Marshes

Marshes are common inland wetlands located along rivers and shores of lakes. They can attenuate river flooding by storing water and slowing river runoff. Marshes are typically covered with grasses or cattails and are seasonally or permanently claimed by water building an important ecosystem that are known for their biodiversity.
Marshes are often compared to sponges or tubs due to their ability to store water. From this storage, the water can infiltrate slowly into the soil and recharge groundwater or flow into surrounding waters in a slow manner. Furthermore, they are a buffer zone for surface water runoff entering the water body and can therefore, attenuate peak flows.

Overview

Type Mixed

Approach Implementation

Hazard Marshes can be implemented to reduce the risk on **Riverine Flooding** by storing water and slowing river discharge**.**

Multi-hazard Marshes are further filtering nutrients and sediments anticipating **Eutrophication**.

SDGs

Direct Benefits

Runoff Storage

The channels, ponds, and soils of marshes have a great capacity for water storage. They store water either from the water body or from entering surface runoff water.

Reduction of peak flow

Marshes function as water storage areas and also their soils are part of the sponge. They can delay the time to peak with their water storage and by releasing water slowly over a longer period.

Slow runoff

The vegetation and channelisation of the marshes can have a calming impact on the discharge speed.

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Co-benefits/ Disbenefits

Water Quality

Wetlands are known for their purification abilities by filtering nutrients and sediments from river runoff or surrounding land such as agricultural fields.

Biodiversity

Wetlands are habitats for a large number of species of flora and fauna. Their conservation and restoration counteract biodiversity loss.

Ecosystem Disservices

Standing and shallow water of wetlands can be suitable breeding areas for mosquitoes which are often perceived as annoying to people using the space for recreational purpose. However, in rural areas that are not used for recreational or touristic purpose this disbenefit might not have any weight.

Carbon Sequestration

Land cover change from, for instance, agriculture to grassland or to extensive agricultural land increases carbon storages moderately. The degree of carbon storage is further dependent on the underlying soil as peat have greater the storage capacities.

Habitat fragmentation

Reconnecting existing wetlands works against increasing fragmentation. The larger habitats are the more they support species richness and, therefore, biodiversity.

Costs

Costs for marsh restoration were estimated for (grazing) marshes around 4 500 – 9 500 € per ha. An example restoration project reported spending of 76 000 € on investigation, design, and works for a 12 km2 large area.

Other costs are reimbursement of landowners. This includes the land itself but also costs for lacking agricultural income. Maintenance costs are not reported.

NBS Related Policies

- Water Framework Directive
- Floods Directive
- Habitats and Birds Directive
- EU Green Deal
- EU Biodiversity Strategy to 2020
- Common Agricultural Policy
- National Wetland Policies
- Ramsar Convention of Wetlands (2002)
    - Resolution VIII.14
      New Guidelines for management planning for Ramsar sites and other wetlands
    - Resolution VIII.16
      Principles and guidelines for wetland restoration

Funding Options

- Cross Border Cooperation (Interreg V-A)
- Danube Transnational Programme
- Interreg Central Europe
- LIFE+
- European Green Deal
- Natural Capital Financial Facility (NCFF)

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Design Implementation

Scale	Watershed/Mesoscale (1 km - 100 km)
Slope	Max. 5 % slope and most suitable in U-shaped valleys
Land Cover	Grassland, non-intensive cropland
Vegetation	Native vegetation, primarily grasses and cattails
Soil depth	Min. 1 m rooting depth
Implementation	They may be implemented in drained areas or poorly drained depressions of grasslands along streams or lakes, in shallow shores of lakes or in floodplains of rivers. In context with pluvial flooding, they can be strategically implemented in areas along rivers and streams where surface runoff is coming together before entering the water.
Combination with other NBS	Ponds & basins, emergency storage areas, grazing management

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	Natural grassland, pastures, sparsely vegetated area, transitional wood and shrub land, land principally occupied by agriculture [LUISA Base Map 2018, Batista and Pigaiani, 2021]
Infrastructure	Buildings (areas without buildings) [ESM, Corbane and Sabo, 2019]
	Areas without (major) roads
Soil depth	Min 1 m [Absolute depth to bedrock, ISRIC, 2017]
Surface water	Rivers (1), Lakes (1)
Slope	Max. 5% [Slope Angle, Wilde et al., 2018]
Flood	In 100-year inundation areas (floodplains)
Precipitation	Areas with higher rainfall that can cause downstream flooding

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