

Riparian Forest Buffer



Riparian buffer zones are habitats along surface water bodies such as rivers and lakes. They can be natural grassland, forests, shrubs, or in some cases also wetlands count as riparian buffers. Riparian forest buffers or riparian woody buffers are treed corridors along water bodies. Forests can store and retain water comparable to sponges. This ability is dependent on the forest type, the density of the forest cover, geographical location but also on other local characteristics. Overall, riparian forest buffer zones are multifunctional natural measures that can 1) reduce flooding by storing water, infiltrating water, but also increasing evapotranspiration; 2) stabilize riverbanks with their rooting system; and 3) filter nutrients and sediments before entering water bodies.

Overview

Type	Mixed (Green & Blue)
Approach	Implementation
Hazard	They can be implemented to reduce the risk on Riverine Flooding .
Multi-hazard	The riparian zone also functions as a buffer between land and water and can filter out pollutants. Therefore, riparian buffers can attenuate Eutrophication . Furthermore, the treed landscape provides protection and stabilisation for riverbanks and, therefore, prevents Landslides .

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Direct Benefits	Runoff Storage Treed riparian buffers have a greater capacity to store runoff water than other land cover types. Nonetheless, they do not reach capacities of other Nature-based Solutions such as ponds. Their retention and storage capacity depends on various factors, e.g., the soil, the climate region, and the forest density.
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Slow Runoff

In general, the riparian forests have the ability to slow surface runoff and, during flooding, also river runoff.

Co-benefits**Water Quality**

Riparian buffers are transitional zones between land and water. They filter pollutants such as phosphor or nitrates and preventing them from entering surface water bodies and the groundwater.

Soil Conservation

Forest covers can retain eroded sediments but also stabilise riverbanks with their rooting system. These functions can prevent sediments from entering the water.

Biodiversity

Riparian buffers have several advantages for biodiversity of flora and fauna. Shade of the trees can regulate the water temperature which can be beneficial for fish populations. Furthermore, fish populations can increase due to natural woody shores which function as breeding places or organic food provision.

On land, riparian forests can increase the biodiversity by connecting forests or creating new habitats. Depending on the species, buffers need a minimum width to provide a habitat. A minimum of 30 m is often reported.

Carbon Storage

Additional forest biomass produced can enlarge carbon storages.

Costs

According to calculations by the European Commission, minimum costs of trees per hectare are between 781-2555 Euro and maximum values are between 718 and 3514 Euros. Country specific prices are available in the Commission Staff Working Document 'The 3 Billion Tree Planting Pledge for 2030' (COM(2021) 572 final).

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

EU Biodiversity Strategy to 2020
Habitats and Birds Directives
Water Framework Directive
Floods Directive
Common Agriculture Policy
European Green Deal
EU Forest Strategy

Funding Options

Rural Development Programme
LIFE+ Climate Action
EU Green Deal

Design Implementation

Scale	Microscale/single/scattered/local (1 m - 1 km) Watershed/Mesoscale (1 km - 100 km)
Size	A minimum buffer width of 16 m is recommended. There is no limit for slopes, but it is suggested to have wider buffers with steeper slopes. Generally, a buffer of at least 30 m width supports wildlife.
Slope	<i>No limitation</i>
Land Cover	Cropland Grassland Sparsely vegetated areas
Soil Texture	Sandy loam Loamy sand Clay loam Silt clay loam Sandy clay loam Loam Silty loam Silt
Soil depth	A minimum of 30 cm is needed for planting trees.
Bulk density	A maximum of about 1.5 g/cm ³ is recommended due to restrictions to root growth above this value.
Cautions	Riparian zones are planted best by connecting existing woody areas. Roads within the buffer may have a limiting factor on biodiversity.

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	Cropland, Sparsely vegetated land, Grassland, Heathland and shrubs [LUISA Base Map 2018, Batista and Pigaiani, 2021]
Canopy Cover	0-30 % [Tree Cover Density 2018, Copernicus Land Monitoring Service]
Soil	Sandy loam, Loamy sand, Clay loam, Silt clay loam, Sandy clay loam Loam, Silty loam, Silt [USDA Soil Structure, Ballabio et al., 2016]
Infrastructure	Buildings (areas without buildings) [ESM, Corbane and Sabo, 2019]

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