbish as part of the People's Park project implementation. Unfortunately, there are still garbage and litter around and in the ponds. Due to dense reeds, some are not visited but the ponds sampled have low water quality compared to other pondscapes nearby.

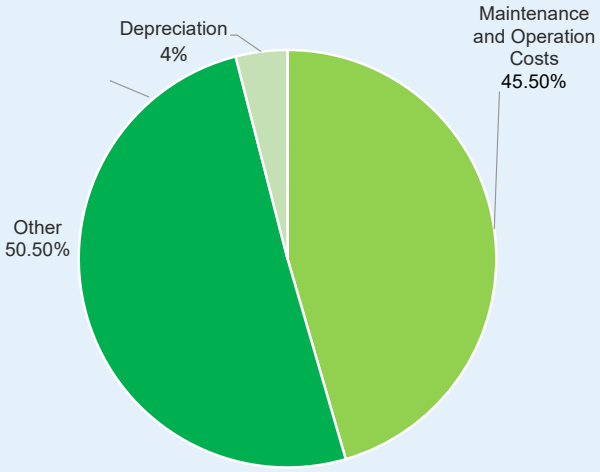
COSTS AND BENEFITS ANALYSIS

OVERALL COSTS ASSESSMENT

SHARE OF COSTS FOR NBS ACTION

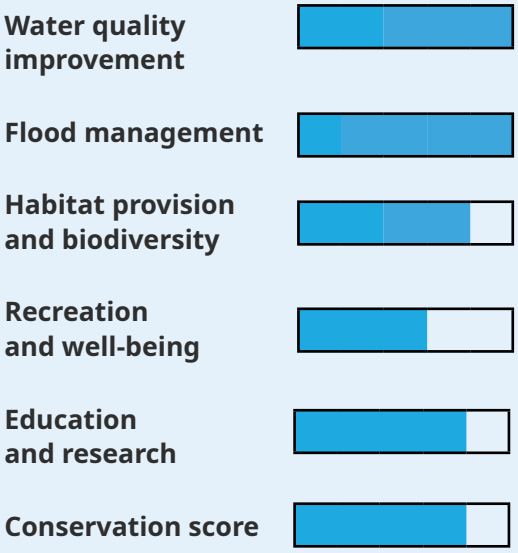


Relative cost of NbS creation measures



Relative cost of ongoing NbS management measures

BENEFITS ASSESSMENT



SUITABLE FINANCE INSTRUMENTS TO REDUCE THE GAP

- **1. Income instruments**

  Development Rights and Leases
- **2. Voluntary contributions /donations**

  Philanthropic contributions, Voluntary beneficiary contributions, Crowdfunding
- **3. Grants**

FUNDING GAP ASSESSMENT

REMAINING THREATS

Gölbaşı Düzlüğü is a vital habitat for waterbirds and plays a crucial role in flood mitigation around Gölbaşı District as well as conserving the water regime and quality of Lake Eymir.

The lack of adequate measures to protect the area and the People's Park project could also lead to increased urbanisation and human interaction, in turn affecting waterbirds populations and disrupting the ecological integrity of the whole ecosystem. If not managed properly, the flood mitigation role of the landscape can also deteriorate. As Lake Eymir is hydrologically highly dependant on Gölbaşı Düzlüğü, the multifunctionality of the pondscape should always be kept in mind while managing the area.

The ponds should be restored according to the CLIMA ponds principles, for which biodiversity enhancement is the primary focus but climate as well as society-related benefits are considered simultaneously.

SUCCESS STORY AND TRANSFERABILITY

GÖLBAŞI DÜZLÜĞÜ PEOPLE'S PARK PROJECT

Gölbaşı Düzlüğü consists of nearly 50 ponds, surrounded by urban infrastructure and separated from each other by dense reedbeds. Currently, a People's Park Project, including the restoration of the ponds and the environment, is being implemented in an area of approximately 60 hectares (landscape and surrounding area). This project aims to restore the ponds to protect and support the biodiversity of the region, increase the public's benefit and awareness of the importance of the region, and serve as an exemplary model for green infrastructure that, if supported by scientific approaches, also provides flood mitigation for the Gölbaşı District.

So far, the ponds and their surroundings have been cleared of waste without cutting the reeds. Several footpaths and bicycle roads have been built for public amenities; and according to the urban plan, there will be a learning center for visitors.

HIGH BIOLOGICAL DIVERSITY IN SEPA REGION: CASE OF GÖLBAŞI DÜZLÜĞÜ

Lake Mogan and Eymir and the pondscapes (both Lake Mogan and Gölbaşı Düzlüğü) areas within the Gölbaşı SEPA Region allow thousands of birds of different species to feed, breed and shelter. As a result of the observations made so far, 249 bird species have been identified in the SEPA region.

The recent studies carried out on the birds of the Gölbaşı SEPA area locate four important regions for birds, one of which is Gölbaşı Düzlüğü (Figure 16). Since the ponds are surrounded by dense reeds, they provide high-quality shelter, breeding and feeding areas for birds. Almost all species that breed in the ponds of Lake Mogan also breed here. White-headed duck (*Oxyura leucocephala*), Great Bittern (*Botaurus stellaris*), Little Bittern (*Ixobrychus minutus*), Squacco Heron (*Ardeola ralloides*), Ferruginous Duck (*Aythya nyroca*), Red-crested Pochard (*Netta rufina*) are the main bird species breeding in the area. Due to dense reeds, the ponds cannot be observed easily and as a result, there is little monitoring or data on the status or biodiversity of the pondscape.

The Gölbaşı Special Environmental Protection Area "Habitat and Species Protection Monitoring Project" was one of the important projects carried out in SEPA region. During the project, the main aim was to identify, track, and safeguard delicate habitats and to find protection measures for *Centaurea tchihatcheffii*, considered «Critically Endangered» (CR) according to the IUCN criteria. The project also aimed to identify areas and species that are threatened or endangered, as well as sensitive areas and potential threats to protected areas. During the field research, all over the SEPA region, a total of 494 plant species were listed. The research also revealed the presence of 3 species of amphibians, 12 species of reptiles, 83 species of birds, and 25 species of mammals within the Gölbaşı SEPA.


Common Pochard
(*Aythya ferina*)


Mallard
(*Anas platyrhynchos*)


White-headed duck
(Oxyura leucocephala)

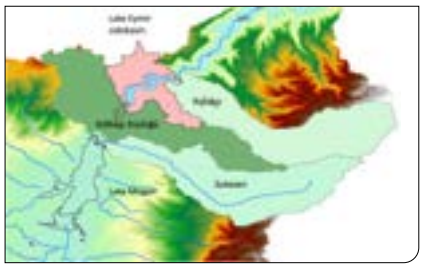

Black-headed Gull
(*Chroicocephalus ridibundus*)

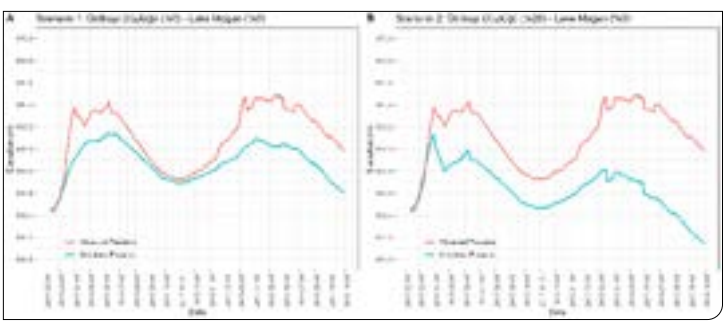
GÖLBAŞI DÜZLÜĞÜ PONDSCAPE HAS A GREAT POTENTIAL TO MITIGATE FLOODS AND PROVIDE WATER TO LAKE EYMIR

Gölbaşı Düzlüğü pondscape has a storage capacity of approximately one million cubic metres of water in the event of severe flooding. This feature, which offers significant flood mitigation potential, makes it an excellent example of green infrastructure in an urban area.

According to data from the State Water Works, Lake Mogan overflows periodically due to heavy rain, particularly in the spring, damaging the surroundings. For example, during the heavy rains of 1969, the lake received 5.7 m3 of water per second, causing the water level to rise by approximately 4 m. Gölbaşı's built-up area was affected, resulting in property damage. In addition, the floods caused significant destruction in the surrounding areas of Lake Eymir and the İmrahor Valley. Following that event, the State Water Works constructed an overflow regulator at the outlets of Lakes Mogan and Eymir.

Nevertheless, flooding incidents still occurred around Lake Mogan in 2011 and 2012, causing severe damage to Gölbaşı district and its settlements (Photos from the 2012 flooding). During this period, a hydrological model of the Gölbaşı Düzlüğü Pondscape was produced, to investigate the causes of flooding and the flood prevention capacity of the area. (See image of the Gölbaşı Düzlüğü catchment). Preliminary research pointed towards the possibility of the area storing excess water from Lake Mogan, where flow regulation infrastructure had been implemented since 1974 (modified in 2015). However, data eventually showed that in the event of heavy rainfall and snow melt, this infrastructure would probably not be sufficient. This is because when the water level rose in Lake Mogan, the canal connecting it to Lake Eymir was unable to transfer sufficient water downstream due to both capacity and management issues. When the excess water from Lake Mogan's outflow combines with the water from the larger Sukesen Creek and its basin which is the main inflow of upstream Lake Mogan, it caused a major flooding in Gölbaşı Plain. According to the Ankara Basin Flood Management Plan published by the General Directorate of Water Management of the Ministry of Agriculture and Forestry, Flooding Hazard Maps (Q500) demonstrated the impact of flooding events (See the flooding hazard map). Based on that, Gölbaşı Düzlüğü is at high risk of experiencing severe flooding (occurring once every 500 years). Thankfully, Gölbaşı Düzlüğü Pondscape has the potential to retain the excess water, allowing for natural drainage over time.





Meanwhile, the existence of Lake Eymir is largely dependent on the water supply from Lake Mogan and Gölbaşı Düzlüğü Pondscape. The water released from Lake Mogan flows into the Gölbaşı Düzlüğü pondscape under control of regulator and then discharges into Lake Eymir.

Gölbaşı Düzlüğü pondscape (the green area in the Gölbaşı Düzlüğü catchment map) is composed of water from the Sukesen Creek and Lake Mogan. Additionally, Lake Eymir is supplied by the Lake Eymir's side catchment and Gölbaşı Düzlüğü Pondscape. The study evaluated water availability and quality to Lake Eymir through two scenarios. The initial scenario postulated that Lake Eymir received no water supply from Lake Mogan and Gölbaşı Düzlüğü Pondscape, and no water would be released from the regulator situated at the outlet of Lake Eymir to the Imrahor Valley. Consequently, as a result of this scenario, the salinity of Lake Eymir increased, there was also a major decrease in water level, and even Lake Eymir would dry out. In the second scenario, Lake Mogan released only 20% of the water which reached Lake Eymir and an equal amount flowed out to the Imrahor River Valley using the regulator at the outflow of Lake Eymir.

HANDBOOK :

APPENDIX :

PHOTOS CREDITS

Maps showing the emergence of the Gölbaşı Düzlüğü, p.3 © Özlem Uğurlu
Centaurea tchihatcheffii, p.7 © Prof.Dr. Ahmet Karataş
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Aythya nyroca p.7 © Gamze Kaya
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Urban Design of Gölbaşı People's Park Project, p.5 © ON Tasarım
Important Bird Breeding, Feeding and Sheltering Areas in Gölbaşı Sepa, p.10 © SEPA Environmental Layout Plan (2022)
Important species in Gölbaşı Düzlüğü Pondscape © Greater Ankara Municipality
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2024

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Ponderful
PONDS FOR CLIMATE

TÜRKIYE

GÖLCÜK AĞININ ADI : GÖLBAŞI DÜZLÜĞÜ GÖLCÜK AĞI

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

GÖLCÜK AĞI NEDIR ?

TANIMLAR

Bir gölcük ağı, bağlantılılık içinde aynı peyzaj matrisi ile birbirine bağlı gölcüklerin oluşturduğu bir ağdır.

Bir gölcük ağının sınırları, fiziksel veya ekolojik koşullar tarafından (bir vadi, bir havza, aynı doğa rezervindeki bir dizi gölcük) veya toplumsal veya siyasi kriterlere göre (kent gölcükleri, il sınırı veya ulusal sınırlar içerisindeki gölcükler) belirlenebilir.

GÖLCÜK VE GÖLCÜK AĞLARI ÜZERİNDEKİ BASKILAR VE TEHDİTLER

Avrupa ülkelerinde gölcük kayıplarının %50 ila %90'ı geçen yüzyılda yaşandı. Dahası, gölcükler genellikle su ve doğa ile ilgili ulusal ve Avrupa Birliği (AB) politika belgeleri ve stratejilerinde, AB Su Çerçeve Direktifi (EU-WFD) dahil olmak üzere, büyük ölçüde göz ardı edilmektedir.

GÖLCÜKLERİN VARLIĞI VE KORUNMASI NEDEN ÖNEMLİDİR ?

BIYOLOJIK ÇEŞITLILIĞI ARTIRMA

Genellikle göz ardı edilen ve ekolojik değeri hiçe sayılan gölcükler, biyoçeşitliliğin korunması açısından son derece önemlidir. Gölcük ağları ise, biyoçeşitliliği artırma açısından kritik bölgelerdir.

AFET RİSKİNİ AZALTMA

Gölcükler ve gölcük ağları, sel ve taşkınların etkilerini hafifletmede temel rol oynar ve aynı zamanda yangınla mücadele için önemli su rezervidirler.

İNSAN SAĞLIĞI

Gölcükler ve gölcük ağları, toplumlar için (diğer katkılarının dışında) insan sağlığına ve yaşam kalitesine destek sağlama, fiziksel aktiviteler veya sosyal etkileşim için alanlar sunma, estetik deneyimler, eğitim ve rekreasyonel faaliyetler gibi geniş bir yelpazede ek faydalar sunarlar.

İKLİM DEĞİŞİKLİĞİNİN AZALTILMASI VE UYUM

Gölcükler, dünya genelinde çok sayıda bulunmaları ve yüksek üretkenlikleri nedeniyle iklim değişikliği azaltılaması ve uyumda önemli rol oynarlar. Yüksek üretkenlikleri nedeniyle, gölcükler hem karbonu tutan (karbon yutak alanlar) hem de karbon ve metan kaynağı olan alanlardır ve bu nedenle karbon döngüsü üzerinde belirgin etkilere sahiptirler.

SU YÖNETİMİ

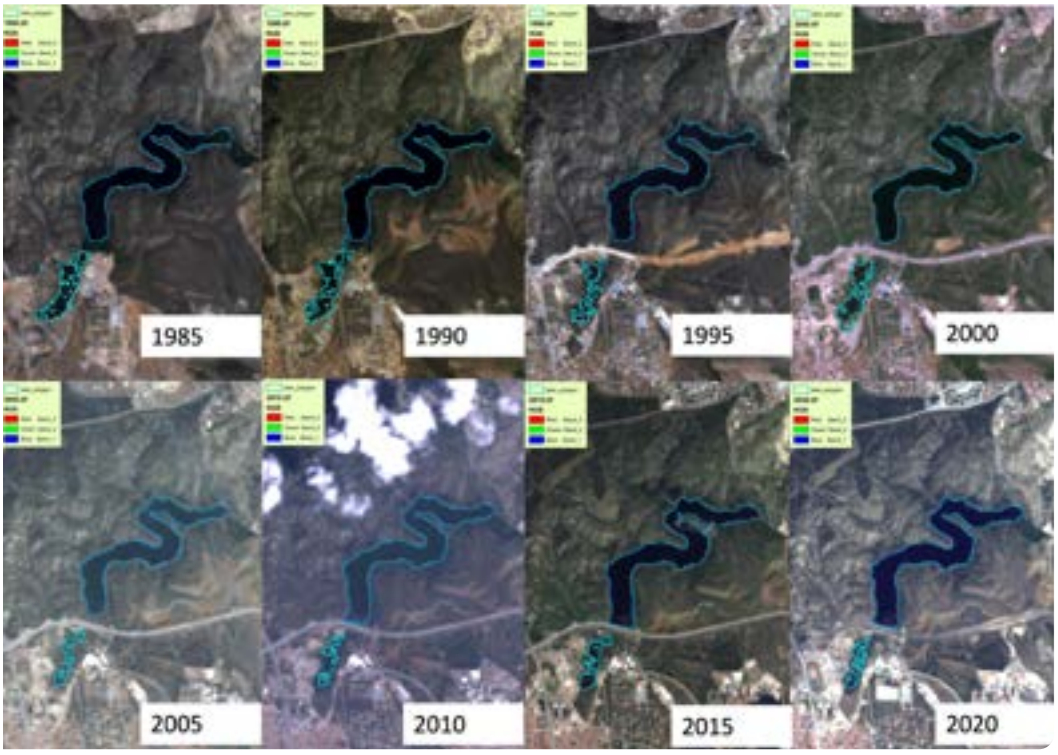
Gölcük ağları, özellikle su kıtlığında önemli su rezervleridir. Hayvanlara su ve sulama suyu sağlamadan önemlidirler.

