Ponds & Basins

Ponds and basins are implemented to collect and store water from heavy rainfall. Two types are recognised: 1) retention – which refers to a pond/basin that is permanently covered by water; and 2) detention – referring to a pond/basin that is temporarily covered by water.
Ponds and basins build habitats for water and land animals and, therefore, can increase biodiversity. Variation in water depths can be beneficial for diversity. The water storage and slow infiltration into soil has a purifying effect on the water. Depending on the design of the pond/basin, they can provide spaces for recreational activities. They can be combined with other Nature-based Solutions like urban parks.

Overview

Type Blue

Approach Implementation

Hazard They can be implemented to reduce the risk on **Urban Flooding.**

Multi-hazard Overall, ponds and basins can be implemented to reduce surface runoff and therefore, also **Fluvial Flooding**. With their ability to store water and recharge groundwater, they can contribute to the mitigation of **Hydrological Droughts**.

SDGs

Direct Benefits

Runoff Storage

Ponds and Basins are designed to store water of high precipitation events. The capacity depends naturally on the size. A minimum was suggested of 500 m3 but can also reach up to 1 km3. Furthermore, the storage capacity is defined by the characteristic of the NBS – whether it is a detention or retention pond/basin.

Groundwater Recharge

The storage and infiltration of water is valuable for dry periods as it can recharge groundwater. The recharge may be determined by the soil texture and type (retention/detention) of the intervention.

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Co-benefits/ Disbenefits

Water Quality

Infiltration of surface runoff can purify water before reaching the groundwater.

Biodiversity

Retention ponds and basins can increase biodiversity by providing habitats for different species. Designing the pond/basin with different water depths will invite more species to reside. While detention ponds can be maintained by grazing and therefore offers a temporary habitat for grazing animals.

Ecosystem Disservices

Retention ponds and basins also provide habitats for mosquitoes which are often perceived as disbenefits.

Furthermore, retention ponds with standing water are at risk of algae bloom which can be prevented with measures such as a fountain in order to keep the ecosystem alive.

Well-being

Ponds and basins combined with other Nature-based Solutions like an urban park can increase the recreational potential (e.g., for leisure, social interactions, sport activities)

Property Prices

Ponds and basins in combination with an urban park might further increase the attractiveness of the area and eventually property prices.

Costs

The costs vary greatly between different sources. Around 44 000 €/ha was reported by NWRM (2015). Stella Consulting (2012) provides costs per EU Member State. Construction costs were also reported in cubic meter with 9 - 91€/m3 (Middlesex University, 2003). Due to older sources, prices may be higher than reported here.

Maintenance: up to 60€/m3

Additional costs: land acquisition

NBS Related Policies

- Water Framework Directive
- Floods Directive
- Habitats and Birds Directive
- EU Green Deal
- EU Biodiversity Strategy to 2020

Funding Options

- European Green Deal

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Design Implementation

Scale	Microscale/single/scattered/local (1 m - 1 km)
Size	Ponds and basins are suggested to be between 1.2 - 5 m deep, with a minimum area of 150 m2 and a capacity of up to 1 km3 water.
Slope	Max. 60 %
Elevation	They are not suitable for coasts and mountainous areas; thus, an elevation between 20 and 1000 m is suggested.
Land Cover	Urban, Cropland, Grassland, Woodland and forest, Heathland and shrub, Sparsely vegetated land
Soil Texture	All types can be suitable
Soil depth	A minimum of 2-3 m
Bulk density	*No limitations found*
Implementation	They are commonly implemented in already vegetated areas. Furthermore, their banks and surroundings are commonly vegetated which causes a small amount of maintenance costs. They are suitable for all climate zones.
Cautions	Ponds and basins should not be implemented in unstable areas that are prone to landslides. Small-scale ponds with standing water can be at risk of algae blooming. This may be anticipated with e.g., a fountain.

NBS Suitability Mapping

(Below are the layers and specifications listed that were used for analysing the suitability of this Nature-based Solution for your area)

Land Cover	Urban green areas, Cropland, Grassland, Woodland and forest, Heathland and shrub, Sparsely vegetated land [LUISA Base Map 2018, Batista and Pigaiani, 2021]
Infrastructure	Buildings (areas without buildings) [ESM, Corbane and Sabo, 2019]
Soil depth	Min. 2 m [Absolute depth to bedrock, ISRIC, 2017]
Elevation	20-1000 m
Slope	Max. 60 % [Slope Angle, Wilde et al., 2018]
Landslide Susceptibility	Susceptible areas (0), all other (1) [European Landslide Susceptibility Map version 2 (ELSUS v2), Wilde et al., 2018]

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