



What a river restoration in Cascais can do: a greenway to adapt and thrive

Cascais, Portugal

IN A NUTSHELL

The Ribeira das Vinhas trail in Cascais is a waterbed restoration project complemented by a greenway trail. Through the integration of nature-based solutions, this project has allowed Cascais to address some of the key objectives of its adaptation strategy: reduce flood risk, lower the average temperature of the area and promote biodiversity.

Restoring a natural landscape at risk

The Vinhas river flows through a unique natural landscape where steep slopes and rich alluvial valleys have been preserved despite centuries of human settlement. The river is part of the largest watershed in Cascais, the Vinhas watershed, with a 2,880-hectare catchment area. Its main riverbed is 10 km in length, starting at the highest point of the Sintra-Cascais Mountain Range and flowing through the urban centre of Cascais into the bay. Along the way, the riverbed in this classified natural heritage site passes through numerous urban areas.

For Cascais, the Vinhas river has cultural and economic relevance; it was a prime location for agricultural activities and watermills, abandoned in the 20th century with the progressive transformation of means of production and the increasing development of the city suburbs. This abandonment resulted in an overall loss of biodiversity and a lack of maintenance of the valleys and riverbeds in the area, making them more vulnerable to the impact of extreme weather events. In November 1983, heavy rain of over 127 mm in 24 hours resulted in the most damaging floods ever recorded in Cascais, aggravated by a lack of drainage due to all the debris and blockages along the riverbed.

Following this extreme weather event, Cascais decided to take action to improve the adaptive capacity of the territory and to restore the riverbed. Past measures taken to reduce the flood risk had mainly been based on grey infrastructure, such as tunnels and cement walls. These kinds of measures focused on reducing the risk of flooding in the city centre, but did not consider green and blue infrastructure in an integrated way.

The city therefore decided to adopt a different approach and undertake a deeper restoration project. It started by enlarging the river tunnels in the downtown area to increase water flow capacity, and increasing the river drainage capacity to reduce the risk of future flooding.



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CASCAIS



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Population:

188,244

Area

97.4 km²

Signatory to the Covenant of Mayors since:

2008

CO₂ emission reduction target:

20% by 2020 and
adaptation

Green/blue nature-based solutions for safety and wellbeing

The change in approach to managing the river and its adaptation potential took place in 2017, when Cascais pioneered the first local action plan for climate adaptation in Portugal. This strategic document was developed with close engagement and contributions from stakeholders covering a range of sectors, such as awareness-raising, biodiversity promotion, civil protection, human health, coastal management and spatial planning. Cascais decided to restore the waterbed by focusing on the greenway's ecosystem services to exploit its full potential. The restoration of the Vinhas greenway aimed to cope with the multi-hazard nature of climate change and promote resilience through adaptation, while providing local urban communities with car-free, natural areas for leisure and wellbeing.

The first phase started with riverbed restoration: the removal of debris and artificial structures. Traditional stone walls were rebuilt in the alluvial areas once used for agricultural activities, to prevent soil erosion and preserve agricultural fields. This initial intervention allowed the water to flow, and when flooding occurred, the water was collected in flood basins.

A second intervention restored the slopes of the valley. Existing trees and bushes with poor phytosanitary characteristics (such as fungus or other visible diseases), or leaning at an angle that could constitute a danger to trail users, were replaced with native species to improve the biodiversity of the area.

With a principle of minimal intervention, the old trail was restored using only compacted sand, which is semipermeable and, in the event of flooding, can be eroded without creating debris. No other lighting or additional infrastructure was added, to respect the nature-based principle of focusing on ecosystem services.

Additionally, all wastewater lids along the trail were refreshed with animal paintings representing the rich biodiversity of the area, adding a valuable dimension of art and culture to this nature-based intervention.

Finally, two meteorological sensors were placed near the riverbed, including a water flow sensor to inform the civil protection services of potential flooding.

Project results and co-benefits

The greenway restoration project demonstrated the potential of nature-based solutions to promote climate adaptation and multi-hazard disaster reduction (against floods, heatwaves, fire, biodiversity loss) while providing a healthier and sustainable service for local communities.

In terms of flood risk reduction, Cascais has measured a significant decrease in flooding levels since the project's implementation: approximately 1 metre less with a rainfall of 65 mm in 24 hours. Moreover, it has helped to reduce the urban heat island effect by 2°C during the summer. This project has allowed Cascais to create a green corridor to be enjoyed by citizens and to improve the infrastructure for active mobility thanks to a 4 km trail connecting all surrounding urban areas. This new artery for nature and leisure has been praised by its users: 25,000 residents who can now commute to downtown Cascais on foot or by bike without using a car.

The greenway restoration project helped the city improve its technical and administrative capacities to work with nature-based solutions. Although it was a challenging process to set up, the green corridor and riverbed restoration measures attracted wide support from different socio-political stakeholders because it delivered numerous simultaneous benefits for a relatively low investment cost. It also laid a foundation for developing similar projects in the future, by providing data to evaluate the effectiveness of nature-based solutions in flood risk reduction. In particular, assessing rainfall in real time through the meteorological sensor network provides valuable information for performing cost-benefit analyses for the use of nature-based solutions in future projects.



KEY FIGURES

4 km of greenway trail restoration

Over **20 hectares** of private and public land restored

Approximately **1 metre decrease** in flooding levels with a rainfall of 65 mm in 24 hours

25,000 citizens benefitting from improved leisure and commuting space for pedestrians and cyclists



FINANCING THE PROJECT

- + **Financing source(s):**
€380,000 self-financed by the municipality of Cascais
€10,000 for meteorological equipment and dashboard from the Portuguese Environmental Fund

USEFUL LINKS

- ▶ Trilho da Ribeira das Vinhas | Câmara Municipal de Cascais: <https://www.cascais.pt/noticia/trilho-da-ribeira-das-vinhas>
- ▶ Inauguração novo trilho da Ribeira das Vinhas: <https://binged.it/3g2eVb9>



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