GÖLCÜK AĞI HAKKINDA

Gölbaşı Düzlüğü gölcük ağı, 1.300 metre uzunluğunda ve ortalama 280 metre genişliğinde olup, yaklaşık 35 hektarlık bir alanı kaplamaktadır. Mogan ve Eymir Gölleri arasında yer alır ve bu bölgede bulunan yaklaşık 30 gölcüğün sınırlarını da tanımlayan yoğun sazlıklar ile karakterizedir. Mogan ve Eymir Gölleri ile birlikte, Gölbaşı Düzlüğü gölcük ağı da Özel Çevre Koruma Bölgesi'nin (ÖÇKB) bir parçasıdır. 1944'ten günümüze kadar olan haritalar incelendiğinde, bu gölcük ağının, su seviyesinin çok yüksek olduğu zamanlarda her iki gölün de bir parçası olduğu, ancak düşük su seviyesi dönemlerinde çok sayıda gölcüğün bulunduğu geniş sulak alanların ortaya çıktığı tespit edilmiştir. Çeşitli yol inşaatları, Gölbaşı ilçesinin büyümesi, atık bertarafı ve ölçüsüz su kullanımı gölcük ağını günümüzdeki boyutuna kadar küçültmüştür.

Gölbaşı Düzlüğü, Eymir Gölü'nün habitatının, su rejiminin ve kalitesinin korunmasında ve Ankara Şehir Merkezi ve Gölbaşı ilçesinde büyük taşkınların önlenmesinde önemli bir rol oynar. Mogan Gölü'nün yukarısından gelen su, iki göl arasındaki beton kaplı bir kanaldan geçerek Gölbaşı Düzlüğü gölcük ağını geçerek Eymir Gölü'ne ulaşır. Gölbaşı Düzlüğü ve havzası, Eymir Gölü'nün en büyük su tedarikçisidir. Yine, Eymir Gölü'ne ulaşmadan önce sazlıklardan geçen sular temizlenir ve gölün su kalitesini korumasını sağlar. Gölbaşı Düzlüğü gölcük ağı, şiddetli sel olayları sırasında yaklaşık 1.000.000 metreküp su depolama kapasitesine sahiptir ve böylece Ankara Şehir Merkezi ve Gölbaşı ilçesinde büyük taşkınların önlenmesine katkıda bulunur. Bununla birlikte, gölcükler, sık sazlıklarla çevrili olduğu için su kuşları için yüksek kaliteli üreme, beslenme ve barınma alanları sağlar. Mogan Gölü gölcüklerinde gözlemlenen hemen hemen tüm türler de burada da gözlemlenir. Gölbaşı Düzlüğü'nün doğal bir alan olarak, yukarıda özetlenen insanlara çok yönlü katkıları nedeniyle, bölgenin ekolojik dengesinin ve su rejiminin bozulabileceği her türlü faaliyetten korunması gerekmektedir.

Gölbaşı Düzlüğü doğal peyzaj açısından önemli bir kaynak değeridir, ancak uzun yıllardır çevresinde bulunan endüstryel alandan gelen mermer işleme atıkları ile bir kısmı doldurulmuştur. Ne yazık ki, doldurulan alanın bir kısmı çevresel kaygılara rağmen inşaata açılmıştır. Ayrıca bölge çöp alanlarına, hurdalıklara ve küçük sanayi sitelerine de ev sahipliği yapmıştır. Bununla birlikte, son yıllarda, Millet Bahçesi projesi ile, gölcüklerde ve çevredeki çöpler temizlenmiş, düzlüğün etrafında bulunan kirletici işletmeler taşınmıştır. Sazlıklara dokunulmadan, su kalitesini arttırıcı temizlik faaliyetleri gerçekleştirilmiştir. Projenin önümüzdeki dönemde, Gölbaşı Düzlüğü'nün doğal bir alan olarak, insanlara çok yönlü katkılarını gözetir şekilde ve doğa temelli çözümler yaklaşımlarını benimseyerek tamamlanması ve yönetilmesi halinde, örnek bir kentsel gölcük ağı ortaya çıkacaktır.



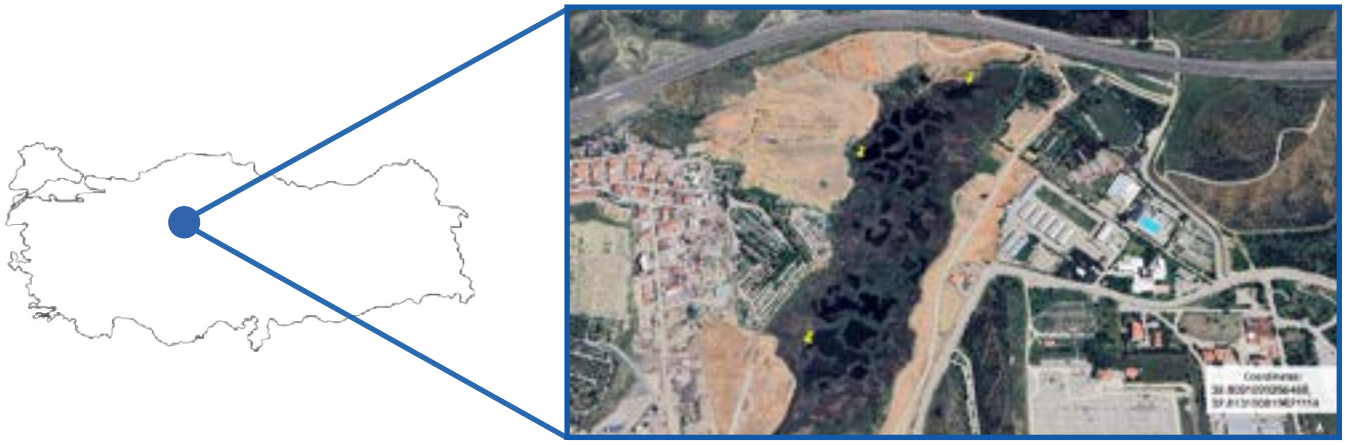
GÖLCÜK AĞI HAKKINDA

Gölcük ağı : Gölbaşı Düzlüğü
Komşu büyük kasabanın adı (30 km yarıçap içinde):
Bala, Haymana, Mamak, Çankaya ve Gölbaşı (1’826’672 kişi)
Biyoklimatik kuşak : İç Anadolu soğuk kurak bozkır iklimi

Baskın arazi kullanımı :
Gölcük ağı - doğa koruma alanı
Çevre - kent çeperi

Gölcük alanı : 0.35 km^2
Gölcük Sayısı: ~ 30 (Örneklenen Gölcük Sayısı: 3)
Yoğunluk: 143/km^2
Yüzey alanları : 3’200 ila 10’000 m^2
Derinlikler : 2.2 ila 5.9 m
Yaş sınırı **:** > 40 yıl

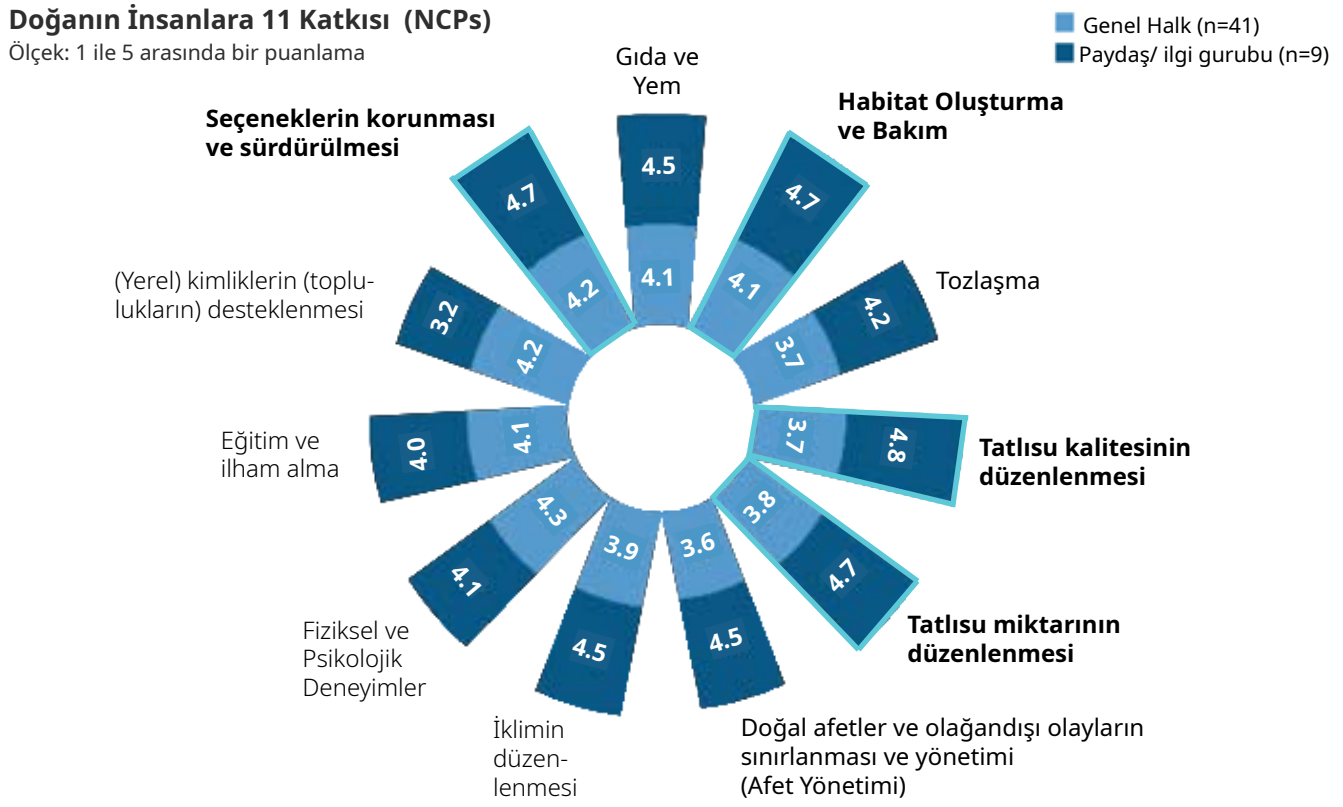
Arazi Sahibi : Tabiat Varlıklarını Koruma Genel Müdürlüğü
Arazi Yönetimi : Gölbaşı Belediyesi
Halka açık erişilebilirlik : Alanın %100’ü erişilebilir
Halka açık olanaklar : Patika yollar, bisiklet yolları ve diğer sosyal ola naklar, öğrenme merkezi ve manzara ve kuş gözlem kuleleri (Millet Bahçesi Projesi tamamlandığında)



Lake Eymir (1944) Lake Eymir (1991) Lake Eymir (2015)

YEREL TOPLUMSAL BEKLENTILER

Doğanın İnsanlara 11 Katkısı (NCPs)
Ölçek: 1 ile 5 arasında bir puanlama



Paydaşlar ve toplumun beklentilerine göre temel olarak (i) tatlı su kalitesi, (ii) tatlı su miktarının düzenlenmesi, (iii) habitat oluşturma ve sürdürme ve (iv) seçeneklerin sürdürülmesi önceliklidir.

YEREL POLITIKALAR

Gölbaşı Düzlüğü gölcük ağı, Mogan ve Eymir Gölleri ile birlikte 1990 yılından bu yana, Tabiat Varlıklarını Koruma Genel Müdürlüğü tarafından yönetilen Özel Çevre Koruma Bölgesi'nin (ÖÇKB) bir parçasıdır. Gölcük ağlarının günlük yönetimi Gölbaşı İlçe Belediyesi'ne devredilmiştir. Gölbaşı ÖÇKB, Ankara'nın kent çeperinde kentleşmeyi sınırlamak ve bölgenin yüksek biyolojik çeşitlilik değerini korumak için, bölgeyi koruma altına almıştır. Gölbaşı Düzlüğü biyolojik çeşitliliğe habitat sağlamasının yanı sıra; taşkın azaltma potansiyeli ve Eymir Gölü'nun su kalitesi ve miktarının korunmasında oynadığı rol nedeniyle de korunması gereken bir alandır.

Gölbaşı ÖÇKB Yönetim Planı (2015-2019)'na göre, Gölbaşı Düzlüğü ve Mogan Gölü'nün batı ve güneyindeki gölcükler (Mogan Gölü Gölcük Ağı) «Önemli Kuş Üreme, Beslenme ve Barınma" alanlarıdır ve bu alanlarda ekolojik karakterin korunması esastır; çöp ve molozların boşaltılması yasaktır. Ayrıca, su rejimini bozabilecek veya sulak alanlarda kurumaya neden olabilecek her türlü uygulama kesinlikle yasaktır. ÖÇKB alanı içerisinde balıkçılık yapılması ve su kuşlarının üreme dönemi olan 15 Mart-15 Temmuz tarihleri arasında alanda izleme, araştırma ve koruma faaliyetleri dışında herhangi bir faaliyetin yürütülmesine izin verilmez. Gölbaşı ÖÇKB Yönetim Planı (2015-2019)'na göre bölge, Hassas A ve Hassas B olmak üzere koruma değeri bakımından iki bölgede ele alınır.

Hassas A alanı, Mogan Gölü gölcük ağı, Mogan Gölü ve gölcüklerin ana su kaynağı olan Çökek Bataklığı, Gölbaşı Düzlüğü'nün sazlık alanları ve bölgeye endemik bitki türü Centaurea tchihatcheffii'nin yetiştiği alanları içerir. Yönetim planına göre, Hassas A alanları ne pahasına olursa olsun korunmalıdır. Gölbaşı Düzlüğü'nün yıllar içinde küçülmesine neden olan atık bertarafının yapıldığı kısımları, sazlık özelliğini kaybetmiş olsa da halen düzlük için önemli katkılarından ötürü, Hassas B bölgesi içine dahil edilmiştir. Gölbaşı Düzlüğü, Ankara'nın Mevcut Çevre Düzeni Planı'nda da «Büyük Kentsel Yeşil Alanlar»dan biri olarak tanımlanmıştır.

YEREL POLITIKALAR

Bununla birlikte, ÖÇKB yönetim planının alanda etkin bir şekilde uygulanmasına dair bazı zorluklar vardır. Gölcük ağının batı, doğu ve kuzey uçları, ÖÇKB ilan edilmesinden sonra dahi büyük ölçüde çöp ve moloz dökümü için kullanılmıştır. Ekolojik dengeyi bozan faaliyetler yasaklanmıştır. Bu yasaklar olmasına karşın bölge; kuzeyde Ankara çevre yolu, güneyde başka bir ana yol, doğu ve batıda ise proto-sanayi ve zanaat faaliyetleri ile yıllarca çevrili kalmıştır. Gölbaşı Düzlüğü pratikte erişime açık bir alandır ve yıllardır atık bertarafı için kullanılmaktadır. Sonuç olarak, gölcükler inşaat malzemesinden (büyük ölçüde doğu kesiminde) ve araba tamiri ve kaynak faaliyetlerinden (batı kesiminde) çöplerle doldurulmuştur.

Son birkaç yıldır, Gölbaşı Düzlüğü gölcük ağını rekreasyonel bir alan olarak kullanıma açmak için Millet Bahçesi projesi yürütülmektedir. Proje peyzaj mimarları tarafından tasarlanmıştır ve merkezi hükümet tarafından finanse edilmektedir. Projenin uygulama aşamasında, gölcükler ve çevresinden atıklar uzaklaştırılmış ve gölcük ağının bir şehir parkı haline gelmesi için endüstriyel tesisler taşınmıştır. Bu proje, yakındaki bir öğrenme merkezi aracılığıyla vatandaşlar arasında farkındalık yaratmayı, ve aynı zamanda ÖÇK Bölgesinde biyolojik çeşitliliği desteklemeyi de amaçlamaktadır.

Bununla birlikte, Millet Bahçesi projesinin, biyolojik çeşitliliği ve özellikle kuş popülasyonlarını etkileyebilecek şekilde yaya trafiğini arttırması da beklenmektedir. Yine, gölcüklerin rekreasyonel özellikleri kadar önemli olan diğer katkıları, yani Gölbaşı Düzlüğü'nün Eymir Gölü'nün habitatının, su rejiminin ve kalitesinin korunmasında ve Ankara Şehir Merkezi ile Gölbaşı ilçesinde büyük taşkınların önlenmesinde oynadığı önemli roller de mutlaka göz önünde bulundurulmalıdır.

