

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 pondscales 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 pondscales 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.

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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 pondsapes. 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.

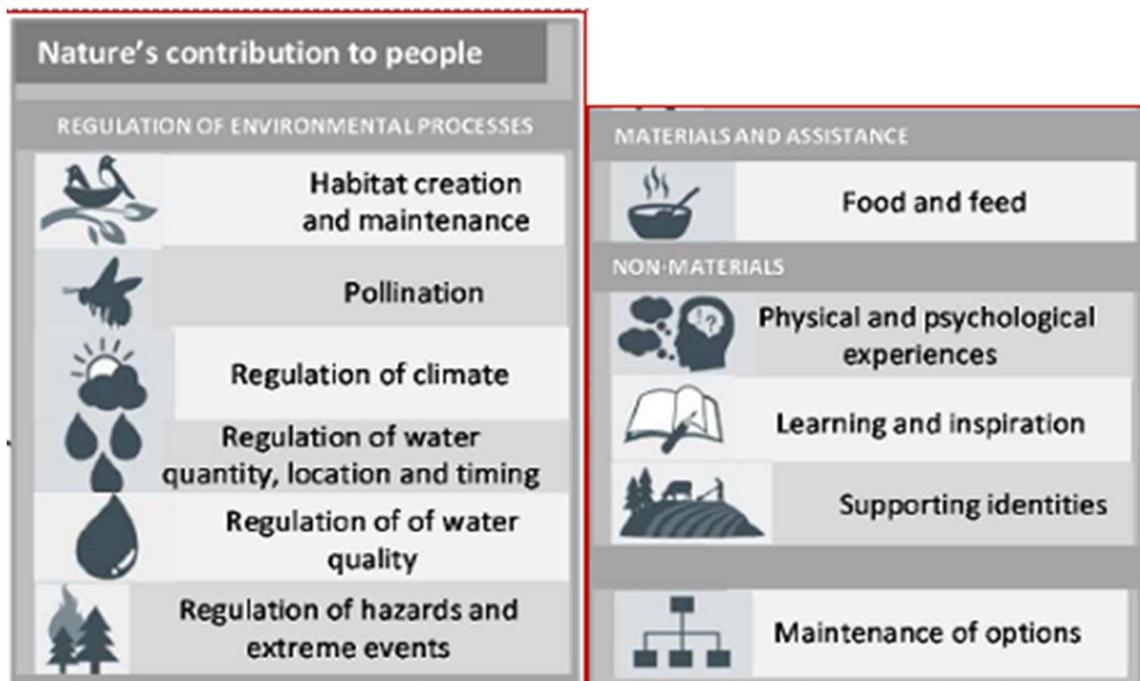
“Local community expectation”

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 pondscape 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 pondscape as NbS:

Category	Description
Goals, Objectives, and Targets	<i>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.</i>
Legislation and Regulations	<i>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.</i>
Management Approaches and Tools	<i>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.</i>
Institutional Capacities and Cooperation	<i>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.</i>
Knowledge Production and Dissemination	<i>Under this category falls the research to understand the benefits of pond and pondscape NbS as well as efforts to disseminate the knowledge gained.</i>
Stakeholder Awareness and Engagement	<i>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.</i>

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
<p>1. Pond creation</p> <ul style="list-style-type: none"> ● Creating a pond in a site where there was formerly no waterbody
<p>2. Pond restoration</p> <ul style="list-style-type: none"> ● 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
<p>3. Pond infrastructure and management actions = on-site infrastructure and management actions that are needed to ensure the good functioning of an individual pond.</p> <p>On-site infrastructure measures (acting on areas immediately surrounding pond):</p> <ul style="list-style-type: none"> ● 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) ● ... <p>Pond management measures (actions within pond):</p> <ul style="list-style-type: none"> ● 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 ●
<p>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)</p> <ul style="list-style-type: none"> ● 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 pondscales. 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.
 - o 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).
 - o The plant species richness covered only aquatic species, including the Charophytes.
 - o 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 pondscape 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, Denmark).

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