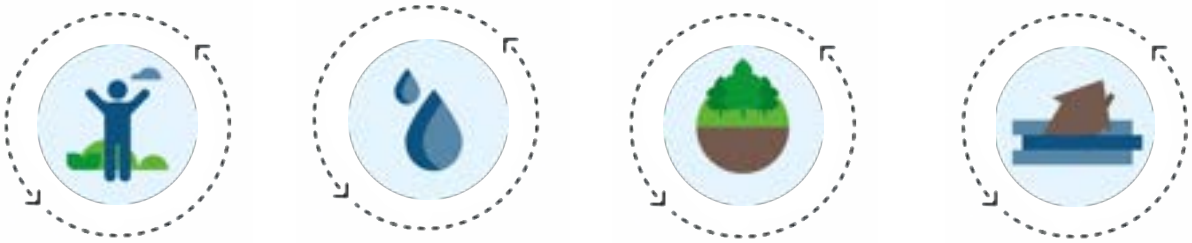
-Gölcük ağının %100'ü ÖÇK Bölgesi içerisindedir ve koruma altındadır, Özel Çevre Koruma Bölgesi (ÖÇKB) statüsü ile; gelecek nesiller için su üstü ve su altındaki hassas alanlar ve çevreleri koruma altına alınır.

100%

-Gölcük ağı, **biyolojik çeşitlilik ve Eymir Gölü'nün su rejiminin ve su kalitesinin korunmasının** yanı sıra Ankara Şehir Merkezi ve Gölbaşı ilçesindeki taşkınların etkisinin azaltılmasına katkıda bulunması nedeniyle özel bir öneme sahiptir.

- Ulusal Öneme Sahip Kuş Yetiştirme Alanı: su kuşları da dahil olmak üzere çeşitli yaban hayatı için beslenme, barınma ve üreme amacıyla uygun bir yaşam alanı sağlar.

TEMEL ZORLUKLAR VE HEDEFLER



İNSAN SAĞLIĞI

Yürümek, sosyalleşmek, rahatlamak ve insanları doğa hakkında eğitmek için geniş bir kentsel mavi-yeşil alan olması.

SU YÖNETIMI

Değişen iklim koşulları ve artan kuraklık koşullarında Eymir Gölü için su kaynağı olması.

BIYOÇEŞITLILIĞIN ARTIRILMASI

Su kuşları, amfibiler ve su bitkilerinin yaşam alanların sağlanması ve korunması.

AFET YÖNETIMI

Su akışını tamponlayarak sel ve taşkın riskinin azaltması.

DOĞA TEMELLI ÇÖZÜMLER

Gölcük ağı ölçeğinde arazi kullanımı ve yönetimine dair alınan önlemler, belirlenen temel zorlukları ele almak için uygulamaya konulan Doğa Temelli Çözümlerdir.

1990 – "Özel Çevre Koruma Bölgesi» ilanı (Gölbaşı ÖÇKB)

1992 – Gölbaşı ÖÇKB için "1/25.000 ölçekli Çevre Düzeni Planı»

2015 – Gölbaşı ÖÇK Bölgesi Yönetim Planı (2015-2019)

2020 – Gölbaşı Düzlüğü Millet Bahçesi Projesi (Gölcükler ve çevresinin atıklardan temizlenmesi, sanayi alanının taşınması ve diğer çevresel yüklerin azaltılması ile daha fazla bozulmasını önlemek)

GÖLCÜK VE GÖLCÜK AĞLARI YÖNETIMI

-Kuş gözlem noktalarının belirlenmesi (2020 -)
-Gölcük ağı için bir öğrenme merkezinin yapılması ve farkındalık yaratılması (2020 -)
- Atıkların gölcükler ve çevresinden uzaklaştırılması (2020 -)

-Su rejimini bozabilecek veya su kütlelerinde kurumaya neden olabilecek her türlü

-Mogan ve Eymir Gölleri, sazlık alanlar ve gölcükleri içeren geniş bir alanda yüksek ekolojik değerine istinaden verilen Koruma Statüsü (Gölbaşı ÖÇKB) verilmesi
-Kapalı alanların inşaatı, kazı ve dolgu yasaklanması
-Gölbaşı Düzlüğü Gölcük ağı için «Hassas A» bölgesi ilanı (Sazlık ve gölcüklerin mutlak korunması zorunluluğu)
-Geçmişte doldurulan alanlar için «Hassas B» bölgesi ilanı (Yaban hayatı ve sazlık özelliğini kaybetmiş alanların korunması zorunluluğu)
-ÖÇKB içerisinde çöp dökümünün yasaklanması ve Gölbaşı ilçesi için yeni hafriyat döküm alanı belirlenmesi
-Gölbaşı Düzlüğü Gölcük Ağı için «Önemli Kuş Üreme, Beslenme ve Barınma Alanı» ilanı
- Balıkçılık ve avcılık faaliyetlerinin yasaklanması
-ÖÇKB bölgesinde üreyen kuş türlerinin düzenli olarak izlenmesi ve kayıt altına alınması
-Su kuşlarının ürediği, beslendiği ve barındığı alanların üreme döneminde insan faaliyetlerine kapatılması (izleme, araştırma ve koruma faaliyetleri hariç).
-Sanayi alanlarının gölcük ağından uzaklaştırılması (2020-)
- İstilacı hayvan türlerinin uzaklaştırılması
- İstilacı bitki türlerinin uzaklaştırılması
- Yeni bir gölcük yapımı veya bir gölcüğün restorasyonunda, bölgede yerel olarak bulunan su bitkilerinin kullanılması
- Tehdit altındaki türlerin koruma altına alınması

- Mogan Gölü'nün taşması ve Gölbaşı ilçesine doğru bir taşkın oluşmasına karşı korumayı en üst düzeye çıkarmak için alanın yönetimi:
-Mogan Gölü'nden Gölbaşı Düzlüğü'ne uzanan kanalın temizlenmesi ve taşıma kapasitesinin arttırılması
-Gölcük ağı ile Eymir Gölü arasındaki bağlantı kanalının temizlenmesi
-Millet Bahçesi'ndeki inşaatların gölcüklerden güvenli bir mesafede tutulması

NCP'LER VE ÖLÇÜLEN GÖSTERGELER

SUCUL BIYOÇEŞITLILIK

TÜR ZENGINLIĞI

Su bitkileri (Tüm ÖÇKB Alanı; Mogan ve Eymir Gölü dahil) : **51**

Su kuşları (Eymir Gölü Çevresi, gözlemlenen) : **67**

Yusufçuk (Familya) (Tüm ÖÇKB Alanı; Mogan ve Eymir Gölü dahil)**: 13**

Omurgasızlar (Familya) (Tüm ÖÇKB Alanı; Mogan ve Eymir Gölü dahil dahil): **14**

MIKTAR

IUCN Kırmızı Liste'de yer alan türlerin sayısı (Kategoriler: CR, EN, VU, NT) (Eymir gölü ve çevresi)**: : 3**
(*Centaurea tchihatcheffii* (CR), *Oxyura leucocephala* (EN), *Aythya nyroca* (NT))

Türkiye için koruma önceliği bulunan türler (Eymir Gölü ve çevresinde nadir ve tehlike altında bulunan türler): **7**
(*Centaurea tchihatcheffii* (CR), *Oxyura leucocephala* (EN), *Aythya nyroca* (NT), *Chroicocephalus genei* (LC), *Microcarbo pygmaeus* (LC), *Botaurus stellaris* (LC), *Ixobrychus minutus* (LC)

SEMBOLIK TÜRLER :

Centaurea tchihatcheffii (CR)

Oxyura leucocephala (EN)

Aythya nyroca (NT)

Orthetrum cancellatum

NCP'LER VE ÖLÇÜLEN GÖSTERGELER

FIZIKSEL VE PSIKOLOJIK DENEYIM

Gölcük ağını ziyaret etmesi beklenen kişi sayısı (Millet Bahçesi projesinin tamamlanmasından sonra) (kişi/yıl). Millet Bahçesi projesinden önce bölgeyi rekreasyon amaçlı kimse ziyaret etmiyordu.

45'000-55'000

100% Gölcük ağının içinde halka açık alan

Gölcük ağına ilişkin memnuniyet (1 ila 5 arasında) **3.7**

En popüler aktiviteler:
yürüyüş (% 23), bisiklete binme (% 23), peyzaj estetiği (% 21), dinlenme (% 21)

SU MIKTARI

1'000'000 m^3

Gölcük ağında şiddetli bir sel olayı sırasında hesaplanan su tutma kapasitesi (m^3)

SU KALITESI

1 (PARK PROJESI BAŞLAMADAN ÖNCE)

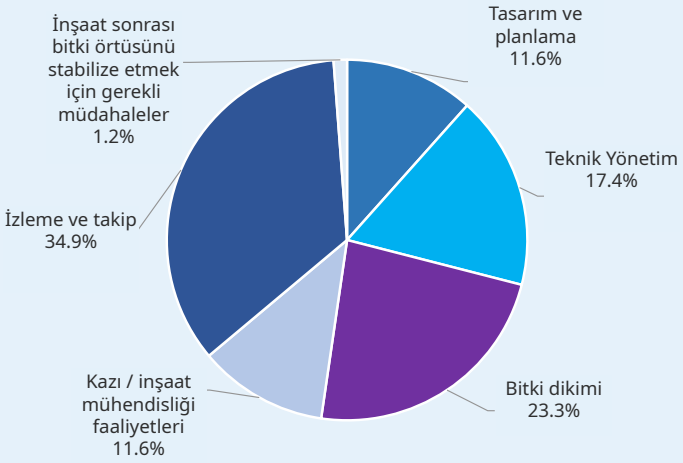
/2 (PARK PROJESI BITTIĞINDE SU KALITESININ DAHA YÜKSEK OLMASI BEKLENIYOR)

Millet Bahçesi projesi sırasında su ve gölcük ağının etrafındaki ortam atıklardan temizlendi. Ne yazık ki, bazı gölcüklerin içinde ve çevresinde halen atıklar mevcuttur. Yoğun sazlıklar nedeniyle bazı gölcükler ziyaret edilememiştir, ancak örneklenen gölcükler, yakındaki diğer gölcük manzaralarına kıyasla daha düşük su kalitesine sahiptir.

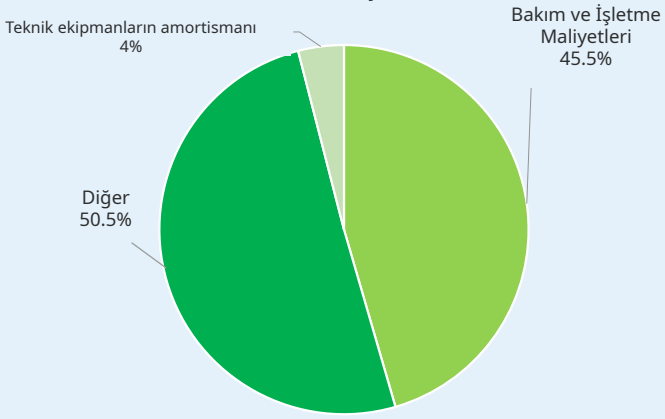
MALIYET VE FAYDA ANALIZI

GENEL MALIYET DEĞERLENDIRMESI

DOĞA TEMELLI ÇÖZÜMLER IÇIN MALIYET PAYI

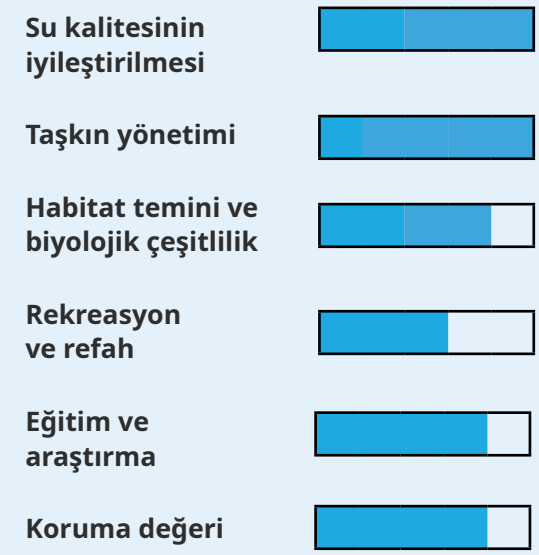


Doğa Temelli Çözümler oluşturmak için alınabilecek önlemlerin tek seferlik maliyet kalemleri



Doğa Temelli Çözümler oluşturmak için alınabilecek önlemlerin periyodik maliyet kalemleri

FAYDA DEĞERLENDIRMESI



FINANS AÇIĞINI AZALTMAK IÇIN UYGUN FINANSMAN ARAÇLARI

- **1. Gelir kaynakları**

  İmar Hakları ve Kiralamalar

- **2. Gönüllü katkılar/bağışlar**

  Sosyal sorumluluk, Gönüllü yararlanıcı katkıları, Kitle fonlaması

- **3. Hibeler**

FINANSMAN AÇIĞI DEĞERLENDIRMESI

TEHDITLER VE ÖNERILER

Gölbaşı Düzlüğü, su kuşları için hayati bir yaşam alanıdır. Bununla birlikte, Ankara Şehir Merkezi ve Gölbaşı İlçesi'ne doğru taşkınların azaltılmasında ve Eymir Gölü'nün su rejiminin ve kalitesinin korunmasında çok önemli bir rol oynamaktadır. Millet Bahçesi projesi ile, bölgenin korunması için yeterli önlemlerin alınmaması, kentleşmenin ve insan etkileşiminin artması, dolayısıyla bölgeyi kullanan su kuşlarının popülasyonun ve çeşitliliğinin azalması ve tüm ekosistemin ekolojik bütünlüğünün bozulması ihtimali mutlaka göz önünde bulundurulmalıdır. Doğa temelli çözümler öncelenerek yönetilmezse, Gölbaşı Düzlüğü'nün taşkın azaltma özelliği ve Eymir Gölü'nün su rejimi ve kalitesine dair fonksiyonları etkilenebilir.

Yoğun sazlıklar nedeniyle gölcüklerin gözlemlenmesi ve örneklenmesi zordur. Bu nedenle, gölcük ağının durumunu veya biyolojik çeşitliliğini ortaya koyan veriler yeterli değildir. Hem mevcut durumu gösterir hem de Millet Bahçesi projesinin tamamlanması sonrasında değişimleri gösterir verilerin toplanması ve gözlemlerin artırılması, Gölbaşı Düzlüğü'nün korunması için önemlidir.

Özet olarak, gölcük ağının havza için önemi ve çok fonksiyonluluğu her zaman akılda tutulmalıdır. Bu nedenle, biyolojik çeşitliliğin öncelikli hedef olduğu "İKLİM gölcük" ilkelerine dayalı gölcük ve gölcük ağı restorasyonu; aynı zamanda iklim değişikliği ve toplumsal faydaları da göz önünde bulundurarak, bölgenin potansiyelinin korunmasını ve artırılmasını sağlayacaktır.

BAŞARI HIKAYELERI

GÖLBAŞI DÜZLÜĞÜ MILLET BAHÇESI PROJESI

Gölbaşı Düzlüğü, kentsel altyapı ile çevrili ve sık sazlıklarla birbirinden ayrılmış 30'a yakın gölcükten meydana gelmektedir. Mevcut durumda, gölcük ağı ve çevresini kapsayacak şekilde, yaklaşık 60 hektarlık bir alanda, gölcüklerin ve çevrenin restorasyonunu içeren bir Millet Bahçesi projesi uygulanmaktadır. Bu proje, bölgedeki biyolojik çeşitliliğin korunması ve desteklenmesi, halkın bölgeye olan ilgisinin ve farkındalığının arttırılması ve bilimsel yaklaşımlarla desteklendiği takdirde Gölbaşı İlçesi için taşkın azaltma hizmetini sağlaması ile; yeşil altyapı için örnek bir model olma potansiyelindedir.

Proje kapsamında şimdiye kadar gölcükler ve çevresi sazlıklar kesilmeden atıklardan arındırıldı. Halkın kullanımına açık yürüyüş ve bisiklet yolları inşa edildi. Peyzaj tasarım projesine göre ise, gölcük ağında ziyaretçiler için bir öğrenme merkezi yer alması planlanmaktadır.

ÖÇKB BÖLGESINDE YÜKSEK BIYOLOJIK ÇEŞITLILIK: GÖLBAŞI DÜZLÜĞÜ ÖRNEĞI

Mogan ve Eymir Gölleri ile Mogan Gölü ve Gölbaşı Düzlüğü gölcük ağları, üremek, beslenmek ve barınmak için farklı türlerden binlerce kuşa ev sahipliği yapmaktadır. Bugüne kadar ÖÇK bölgesinde yaklaşık 249 kuş türü tespit edilmiştir.

ÖÇK bölgesindeki kuşları gözlemleyen son çalışmalara göre, bölge içinde su kuşları için 4 önemli bölgeyi belirlenmiştir, bunlardan biri de Gölbaşı Düzlüğü'dür (Şekil 16). Gölcükler sık sazlıklarla çevrili olduğu için kuşlar için yüksek kaliteli barınak, üreme ve beslenme alanları sağlar.

Mogan Gölü gölcüklerinde gözlemlenen hemen hemen tüm türler de burada gözlemlenebilir. Dikkuyruk Ördek (*Oxyura leucocephala*), Balaban (*Botaurus stellaris*), Küçük Balaban (*Ixobrychus minutus*), Alacabalıkçıl (*Ardeola ralloides*), Pasbaş Patka (*Aythya nyroca*), Macar Ördeği (*Netta rufina)* bölgede üreyen başlıca kuş türleridir.

Gölbaşı ÖÇK Bölgesi «Tür ile Habitat Koruma ve İzleme Projesi» ÖÇKB bölgesinde yürütülen önemli projelerden biridir. Proje sırasında temel amaç, hassas habitatların belirlenmesi ile için IUCN kriterlerine göre nesli kritik tehlikede olan (CR) Sevgi Çiçeği (*Centaurea tchihatcheffii*) populasyonunun takibi ve türün korunması için koruma önlemlerinin tespitidir. Proje ayrıca, korunan alanlara yönelik potansiyel tehditleri belirlemeyi de amaçlar. Saha araştırması sırasında, ÖÇK bölgesinin tamamında toplam 494 bitki türü listelenmiştir. Araştırmada ayrıca Gölbaşı ÖÇK bölgesinde 3 amfibi türü, 12 sürüngen türü, 83 kuş türü ve 25 memeli türü tespit edilmiştir.


Elmabaş Patka
(*Aythya ferina*)

Yeşilbaş
(*Anas platyrhynchos*)

Dikkuyruk
(*Oxyura leucocephala*)

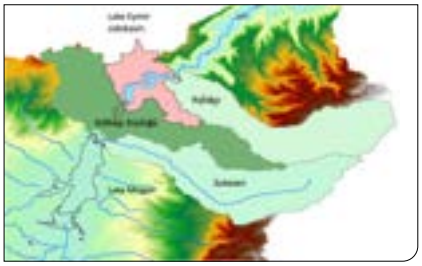
Karabaş Martı
(*Chroicocephalus ridibundus*)

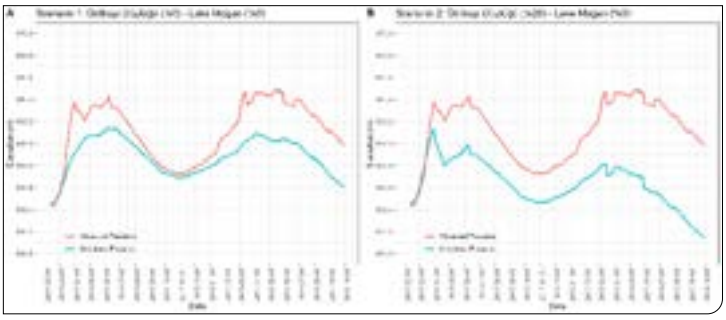
GÖLBAŞI DÜZLÜĞÜ GÖLCÜK AĞI, TAŞKINLARI AZALTIR VE EYMIR GÖLÜ'NÜ BESLER

Gölbaşı Düzlüğü gölcük ağı, şiddetli su baskını durumunda yaklaşık 1.000.000 metreküp su tutma kapasitesine sahiptir ve önemli bir taşkın azaltma potansiyeli vardır. Bu özelliği ile Gölbaşı Düzlüğü, kentsel alanda yeşil altyapı ile taşkın yönetiminin önemli bir örneğidir.

Devlet Su İşleri'nden alınan verilere göre, Mogan Gölü'nde, özellikle ilkbaharda şiddetli yağmurlar nedeniyle taşkınlar yaşanmaktadır. Örneğin, 1969'da meydana gelen şiddetli yağışlar nedeniyle gölün su seviyesi yaklaşık 4 metre yükselmiştir. Bunun sonucunda, Gölbaşı ilçesinde bulunan yerleşim alanlarında maddi hasara meydana gelmiştir. Bu taşkın, Eymir Gölü ve İmrahor Vadisi'nin çevresinde de önemli tahribatlara neden olmuştur. Bunu takiben, Devlet Su İşleri, taşmayı engellemek ve su akışını düzenlemek için Mogan ve Eymir Göllerinin çıkışlarında birer regülatör inşa etmiştir.

2011 ve 2012 yıllarında Mogan Gölü çevresinde meydana gelen taşkınlar ise Gölbaşı ilçesi ve yerleşim yerlerinde ciddi hasara neden olmuştur. Bu dönemde, Gölbaşı Düzlüğü gölcük ağının hidrolojik bir modeli geliştirilmiş, taşkın nedenleri ve bölgenin taşkın önleme kapasitesi araştırılmıştır. Çalışmanın sonuçları, 1974'te inşa edilen ve 2015'te yenilenen su akışını düzenleyen altyapının yoğun yağış ve kar erimesi durumunda yeterli olmayabileceğini göstermektedir. Mogan Gölü'nde su seviyesi yükseldiğinde, onu Eymir Gölü'ne bağlayan kanal, suyu mansabına aktaramamaktadır. Bu durum, kanalın yetersiz kapasitesinden veya potansiyel yönetim sorunlarından meydana gelmiş olabilir. Mogan Gölü'nün çıkışından akan taşkın suları, havzada Sukesen Deresi'nden ve Mogan Gölü'nün ana akışını meydana getiren alt havzasından gelen su ile birleştiğinde, Gölbaşı Düzlüğü'ne yüksek miktarda su girişi olmaktadır. Tarım ve Orman Bakanlığı Su Yönetimi Genel Müdürlüğü tarafından yayınlanan Ankara Havzası Taşkın Yönetim Planı içinde yayınlanan Taşkın Tehlike Haritaları (Q500) benzeri taşkın olaylarının etkisini ortaya koymaktadır (Bkz. Taşkın tehlike haritası). Bu verilere dayanarak, Gölbaşı Düzlüğü her 500 yılda bir meydana gelen şiddetli taşkın riski altında olduğu hesaplanmaktadır. Bunlarla birlikte, Gölbaşı Düzlüğü gölcük ağı, fazla suyu bir süre tutma potansiyeline sahiptir ve zamanla fazla suyun doğal olarak drenajına imkan tanır.





Eymir Gölü'nün varlığı büyük ölçüde Mogan Gölü'nden ve Gölbaşı Düzlüğü gölcük ağından su teminine bağlıdır. Mogan Gölü'nden salınan su, regülatör kontrolünde Gölbaşı Düzlüğü gölcük ağına akmakta ve ardından Eymir Gölü'ne boşalmaktadır.Sukesen Deresi ve Mogan Gölü'nden gelen sular, Gölbaşı Düzlüğü'nün havzasını meydana getirmektedir. Eymir Gölü ise, Eymir Gölü'nün kendi havzasına ek olarak, Gölbaşı Düzlüğü gölcük ağından gelen sular ile beslenmektedir. Hidrolojik modelleme çalışmaları ile, Eymir Gölü'nde su mevcudiyeti ve kalitesi iki senaryo üzerinden değerlendirilmiştir.

İlk senaryo, Eymir Gölü'nün Mogan Gölü ve Gölbaşı Düzlüğü gölcük ağından su almadığı ve Eymir Gölü'nün İmrahor Vadisi'ne çıkışında bulunan regülatörden su verilmediğini varsaymaktadır. Bu senaryonun sonucu olarak, Eymir Gölü'nün tuzluluk oranı artmakta, gölde su seviyesi önemli ölçüde azalmakta ve hatta Eymir Gölü kurumaya yüz tutmaktadır. İkinci senaryoda ise, Mogan Gölü'nden Eymir Gölü'ne su verilmezken, Gölbaşı Düzlüğü'nden Eymir Gölü'ne doğal halinde ulaşan suyun sadece % 20'sinin ulaştığı ve Gölbaşı Düzlüğü'nden Eymir Gölü'ne ulaşan su miktarı kadar, Eymir Gölü'nün çıkışındaki regülatör kullanılarak İmrahor Nehri Vadisi'ne su bırakıldığı varsayılmıştır. Bu halde, Eymir Gölü'nün su seviyesi yine önemli ölçüde azalmıştır. Bu sonuçlara göre, Gölbaşı Düzlüğü'nün Eymir Gölü'nün varlığına dair rolü çok belirleyicidir.

HANDBOOK :

APPENDIX :

FOTOĞRAF KAYNAĞI

Gölbaşı Düzlüğü'nün geçmişten günümüze haritaları, s.5. © Özlem Uğurlu[1]
Sevgi Çiçeği (*Centaurea tchihatcheffii*), s.9. © Prof.Dr. Ahmet Karataş[2]
Dikkuyruk (*Oxyura leucocephala*), s.9. © Metin Cenkciler[3]
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Gölbaşı Düzlüğü Gölcük ağındaki bazı önemli türlerin fotoğraflarından oluşan kolaj ©Ankara Büyükşehir Belediyesi[7]
Mogan Gölü çevresindeki taşkınları gösteren fotoğraflar © Okan Çağrı Bozkurt

YAZARLARI

Başoğlu Acet D., Avcı F., Kıran H., Akpınar M. B., Dolcerocca A., Akyürek Z., Beklioğlu M.

2024

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Ponderful
PONDS FOR CLIMATE

URUGUAY

PONDSCAPES

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

Around 90% of wetland areas in South America are estimated to have been lost since 1900[1], and the estimation for Uruguay is at least 35 to 50%[2]. Furthermore, natural and artificial ponds are largely neglected in water- and nature-related national and regional policies.

WHY IS IT IMPORTANT TO CARE FOR AND MANAGE PONDS AND PONDSCAPES ?

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.

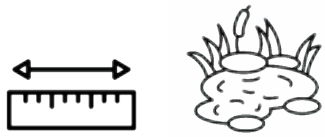
WATER MANAGEMENT

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

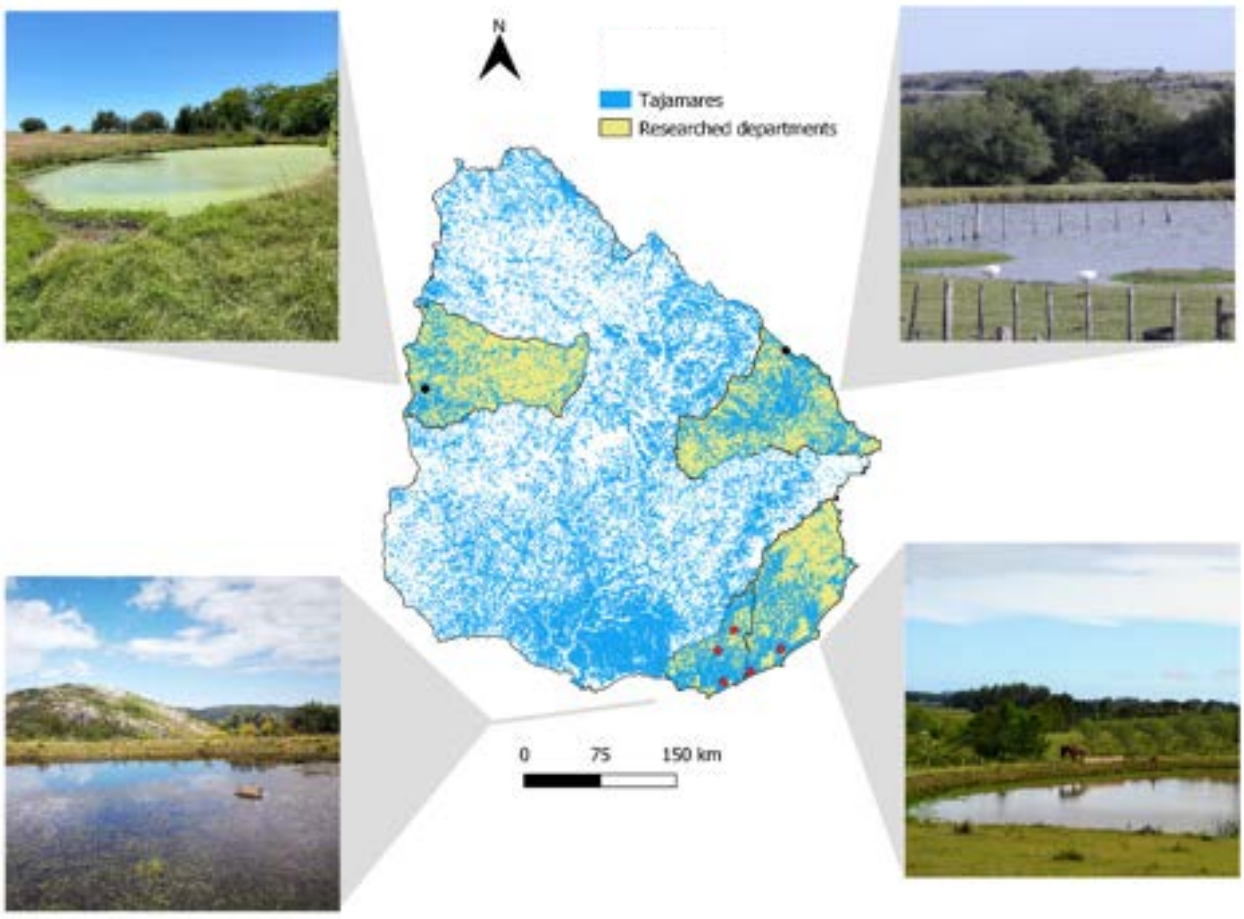
CONTEXT

This leaflet highlights results from research projects that focused on artificial ponds in Uruguay. In Uruguay, rural artificial ponds (tajamares) are primarily constructed to support cattle production and secondarily for the irrigation of crops or other purposes. A small proportion is built to enhance the economic value of land due to their aesthetic appeal. Their numbers have been increasing dramatically since the early 2000s, coinciding with the intensification of agricultural production. As of 2022, natural grasslands cover 65% of the country's territory, having decreased by 20% from 1985 to 2022[3]. Simultaneously, natural ponds and wetlands are disappearing due to the advance of agriculture and urbanization advance. Tajamares occur in watersheds with different land use intensities (e.g., intensive cattle production on seeded pastures versus extensive cattle production on natural grasslands). They are almost exclusively owned and managed privately; therefore, public accessibility is very limited. Studies on their environmental impact and potential contributions to biodiversity are extremely scarce and incipient.

Bioclimatic zone : Temperate grasslands, humid subtropical climate.
Dominant land use : Cattle grazing (on natural grassland or pastures) and agriculture



Tajamares : Over 170'000 « tajamares de aquada » (meant to water cattle) by 2021 (according to the national spatial information infrastructure - IDE)
Density : The densest region is Canelones with over 4 tajamares per km^2, and the least dense region is Rio Negro with 0.3 tajamares per km^2
Surface area : The most frequent surface area is between 90 m^2 and 0.5 ha, but «tajamares de aguada» can reach up to 4 ha.
Water column : Usually from 0.5 to 3m. (Technical guidelines from the Ministry of Agriculture, Cattle and Fisheries (MGAP) recommend water columns higher than 2m.)



Map of Uruguay showing the different departments where artificial ponds were studied for this leaflet. In red are the pondscapes studied by the Ponderful team at CURE, 5 pondscapes containing 6 tajamares each. In black, locations where tajamares were studied by a team at CENUR Litoral Norte.

LOCAL POLICIES

Construction of tajamares de aguada has been promoted for decades by different administrations, either through technical assistance or loans to farmers at the national and municipal levels. Due to their small area, tajamares do not require environmental authorization for construction. In principle, all tajamares, regardless of size, should be registered and built according to specific technical guidelines to secure water volume. However, this is rarely done due to associated costs, and fines are almost never applied. Management is not monitored, leaving it up to the farmers to implement measures they deem appropriate, including in those ponds constructed inside Protected Areas.

- As of 2021, there are more than **170,000 tajamares de aguada** country-wide[4]**.**

170'000

- Only 0.25% of "tajamares de aguada" are registered, mainly because of the high costs of hiring the technical staff needed and official documents required [4,5].

0.25%

- 12.2% of Uruguay's territory is classified as having maximum or high conservation priority, a lot of that area is condensed in the southeastern region[5].

12.2%

The last handbook for design and construction of "tajamares" is from 2012: this handbook produced by MGAP[6] has technical guidelines and focuses on production, with little consideration for environmental aspects.

REMAINING THREATS

1. The increase in eutrophication promotes biodiversity loss, deterioration of water quality, and impacts on productive and recreational uses. Additionally, it contributes to higher greenhouse gas emissions.

2. Toxic cyanobacterial blooms are common in high-intensity land use ponds, driven by nutrient inputs into the water (manure, fertilizers, and runoff from agrochemicals).

3. In high-intensity ponds, free-floating plants (water hyacinths, water lettuce, duckweeds, etc.) covering the water surface are also frequent. This prevents oxygen diffusion and leads to the death of many aquatic organisms.

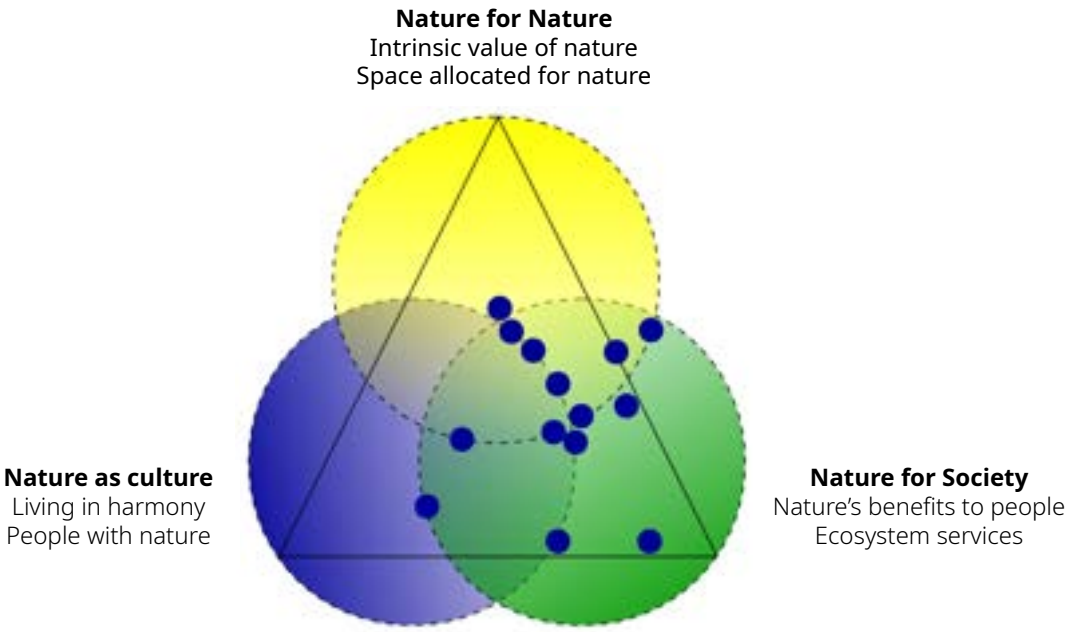
4. In different parts of the country, invasive exotic species originating from aquaculture activities have been found, such as the American bullfrog, common carp, and herbivorous carp. Although there are no wild records yet, there is a risk of the same happening with other cultivated species, such as Nile tilapia and Australian redclaw crayfish.

5. Other exotic species used in aquarism (like the African clawed frog) are also a threat to native biodiversity.

6. Some fish species, both exotic and native, have been intentionally introduced, ignoring the environmental damage caused. The absence of fish in some ponds is natural and promotes greater regional biodiversity.

7. Agrochemicals—pesticides, herbicides, and insecticides—are increasingly found in both water and aquatic biota. This leads to local biodiversity losses and abnormalities in some organisms.

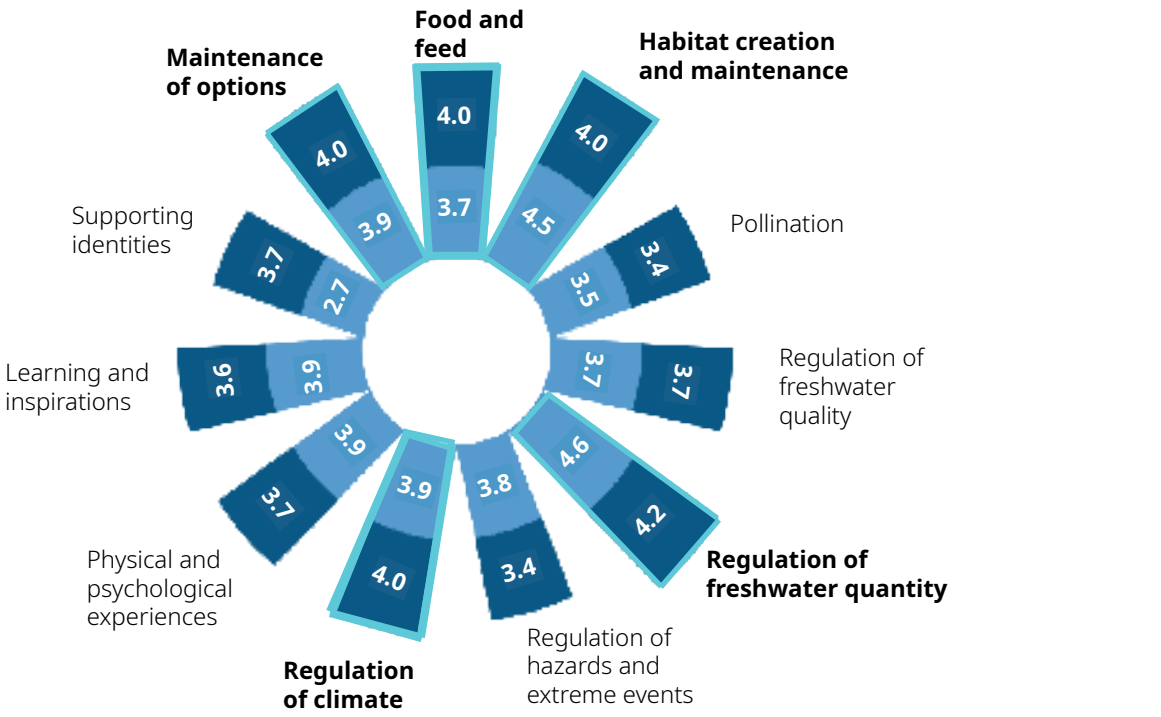
LOCAL COMMUNITY EXPECTATIONS



The Nature Futures Framework[7] proposed by IPBES shows three key value perspectives for ecosystems. Most stakeholders highlighted the role of Uruguayan tajamares as more valuable for society rather than for culture or for Nature itself (workshop held in December 2021).

The 11 Nature-contributions to people (NCPs) of tajamares

Scale : scores from 1 to 5



The expectations rely mainly on (i) Water quantity and quality, (ii) Habitat creation and maintenance and (iii) option maintenance and resilience besides the obvious food and feed. This survey has been conducted on two pondscapes : La Pedrera and Sierra de los Caracoles.

MAIN CHALLENGES FOR TAJAMARES

WATER MANAGEMENT

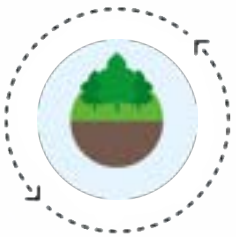
Management practices that enhance water quality and quantity, for instance creating a riparian buffer, fencing ponds to prevent direct cattle access, and removal of dense free-floating plants, are not always used and sanitary risks for cattle and native fauna are frequent.

ECONOMIC OPPORTUNITIES

Relatively high costs and lack of environmental concern are the main reasons tajamares are not ideally designed or managed. These costs are related to hiring professionals, making upgrades to the existing ponds and monitoring water quality.

PARTICIPATORY PLANNING & GOVERNANCE

Stakeholders highlight a lack of technical support and monitoring programs. A notable concern of farmers is the interruptions in state-supported programs for building and managing tajamares, with no resources allocated for monitoring their quality.



BIODIVERISTY ENHANCEMENT

If eutrophic and poorly managed, rural ponds can be detrimental to native biodiversity and generate environmental problems, like cyanobacterial blooms or the promotion of invasive species. Tajamares in grassland areas tend to have better water quality than those in pastures. Healthier and more heterogeneous ponds support a higher biodiversity and are safer for cattle, native fauna, and people

NATURE BASED SOLUTIONS (NBS)

ARTIFICIAL PONDS AND PONDSCAPE MANAGEMENT

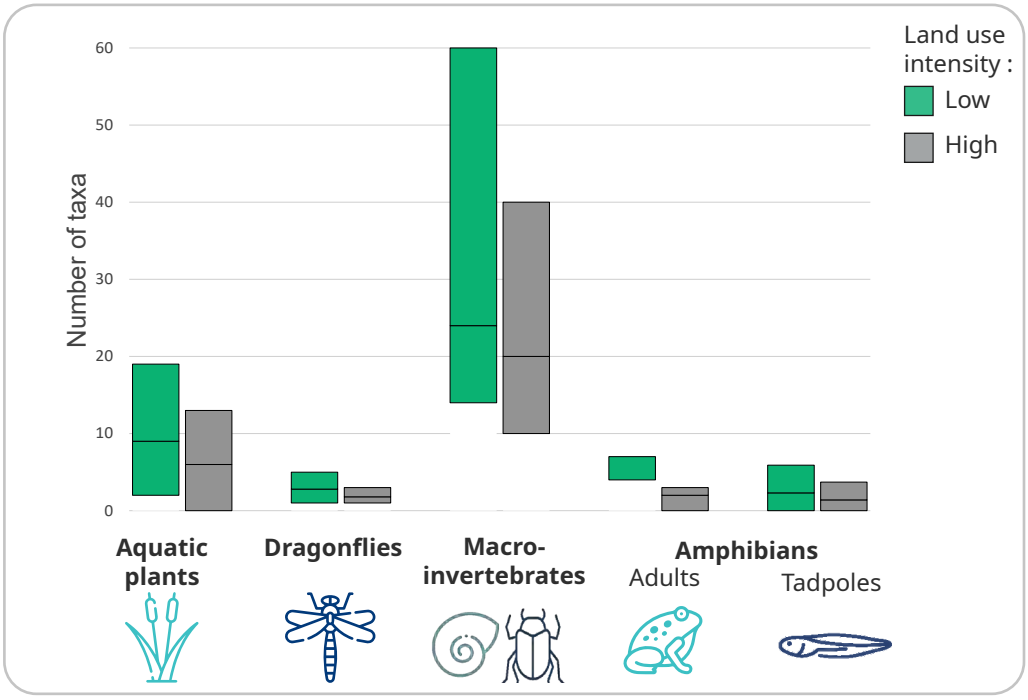
Rural pond creation rate changes depending on the regional land use, local water situation and funding efforts and support from goverment. Nature-based Solutions (NBS) are "actions to protect, sustainably manage, and restore natural and modified ecosystems that address societal challenges effectively and adaptively, simultaneously benefiting people and nature"[8]. Several NBS can be applied to face these challenges:

- Conservation of natural grasslands
- Reduction of the use of agrochemicals
- Fencing to prevent soil erosion and manure from livestock
- Implementing (or enlarging) the buffer area immediately surrounding the pond
- Management plans to control dense covers of free-floating plants
- Regular monitoring of physical, chemical and biological indicators

- Removal of introduced non-native fishes, amphibians, or plants
- Fencing and diverting water to external cattle drinking
- Restoration or creation of habitats by diverse native riparian vegetation
- Measures to provide connectivity for amphibian populations and other native fauna
- Landscape perspective for pond management, drainage, etc.

NATURE CONTRIBUTIONS TO PEOPLE AND MEASURED INDICATORS

AQUATIC BIODIVERSITY IN WATERY TAJAMARES



EXAMPLES OF NATIVE SPECIES :

Scinax squalirostris

Nymphoides humboldtiana

Potamogeton natans

Leptodactylus luctator

REGULATION OF FRESHWATER QUANTITY, LOCATION AND TIMING

100%

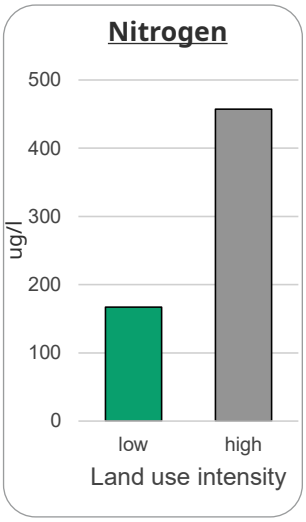
100% of tajamares are artificial, created with the purpose of holding freshwater. They are frequently created using tractor scrapers or excavators in low-lying areas, or by damming running waters like streams or ditches to

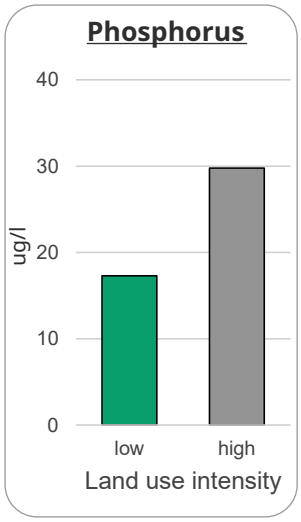
NATURE CONTRIBUTIONS TO PEOPLE AND MEASURED INDICATORS

FOOD AND FEED

All "tajamares de aguada" are created to give water to cattle, being livestock one of the main economic activities in the country.

100%





REGULATION OF FRESHWATER QUALITY

Studies carried out in different parts of the country found that most tajamares are eutrophic, meaning they have very high levels of nutrients and poor water quality. In some areas they are even hypereutrophic[9]. This could place a sanitary risk to cattle and humans, and might result in biodiversity loss, and a risk to other freshwater sources.

14 chemical compounds were found in the country's northern tajamares: 6 herbicides, 4 fungicides and 4 insecticides, some with levels above chronic toxicity. Compounds were found in both water and biota (macroinvertebrates and predatory fish).

HABITAT CREATION AND MAINTENANCE

If well managed, tajamares could be a habitat for threatened species.
Having a buffer of native plants at the margins of tajamares reduces their nutrient load, reduces soil erosion and creates habitat heterogeneity, generating an overall healthier system that can sustain higher biodiversity and better water quality.

REGULATION OF HAZARDS AND EXTREME EVENTS

Different public policies and practices promote the creation of tajamares as a measure of adaptation to climate change and climatic variability. Many farmers dredge tajamares during droughts, often without technical assistance.

COSTS AND BENEFITS ANALYSIS

OVERALL COSTS ASSESSMENT

$ $ $

BENEFITS ASSESSMENT

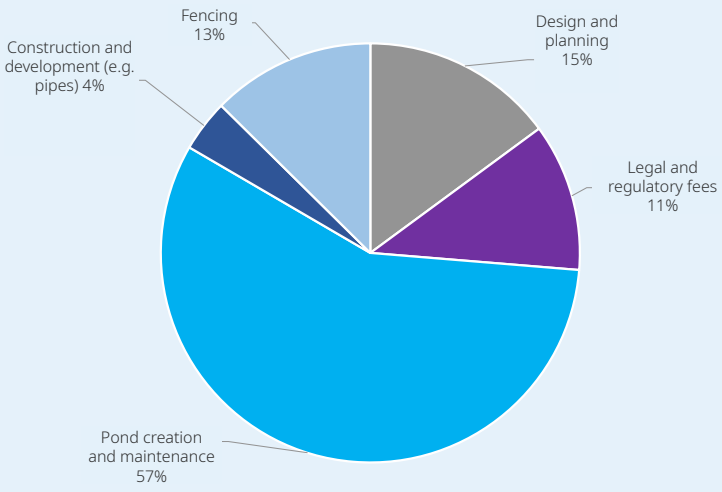
LOW INTENSITY LAND USE

- Water quality improvement
- Water source
- Flood management
- Habitat provision
- Erosion control
- Recreation and well-being
- Food and materials
- Conservation value

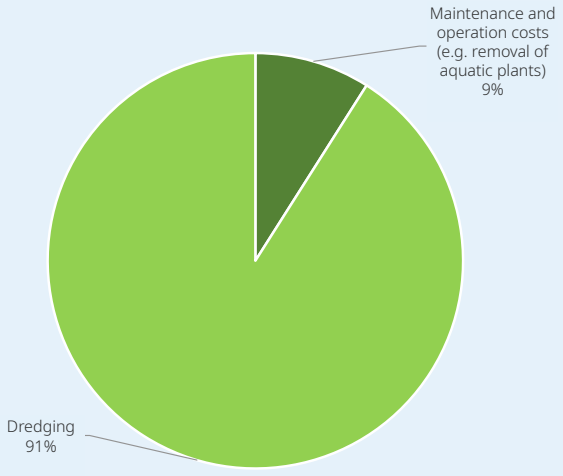
HIGH INTENSITY LAND USE

- Water quality improvement
- Water source
- Flood management
- Habitat provision
- Erosion control
- Recreation and well-being
- Food and materials
- Conservation value

SHARE OF COSTS FOR NBS ACTION



Relative cost of NbS creation measures



Relative cost of ongoing NbS management measures

SUITABLE FINANCE INSTRUMENTS TO REDUCE THE GAP

- 1. Sale of market goods and services
- 2. Public/private partnership
- 3. Tax concessions
- 4. (Green) loans
- 5. Commercial investing
- 6. Agricultural subsidies

= YES = MAYBE

SUCCESS STORY AND TRANSFERABILITY

REGENERATIVE LIVESTOCK FARMING IN LA PEDRERA

Family farmers have constructed tajamares since 2010 to mitigate the effects of climate variability and support cattle production while contributing to biodiversity. They have practiced regenerative livestock farming since 2019. They rotate the cattle to a different area at regular intervals, limiting their stay to allow for land regeneration and vegetation regrowth, and water quality recovery. The complete rotation takes around 100 days. Their goal is to mimic the natural movement of herbivore herds.

Some tajamares have no direct cattle access, while others have limited access due to electric fencing. They have observed big improvements, especially in diversity and abundance of macrophytes, waterfowl, and overall biodiversity.

LOW INTENSITY LAND USES PROMOTE HEALTHIER PONDS.

Ponds and pondscapes inserted in low land use intensity and with greater proportion of natural grasslands in their basins show higher water quality, lower risk of cyanobacterial blooms, higher aquatic biodiversity, and lower GHG emissions. At the local and landscape levels, low land use intensity areas can mitigate the negative effects of agricultural intensification on water quality and biodiversity. Local management of the ponds is also important, as a significant presence of riparian vegetation around tajamares reduces erosion and nutrient inputs, and at the same time contributes with new habitats for native fauna and flora.

Based on the scientific literature, managing ponds at different spatial and temporal scales can further promote biodiversity within the same productive unit and at the landscape level[10] (e.g., dredging some and not all ponds at the same time, and dredging only part of the individual ponds to avoid impact on the biota).

CONCLUSION

Tajamares could exert a positive or negative impact on the environment, depending on their design, construction, and management. Properly managed ponds have the potential to alleviate local biodiversity and wetland losses. Manuals for the design, construction and management of tajamares should incorporate environmental challenges and guidelines. Monitoring and management practices to safeguard water quality and biodiversity are increasingly needed in light of the growing challenges posed by eutrophication, climate variability and climate change.

HANDBOOK :

APPENDIX :

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PONDS FOR CLIMATE

URUGUAY

PAISAJE DE TAJAMARES

Pond Ecosystems for Resilient Future Landscapes in a Changing Climate

Este proyecto ha recibido fondos del programa de investigación e innovación Horizonte 2020 de la Unión Europea
No. 869296. En Uruguay, de CSIC I+D-2020-511, CSIC Grupos 2022-882442 y de ANII FCE-3-2020-1-162152.

¿QUÉ ES UN "PONDSCAPE" O PAISAJE DE TAJAMARES Y CHARCOS?

DEFINICIÓN

Un paisaje de tajamares es una red de tajamares cercanos espacialmente («conectividad») y su matriz paisajística circundante, incluyendo otros cuerpos de agua.

Los límites de un paisaje de tajamares pueden estar determinados por entornos físicos o ecológicos (un valle, una cuenca hidrográfica, un conjunto de tajamares y charcos en una reserva) o incluso por criterios sociales o políticos (tajamares urbanos, fronteras departamentales o nacionales).

PRESIONES/AMENAZAS SOBRE TAJAMARES, HUMEDALES, CHARCOS Y AGUADAS

Se estima que alrededor del 90% de los humedales de América del Sur se han perdido desde 1900[1], y la estimación para Uruguay es de al menos 35 al 50%[2]. Además, los cuerpos de agua pequeños naturales y artificiales (charcos y lagos naturales, aguadas y tajamares) no se incluyen claramente en las políticas y prácticas nacionales y regionales relacionadas con el agua y el ambiente.

¿POR QUÉ ES IMPORTANTE CUIDAR Y MANEJAR CORRECTAMENTE LOS TAJAMARES Y LOS PAISAJES DE TAJAMARES?

CONSERVACIÓN DE LA BIODIVERSIDAD

En gran medida descuidados, y generalmente no considerados desde un punto de vista ambiental, los tajamares pueden ser muy importantes para la conservación de la biodiversidad local y regional.

REDUCCIÓN DE RIESGO DE DESASTRES

Los tajamares y los paisajes de tajamares y otros cuerpos de agua desempeñan un papel fundamental en la mitigación de las inundaciones y también constituyen una reserva de agua para enfrentar incendios y sequías.

SALUD HUMANA

Los tajamares y paisajes de tajamares pueden proporcionar una amplia gama de beneficios adicionales para la sociedad, como apoyo a la calidad de vida, espacios para actividades físicas o la interacción social, pero también experiencias estéticas y actividades educativas y recreativas.

MITIGACIÓN Y ADAPTACIÓN AL CAMBIO CLIMÁTICO

Dada su abundancia y su elevada productividad, los tajamares influyen notablemente en el ciclo del carbono al actuar tanto como sumideros como fuentes de carbono hacia la atmósfera.

GESTIÓN DEL AGUA

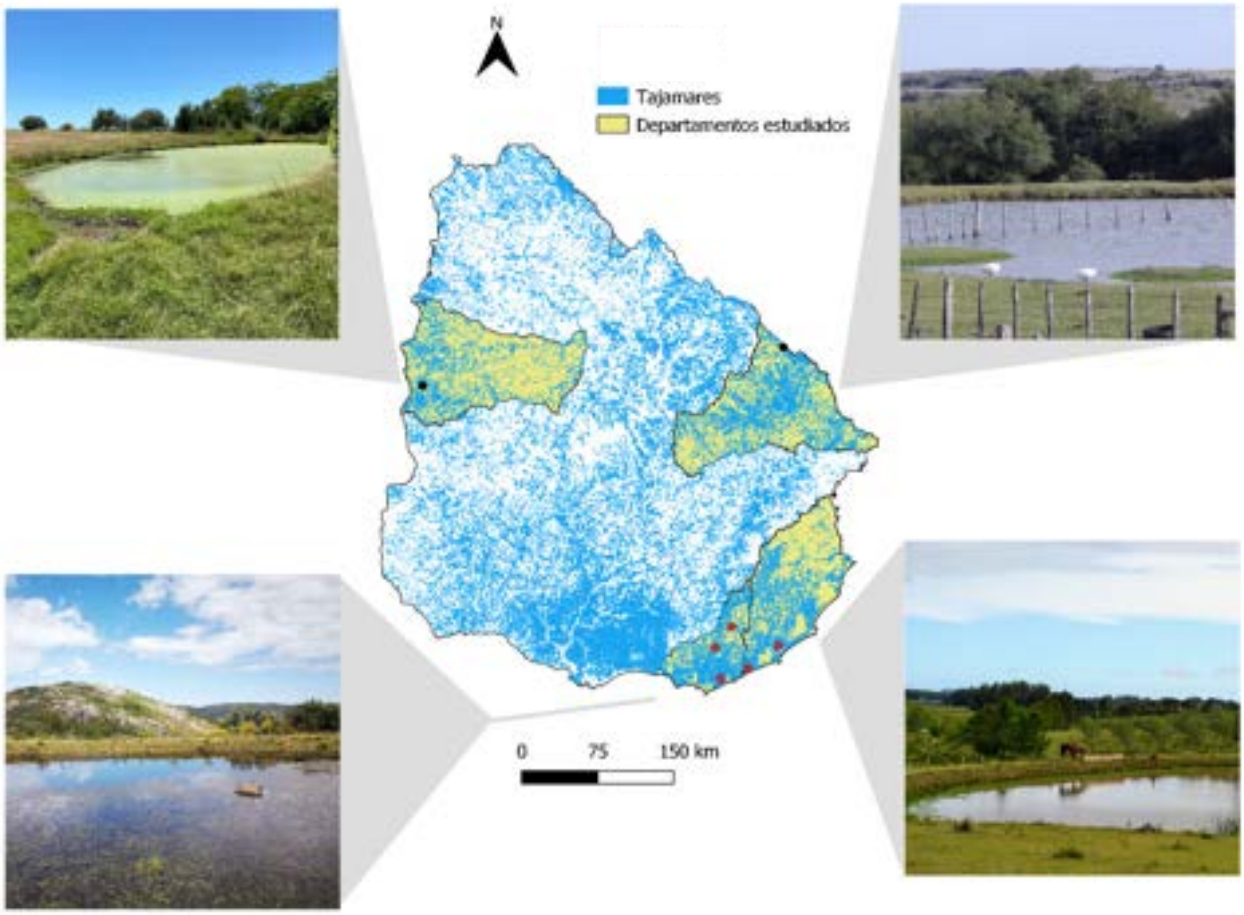
Los tajamares constituyen una reserva de agua importante en contextos de escasez. Son especialmente útiles para riego y brindar agua a animales, tanto domésticos como fauna nativa.

CONTEXTO

Este folleto destaca los resultados de proyectos de investigación centrados en estanques artificiales en Uruguay. En Uruguay, los tajamares (reservorios de agua en zonas rurales) son sistemas artificiales, construidos principalmente para apoyar la producción ganadera y en segundo lugar para el riego de cultivos. Una pequeña proporción se construye para aumentar el valor económico de la tierra, por razones estéticas. Su número ha aumentado drásticamente desde principios de la década de 2000, junto con la intensificación de la producción agropecuaria. Al mismo tiempo, los humedales, charcos y otros ecosistemas naturales están desapareciendo debido al avance de la agricultura y la urbanización. Al 2022, los pastizales o campo natural ocupaban el 65% del territorio del país, habiendo disminuido un 20% desde el año 1985 al 2022[3]. Los tajamares se sitúan en cuencas de distinta intensidad de uso del suelo (por ejemplo, ganadería intensiva sobre pastura sembrada frente a ganadería extensiva sobre campo natural). Su propiedad y gestión son casi exclusivamente privadas, por lo que el acceso público es muy limitado. Los estudios sobre su impacto ambiental y sus posibles aportes a la biodiversidad son muy escasos e incipientes.

Zona bioclimática : Pradera templada, clima subtropical húmedo.
Principales usos de la tierra : Pastoreo (en praderas y en campo natural) y agricultura.

Tajamares de aguada : Más de 170.000 (según Infraestructura de Datos Espaciales de Uruguay - IDE, 2021)
Densidad : El departamento más denso es Canelones, con más de 4 tajamares por km^2, y el menos denso es Río Negro, con 0,3 tajamares por km^2.
Superficies : Generalmente la superficie oscila entre 90 m^2 y 0,5 ha, pero los «tajamares de aguada» (destinados exclusivamente para abrevadero de ganado) pueden alcanzar hasta 4 ha.
Columna de agua : Generalmente entre 0,5 y 3 m. Técnicamente se recomienda que supere los 2m.



Mapa de Uruguay que muestra la densidad de tajamares y los diferentes departamentos donde se estudiaron tajamares para este folleto. En rojo, las zonas con tajamares estudiados por el equipo de Ponderful en el CURE, 5 “pondscapes” con 6 tajamares cada uno. En negro, las zonas donde se estudiaron tajamares por equipo del CENUR Litoral Norte.

POLÍTICAS LOCALES

La construcción de tajamares se ha promovido durante décadas por diferentes administraciones, mediante apoyo técnico, maquinaria, o a través de préstamos a los productores rurales a nivel nacional y municipal. Por su pequeño tamaño, los tajamares de aguada no requierenautorización ambiental para su construcción. En principio, todos los tajamares, independientemente de su tamaño, deberían construirse siguiendo ciertas directrices técnicas para garantizar el volumen de agua y registrarse. Esto rara vez se hace debido a los costos asociados y casi nunca se aplican multas. No se supervisa la gestión local, dejando en manos de los productores la aplicación de las medidas que consideren oportunas, inclusive en tajamares construidos dentro de Áreas Protegidas.

- Al 2021 hay más de **170.000 tajamares** en todo el país[4].

170.000

- Solo el 0,25% de los tajamares de aguada están registrados[4,5]**,** debido principalmente a los costos de contratación del personal técnico y la documentación necesaria.

0,25%

- El 12,2% del territorio uruguayo está clasificado como de máxima o alta prioridad de conservación, gran parte de esa superficie está en la región sureste[5].

12,2%

El manual para el diseño y construcción de tajamares de aguada, producido por el MGAP[6] en 2012, presenta lineamientos técnicos y se centra en la producción agropecuaria, con escasa consideración de aspectos ambientales

AMENAZAS CRECIENTES

1. El aumento de la eutrofización promueve pérdida de biodiversidad, deterioro de calidad del agua y afectación de usos productivos y recreativos. Y además, promueve mayores emisiones de gases de efecto invernadero.

2. Las floraciones de cianobacterias tóxicas son frecuentes en tajamares de alta intensidad de uso de suelo, impulsadas por aportes de nutrientes al agua (estiércol, fertilizantes y escorrentía de productos agroquímicos).

3. En tajamares de alta intensidad también son frecuentes las plantas flotantes libres (camalotes, repollitos o acordeón de agua) cubriendo el espejo de agua. Esto impide la difusión de oxígeno y provoca la muerte de muchos organismos acuáticos.

4. En distintas partes del país se han encontrado especies exóticas invasoras provenientes de actividades de acuicultura, como la rana toro, la carpa común y la carpa herbívora. Aunque aún no hay registros silvestres, existe el riesgo de que lo mismo ocurra con otras especies cultivadas, como la tilapia nilótica y la langosta australiana de pinzas rojas.

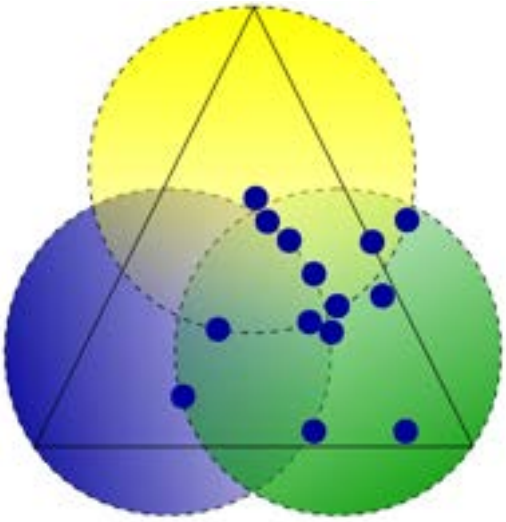
5. Otras especies exóticas, usadas en acuarismo (como la rana africana de uñas), también son peligrosas para la biodiversidad nativa.

6. Algunas especies de peces, tanto exóticas como nativas, han sido introducidas a propósito, ignorando el daño ambiental producido. La ausencia de peces en algunos tajamares es natural y promueve una mayor biodiversidad a nivel regional.

7. Agroquímicos: pesticidas, herbicidas e insecticidas, se encuentran cada vez más frecuentemente en el agua y también en la biota acuática. Esto genera pérdidas locales de biodiversidad y anomalías en algunos organismos.

EXPECTATIVAS DE LAS COMUNIDADES LOCALES

La naturaleza por la naturaleza
Valor intrínseco de la naturaleza
Espacio destinado a la naturaleza



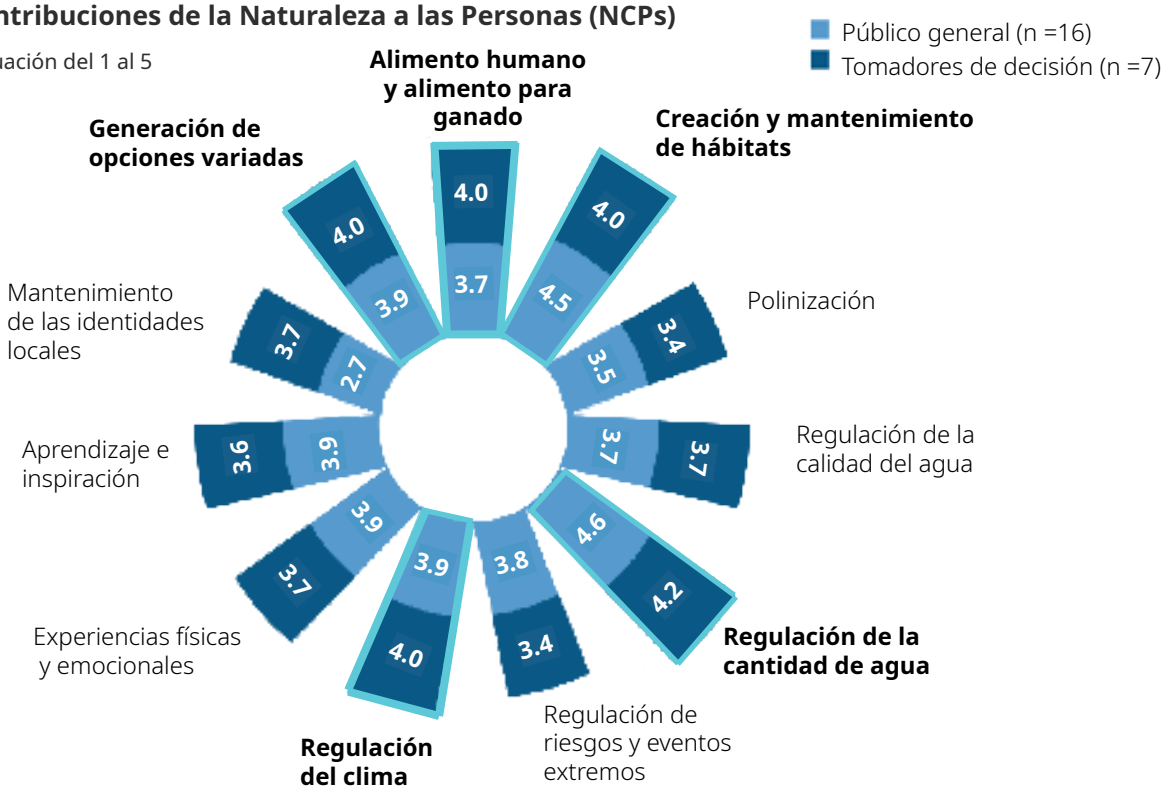
La naturaleza como cultura
Vivir en armonía
Personas y naturaleza

Naturaleza para la sociedad
Beneficios de la naturaleza
para las personas
Servicios de los ecosistemas

El Marco de Futuros de la Naturaleza[7], propuesto por IPBES, muestra tres perspectivas de valorización de los ecosistemas. La mayoría de los tomadores de decisión destacaron a los tajamares uruguayos como más valiosos para la sociedad que para la cultura o para la propia naturaleza (datos tomados de Taller Participativo en el CURE, diciembre de 2021).

Las 11 Contribuciones de la Naturaleza a las Personas (NCPs)

Escala: puntuación del 1 al 5



Las expectativas sobre las principales contribuciones de los tajamares se centran en: (i) la cantidad y la calidad del agua, (ii) la creación y el mantenimiento de hábitats, y (iii) el mantenimiento de opciones y resiliencia a nivel de paisaje, además de la provisión de alimento. Este estudio fue realizado con actores sociales para dos "pondscapes" (zonas con tajamares): La Pedrera (Rocha) y Sierra de los Caracoles (Maldonado).

PRINCIPALES DESAFÍOS PARA LOS TAJAMARES

GESTIÓN DEL AGUA

Las prácticas de manejo que pueden mejorar la cantidad y la calidad del agua (por ejemplo, la creación de una zona ribereña, el cercado para impedir el acceso directo del ganado y la remoción de cobertura de plantas flotantes), no siempre se utilizan y son frecuentes los riesgos sanitarios para el ganado y la fauna autóctona, así como el mal funcionamiento del tajamar como reservorio de agua.

OPORTUNIDADES ECONÓMICAS

Los costos altos y la falta de asesoramiento y de consciencia ambiental son la principal razón por la que los tajamares no se crean y gestionan de forma ideal. Estos costos están relacionados con la contratación de profesionales, la realización de ciertas mejoras en los tajamares existentes, y el monitoreo de la calidad del agua.

PLANEAMIENTO PARTICIPATIVO Y GOBERNANZA

Los tomadores de decisión destacan la escasez de apoyo técnico y la ausencia de programas de monitoreo. Los productores también destacan la falta de continuidad en los programas estatales de apoyo a la construcción y gestión de tajamares y de apoyo técnico para buenas prácticas.

CONSERVACIÓN DE LA BIODIVERSIDAD

Si son eutróficos y no están bien manejados, los tajamares pueden afectar negativamente a la biodiversidad nativa y generar problemas ambientales, como floraciones de cianobacterias o promover especies invasoras. Los tajamares en zonas con más campo natural suelen tener mejor calidad de agua. Los tajamares más sanos y heterogéneos (zona litoral variada, etc.) favorecen una mayor biodiversidad y son más seguros sanitariamente para el ganado, la fauna autóctona y las personas.

SOLUCIONES BASADAS EN LA NATURALEZA (SBN)

GESTIÓN DE PAISAJES DE TAJAMARES

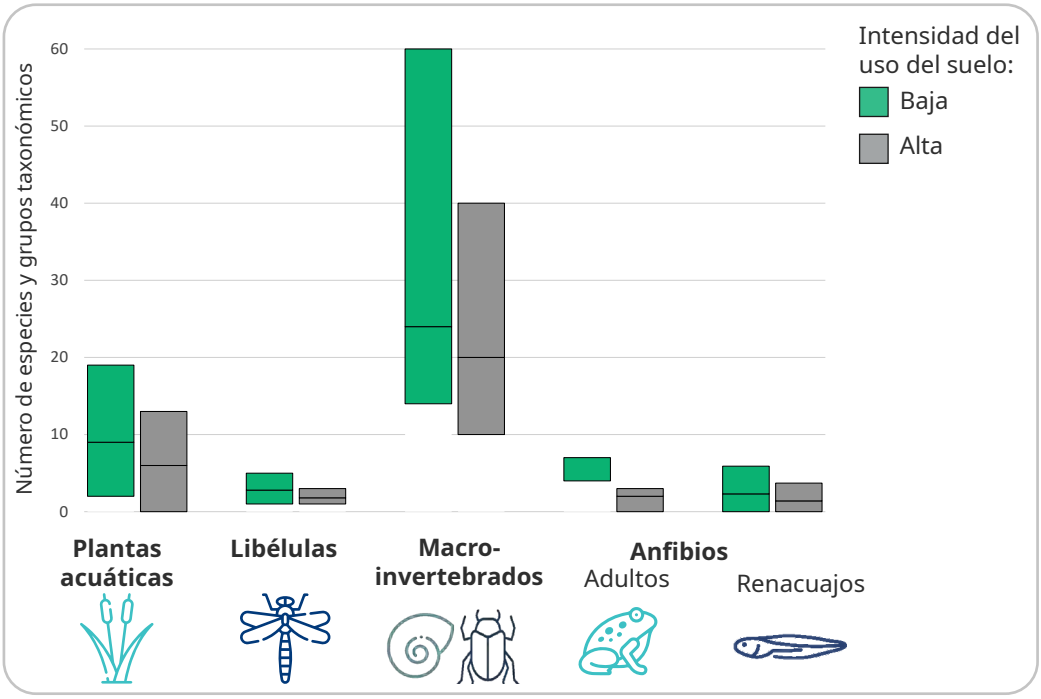
El ritmo de creación y el estado de tajamares varía en función del uso regional del suelo, la situación hídrica local y programas de financiación y apoyo de organismos del estado.
Las soluciones basadas en la naturaleza (SbN) son acciones para proteger, gestionar de manera sostenible y restaurar los ecosistemas naturales y artificiales que abordan de manera efectiva y adaptativa los desafíos de la sociedad, beneficiando simultáneamente a las personas y a la naturaleza[8]. Muchas SbN pueden aplicarse para enfrentar los desafíos de los tajamares:

- Conservación del campo natural en las cuencas
- Reducción del uso de agroquímicos
- Cercado para evitar el pisoteo y estiércol del ganado
- Implantación y mantenimiento de zona buffer en gran parte del perímetro del tajamar
- Plan de gestión para controlar el desarrollo denso de plantas flotantes
- Control periódico de indicadores físicos, químicos y biológicos del agua

- Remoción de peces, anfibios o plantas no autóctonos invasores
- Cercado y desvío del agua para el ganado
- Creación o restauración de hábitats con vegetación riparia autóctona y variada (arbustos, chircales, caraguatales)
- Promoción de conectividad para poblaciones de anfibios y otros animales nativos
- Perspectiva a nivel de paisaje para la gestión y manejo de tajamares

CONTRIBUCIONES DE LA NATURALEZA A LAS PERSONAS E INDICADORES MEDIDOS

BIODIVERSIDAD ACUÁTICA EN TAJAMARES DE AGUADA



EJEMPLOS DE ESPECIES NATIVAS:

Scinax squalirostris

Nymphoides humboldtiana

Potamogeton natans

Leptodactylus luctator

REGULACIÓN DE LA CANTIDAD DE AGUA DULCE, SU UBICACIÓN Y EL MOMENTO EN QUE SE CONSUME

100%

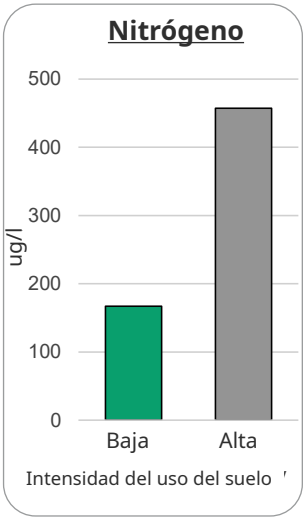
100% de los tajamares son artificiales, creados con el fin de acopiar agua dulce para distintos propósitos. Usualmente se construyen utilizando traillas agrícolas y excavadoras en partes bajas del terreno o represando fuentes de agua corriente para retener el agua por más tiempo.

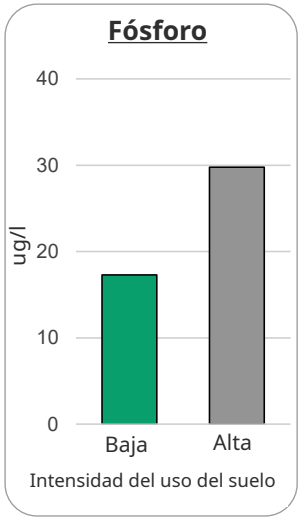
CONTRIBUCIONES DE LA NATURALEZA A LAS PERSONAS E INDICADORES MEDIDOS

ALIMENTACIÓN HUMANA Y ANIMAL

Los "tajamares de aguada" se crean para dar agua al ganado, siendo la ganadería una de las principales actividades económicas del país.

100%





REGULACIÓN DE LA CALIDAD DEL AGUA DULCE

La mayoría de los tajamares de aguada son eutróficos, lo que significa que tienen niveles muy altos de nutrientes y una mala calidad del agua. En algunas zonas de muy alta intensidad productiva incluso son hipereutróficos[9]. Esto representa un riesgo sanitario para el ganado y los seres humanos, así como genera pérdida de biodiversidad y un riesgo para otras fuentes de agua dulce cercanas.

14 compuestos agroquímicos se encontraron en tajamares del norte del país:
6 herbicidas, 4 fungicidas y 4 insecticidas, algunos con niveles superiores a la toxicidad crónica. Se encontraron tanto en el agua como en la biota (macroinvertebrados y peces carnívoros).

CREACIÓN Y MANTENIMIENTO DE HÁBITATS

Bien gestionados, los tajamares podrían ser el hábitat de especies amenazadas.
Una zona litoral con plantas autóctonas en el perímetro de los tajamares reduce la carga de nutrientes que llega al agua, disminuye la erosión y crea heterogeneidad de hábitats; generando un ecosistema más sano que puede mantener mayor biodiversidad y mejor calidad del agua.

REGULACIÓN DE RIESGOS Y EVENTOS EXTREMOS

El Estado, a través de distintas políticas y prácticas, promueve la creación de tajamares como medida de adaptación al cambio climático y a la variabilidad climática. Muchos productores profundizan los tajamares durante sequías, generalmente sin asesoramiento técnico.

ANÁLISIS DE COSTOS Y BENEFICIOS

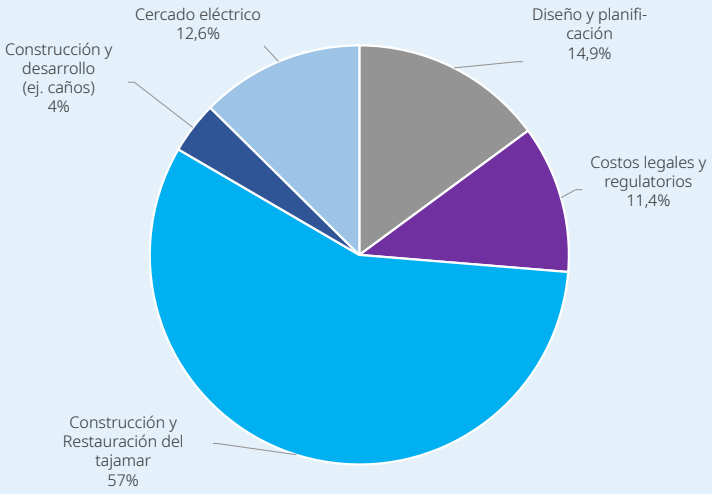
EVALUACIÓN DE COSTOS GENERALES

$ $ $

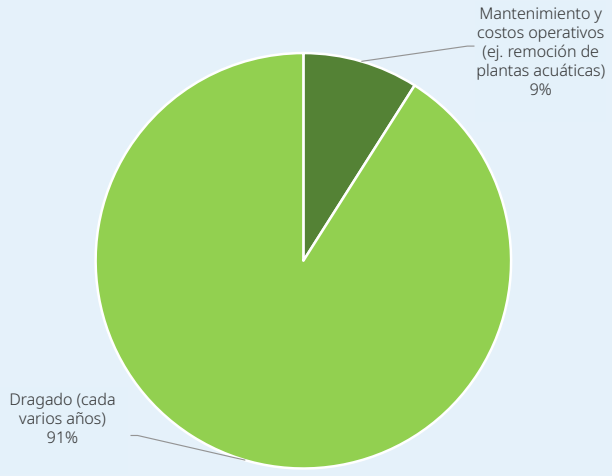
EVALUACIÓN DE BENEFICIOS SEGÚN INTENSIDAD DE USO DEL SUELO (I.U.S.)

BAJA (I.U.S)	ALTA (I.U.S)
Mejora de la calidad del agua	Mejora de la calidad del agua
Fuente de agua	Fuente de agua
Control de inundaciones	Control de inundaciones
Provisión de hábitats	Provisión de hábitats
Control de la erosión	Control de la erosión
Recreación y bienestar	Recreación y bienestar
Alimento y materiales	Alimento y materiales
Valor de conservación	Valor de conservación

PROPORCIÓN DE COSTOS DE LAS SBN



Costos relativos para realizar tajamares como SbN



Costos operativos relativos en la actualidad

POSIBLES INSTRUMENTOS FINANCIEROS PARA REDUCIR LA BRECHA DE FINANCIACIÓN:

- ☐ 1. Venta de bienes y servicios
- ☑ 2. Asociación público-privada
- ☐ 3. Exoneración de impuestos
- ☐ 4. Préstamos "verdes"
- ☐ 5. Inversiones comerciales
- ☑ 6. Subvenciones al sector agropecuario

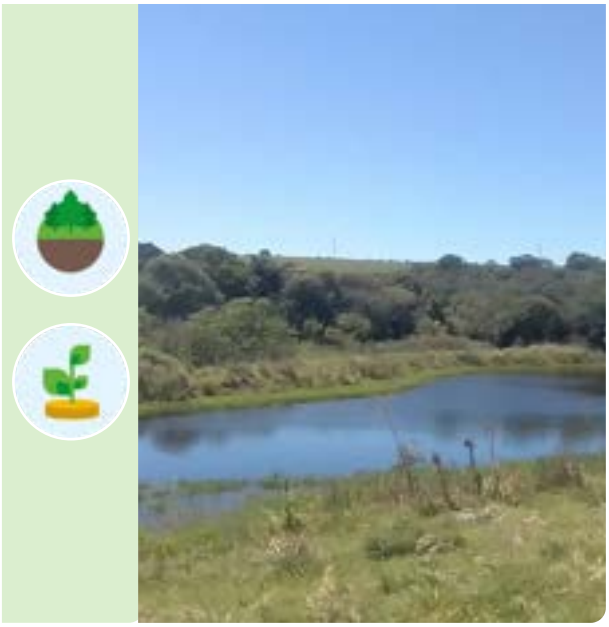
☑ = SÍ ☐ = TAL VEZ

HISTORIAS DE ÉXITO E INSPIRACIÓN

GANADERÍA REGENERATIVA EN LA PEDRERA (ROCHA)

Productores familiares han construido tajamares desde 2010 para mitigar los efectos de la variabilidad climática y poder apoyar la producción ganadera así como contribuir a la biodiversidad. Comenzaron con ganadería regenerativa en 2019. Rotan el ganado a una zona distinta cada cierto tiempo, para limitar su permanencia y permitir la regeneración de la tierra, la vegetación y la recuperación de la calidad del agua. La rotación completa se hace en unos 100 días.

Su objetivo es imitar el movimiento natural de los rebaños de herbívoros. Algunos tajamares no tienen acceso directo del ganado, y otros tienen acceso limitado debido al cercado eléctrico. Han observado grandes mejoras principalmente en la diversidad y abundancia de la vegetación acuática, las aves acuáticas y la biodiversidad en general.



LOS USOS DEL SUELO DE BAJA INTENSIDAD FAVORECEN LA SALUD DE LOS TAJAMARES

Los tajamares y paisajes de tajamares insertos en zonas de baja intensidad de uso de suelo y con mayor proporción de campo natural tienen mejor calidad del agua, menor riesgo de floraciones de cianobacterias tóxicas, mayor biodiversidad acuática y menores emisiones de gases de efecto invernadero. A nivel local y a nivel de una zona o paisaje, áreas con baja intensidad de uso del suelo pueden mitigar los efectos negativos de la intensificación agropecuaria sobre la calidad del agua y la biodiversidad. La gestión local también es importante, ya que la presencia de vegetación riparia diversa cubriendo gran parte del perímetro de los tajamares, reduce la erosión y el ingreso de nutrientes y, al mismo tiempo, contribuye con nuevos hábitats para la fauna y la flora autóctonas.

En base a la literatura científica, la gestión de los tajamares a diferentes escalas espaciales y temporales puede promover aún más la biodiversidad dentro de la misma unidad productiva y a nivel de paisaje[10] (por ejemplo, dragando algunos tajamares y no todos al mismo tiempo, y dragando sólo parte de los tajamares individuales para evitar la desaparición de la biota y su banco de semillas).

CONCLUSIONES

Los tajamares pueden tener un impacto positivo o negativo en el ambiente dependiendo de cómo se diseñen, construyan y gestionen. Los tajamares bien gestionados podrían mitigar las pérdidas locales de biodiversidad y de humedales y charcos naturales. Deberían incorporarse las preocupaciones y lineamientos ambientales en los manuales de diseño, construcción y gestión de tajamares. El seguimiento (monitoreo) y la gestión para proteger la calidad del agua y la biodiversidad son cada vez más importantes, dados los crecientes desafíos vinculados a la eutrofización, y a la variabilidad y el cambio climáticos.

HANDBOOK :

APPENDIX :

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UNIVERSIDAD DE LA REPÚBLICA URUGUAY

ANII AGENCIA NACIONAL DE INVESTIGACIÓN E INNOVACIÓN

CSIC COMISIÓN SECTORIAL DE INVESTIGACIÓN CIENTÍFICA

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ANNEX -
APPENDIX TO THE PONDSCAPE LEAFLETS (PONDERFUL DEMO-SITES)

Appendix to the pondscape leaflets (PONDERFUL DEMO-sites)

In the framework of the project PONDERFUL, a synthetic "leaflet" has been developed for each of the pondscapes making part of DEMO-sites implemented across Europe, Turkey and Uruguay. The main objective of the leaflets is to present a selection of science-based success stories in the implementation of pondscapes as Nature-based Solutions (NbS) for addressing societal challenges (such as climate change and biodiversity loss), and to promote the transferability of these practices elsewhere. The success stories are evidenced in this leaflet by the measurement of indicators of the Nature Contribution to People, and by a cost-benefit analysis.

The leaflets were written and designed to interest and inspire professionals in land use planning and management of natural areas, people active in NGOs, and also for a wider and more varied public.

The information provided in the leaflet is intentionally simplified to avoid excessive jargon and scientific complexity and to remain accessible and understandable to a broad audience.

This appendix explains the vocabulary and gives some guidance on the different headings.

List of content

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

Cover page

The country and the local name of the pondscape are provided on the cover page. Three pictures illustrate the pondscape.

"What is a pondscape?"

Section "*Why is it important to promote them?* "

The logos represent the main societal challenges potentially addressed by the pondscapes.
For more information, see Cuenca-Cambronero et al. (2023).

The Societal challenges

The 2017 EKLIPSE Expert Working Group impact evaluation framework report (Raymond et al., 2017) identified ten challenge areas related to climate resilience in urban areas. The NbS assessment Handbook (Dumitru et al. 2021; Cardinali et al. 2021) expands these original ten challenge areas to twelve separate societal challenge areas that can potentially be addressed by NbS:

Number	Societal challenges
1	Climate Resilience
2	Water Management
3	Natural and Climate Hazards
4	Green Space Management
5	Biodiversity Enhancement
6	Air Quality
7	Place Regeneration
8	Knowledge and Social Capacity Building for Sustainable Urban Transformation
9	Participatory Planning and Governance
10	Social Justice and Social Cohesion
11	Health and Wellbeing
12	New Economic Opportunities and Green Jobs

The icons used in the leaflets follow the propositions made by IUCN (2020) for representation of the major societal challenges (number in parenthesis):

Climate change mitigation and adaptation (1) | Disaster risk reduction (3) | Economic and Social Development (8, 10, 12) | Human health (11) | Food security | Water security (2) | Environmental degradation and biodiversity loss (5)

"Context"

Background information of each pondscape is presented here, such as localisation, geographical context and the main characteristics.

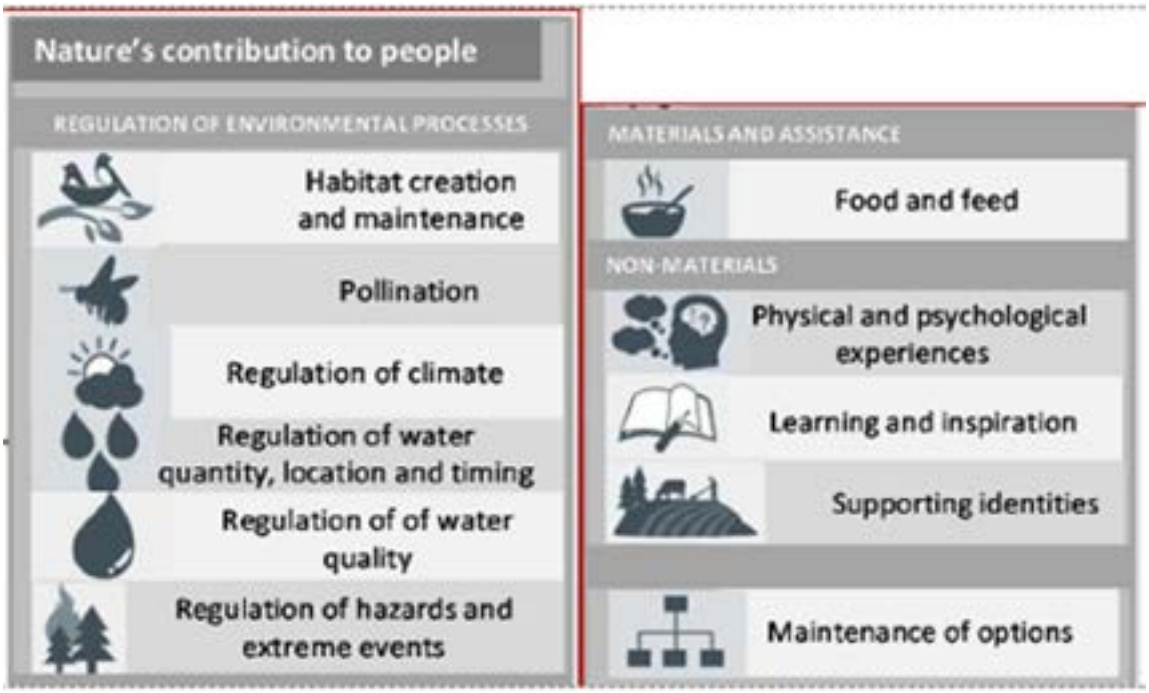
"Local community expectation"

The figure presented in this section shows how the stakeholders from the pondscapes and the public scored (from 1 to 5) different NCPs in relation to their importance in the pondscape area. These patterns are based on the results gathered by an inquiry conducted in the framework of PONDERFUL (WP1).

Nature's Contributions to People (NCP)

Nature-based Solutions are measures, inspired and supported by nature, implemented to deliver outcomes that we desire. The expected outcomes are the Nature's Contributions to People (NCP). NCP are all the contributions, both positive and negative, of living nature to people's quality of life. They may be perceived as benefits or disbenefits depending on the cultural, socioeconomic, temporal, or spatial context. This notion considers the socio-cultural dimension, through the identification of all links between society and nature, and therefore allows us to assess the impact of pondscapes on human activities.

Diaz et al. (2018) proposed 18 different types of NCPs. All NCP are not necessarily fully relevant to ponds and pondscapes, and are not expected as main outcomes from the NbS investigated in the framework of PONDERFUL. During the development of the project PONDERFUL (2018-2019), the list of 18 types of NCPs was therefore filtered according to their relevance for pondscape, and conducted to a shorter list of 11 NCPs:



"Local policies"

Whether NbS, and more specifically ponds and pondscapes as NbS, come to fruition often depends on the policy context and generally political environment. This describes the legal regulations, the strategic planning documents, and the everyday practices. In PONDERFUL, specifically, we identified seven categories of barriers and enabling factors that define hinder or facilitate the implementation of ponds and pondscapes as NbS:

Category	Description
Goals, Objectives, and Targets	*This category describes the overarching policy statements that provide guidance for action and set the general direction in which a society or system shall be developed.*
Legislation and Regulations	*In PONDERFUL, this category encompasses first and foremost the legal protections for ecosystems, land tenure and associated rights and duties of landowners, zoning policies, as well as other legal classifications of ponds that may impact their state or their potential to be employed as NbS.*
Management Approaches and Tools	*This category describes both the larger planning capacities and focus of policy-makers, as well as the day-to-day ability of managers to monitor the state of ponds and surveil the compliance of key actors with the practices permitted by law.*
Institutional Capacities and Cooperation	*This category focuses, on the one hand, on the human resources and expertise of institutions involved or (potentially) responsible for pond and pondscape NbS. On the other hand, it also describes their ability to cooperate across governance sectors and levels with each other, alongside with their rapport with key actors on the ground.*
Knowledge Production and Dissemination	*Under this category falls the research to understand the benefits of pond and pondscape NbS as well as efforts to disseminate the knowledge gained.*
Stakeholder Awareness and Engagement	*This category includes the awareness of stakeholders of benefits of pond and pondscape NbS. It also describes the engagement processes that stakeholders can participate in to influence the implementation of pond and pondscape NbS.*

While it is very context-dependent which category of barriers and enabling factors is most relevant or prevalent in each pondscape, it is important to underline that these barriers and enabling factors rarely work in isolation from each other. Rather they often interlink and interact with each other, so that improving on one category can have positive side effects on another. That means, for example, if an area is protected through a statutory designation, it usually comes with more access to financing as well.

"Main challenges and objectives"

The main societal challenges are those identified by the authors of the leaflet (taking into account stakeholders advice) as the ones that could be addressed through the implementation of the NbS in this pondscape.

The potential challenges to take into consideration have been presented in the page 2 of the leaflet (section "*What is a pondscape*?").

"Nature-based Solutions" (NbS)

NbS are defined by the International Union for the Conservation of Nature (IUCN) as: "*Actions to protect, sustainably manage, and restore natural or modified ecosystems that address societal challenges, such as climate change, effectively and adaptively, simultaneously providing human well-being and biodiversity benefits*" (IUCN, 2020).

Because of their role in supporting biodiversity and delivering crucial NCPs to people, ponds and pondscape constitute NbS that are particularly important for climate change adaptation and mitigation.

The NbS taken into consideration and presented in the leaflets comply with the approach presented by IUCN (2020), and adhere to the presented indicators and criteria.

NbS: broad type and description
1. Pond creation ● Creating a pond in a site where there was formerly no waterbody
2. Pond restoration ● Creating or restoring a pond in a site where formerly a pond was existing, e.g. excavating a pond that had been filled in ● Significant alterations to an existing pond, e.g. depth, morphometry, slopes, shoreline design, flora or fauna
3. Pond infrastructure and management actions *= on-site infrastructure and management actions that are needed to ensure the good functioning of an individual pond.* **On-site infrastructure measures *(acting on areas immediately surrounding pond)*:** ● Access restrictions, e.g. fencing to prevent access by livestock, dogs, or visitors - or removing fencing to allow livestock access ● Development of trails or wildlife observatories ● Management of riparian vegetation and wetland plants ● Removing invasive alien plant species ● Implementing (or enlarging) the buffer area immediately surrounding the pond ● Creation of terrestrial habitats in the vicinity of the pond (e.g. for reptiles or amphibians) ● Removing hard infrastructure (e.g. concrete edge) ● … **Pond management measures *(actions within pond)*:** ● Removing invasive alien plant and animal species ● Removing of all fish ● Reintroducing or protecting threatened plant and animal species ● Pond water management, e.g. manage input, output (e.g. sluice repair or adjustments, lining), drying rate ● Routine management measures in relation with the pond design and depth (e.g. slight re-profiling of banks, removal of sediments, creation or removal of an island, scraping edges to maintain populations of pioneer species) ● Mowing and removal of submerged, floating or emergent plants ● Regular monitoring of physical, chemical or biological indicators ● Planting or introducing structured vegetation into ponds (e.g. planted coil rolls) ● Shade management (e.g. a few trees or large % of cover) ● Part-desilt ● ….
4. Pondscape scale land use and management actions *= on-site land-use actions that are needed to ensure the good functioning of a pondscape (ponds and landscape)* ● Placing the pondscape (or a part of the pondscape) under protective status (e.g. protected areas regulations) ● Changing land use in the pondscape and in the area surrounding the pondscape (e.g. convert arable land or intensive livestock grazing area to extensive grassland; decrease impervious surfaces e.g. asphalt in neighboring areas). ● Enhancing the connectivity between ponds or pondscapes. This involves the creation of terrestrial or aquatic corridors, removing obstacles, or active transport of propagules. - Specific pondscape management measures, depending on landscape (within and surrounding the pondscape): - In agricultural land, other pondscape related management measures: 1) Soil Management (e.g. Allow field drainage systems to deteriorate or reinstate/increase infiltration to decrease sediment load), 2) Livestock Management (e.g. Reduce the length of the grazing day or grazing season), 3) Fertiliser Management (e.g. Reduce fertiliser application rates), 4) Manure Management (e.g. change from slurry to a solid manure handling system) and 5) Farm infrastructure (e.g. Fence off pondscape from livestock) - In urban land, 1) Manage water quality (e.g. inputs of nutrient, salt, other pollutants); 2) Increase good quality terrestrial habitats in neighbouring areas (e.g. other green/blue spaces); 3) Promote natural hydroperiods, 4) Encourage water harvesting from buildings (rainwater) - …. ● **…**

"Nature contributions to people and measured indicators"

In this leaflet we use the "Nature Contribution to People" (NCP) framework in our evaluation of different benefits ponds and pondscape provide to people (see more development in the section "*local community expectation*" of this appendix).
The NCPs have been measured on each pondscape with the objective of describing them. As much as possible, the methodologies tried to be the same for all leaflets, and therefore a common framework was proposed to the teams prior to the investigations. This framework has been set out in the form of a protocol ("*Protocol for assessing DEMO-sites*"). It presented a methodology with an associated list of parameters and indicators. In some situations, when for example the resources were insufficient, the measurement of the NCP has been conducted independently of the protocol, also taking advantage of information already available.

As the total number of ponds was generally high in each pondscape, the measures have been targeted on a subset of ponds, representative of the pondscapes. When necessary an upscaling of the results has been done to present a trend representative of the whole pondscape (e.g. for water quantity and quality, or carbon flow).

The detailed data of all the measurements (including also measures that are not presented in the leaflet) are stored in the Information System of PONDERFUL.

- Aquatic biodiversity.
    - Most information taken into consideration has been gathered in the framework of PONDERFUL (particularly through inventories conducted in the framework of WP2), but other information has also been considered (e.g. NGO bird or amphibian inventories).
    - The plant species richness covered only aquatic species, including the Charophytes.
    - Conservation priority species: species classified as VU, EN, CR on national red lists.

"Costs and Benefits analysis"

The objective of the economic evaluation in PONDERFUL is to understand what benefits ponds and pondscapes deliver to humans, and what the associated costs are.

Information on costs and benefits is important for decision makers (such as farmers, companies, policy makers, financiers) who are considering restoring ponds, creating new ponds, or changing the management of their existing ponds.

The analysis helps them to understand the reasons behind ponds' implementation: (i) understanding the societal challenges addressed by the pondscapes (European Commission, 2021), (ii) identifying the total and different types of benefits of different ponds (including biodiversity, climate mitigation/adaptation, water quality, human and animal health), and (iii) assessing how much pondscapes ultimately cost. Types of costs include 1) one-off costs, including upfront planning and construction and development costs, as well as 2) ongoing costs, such as maintenance and operation costs.

To ensure implementation and the long-term sustainability of the pondscape, costs must be covered by financing. PONDERFUL pondscapes specific project contexts are used to identify financing instruments for their project following the range of options identified in the PONDERFUL Sustainable Finance Inventory.

"Remaining threat"

This section presents a selection of remaining threats. It is not exhaustive, as it was not the aim of this leaflet to cover this topic in detail.

"Success story and transferability"

For each pondscape, a selection of success stories is presented, evidencing how the implementation of NbS delivered benefits for biodiversity and for human well-being.

The choice of success stories was realized with an objective of transferability, through the presentation of successful NBS that can be implemented elsewhere and in other contexts (other landscapes, other countries).

All success stories have been proposed by the authors of each leaflet, and have been later discussed with a PONDERFUL expert panel. This panel was composed of six members of the PONDERFUL consortium: Mireia Bartrons (University of Vic, Spain), Beat Oertli (University of Applied Sciences and Arts Western Switzerland), Manuel Lago (Ecologic Institut gemeinnützige GmbH, Germany), Joël Robin (Institut Supérieur d'Agriculture Rhône-Alpes, France), Pascale Nicolet (Freshwater Habitat Trust, UK) and Marzenna Rasmussen (Amphi International APS, Danemark).

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