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Rehabilitating the Guincho-Cresmina Coastal Dune System

Nature-Based Solutions as a Climate Change Adaptation Option

Nature-based Solutions for rehabilitating biodiversity at the Guincho-Cresmina dune system restore natural processes and ecological balance, while simultaneously responding to the challenges caused by climate change.

Key Learnings

- **Using native species**: Native vegetation plays an important role in stabilising dunes and reducing erosion. Re-introducing native species is essential for ecosystem restoration and enhancing ecosystem resilience to extreme conditions along the coastline.
- **Continuous monitoring** is essential for evaluating intervention success and if necessary, adjusting strategies, while considering the observations made and results collected.
- Engagement of the local community and stakeholders: Promoting awareness-raising initiatives such as the removal of invasive alien species, maintaining walkways and planting native species, helps to create a sense of responsibility and belonging, as well as a support network for the long-term conservation of the dune ecosystem.

About the region

The municipality of Cascais covers an area of 97 km², with one-third of its landscape designated as protected areas and nearly 30km of coastline. Cascais belongs to the Lisbon Metropolitan Area along with seventeen other municipalities and has about 216,000 inhabitants according to data from 2021. It is a renowned tourist

destination and has an unrivalled heritage. Cascais also boasts the Guincho-Cresmina dune system, a coastal area of great ecological and landscape value. The dune system plays a crucial role in preserving natural heritage, acting as a protective barrier against coastal erosion and tidal dynamics.

Climate Hazards

Flooding, Sea Level Rise, Storms, Droughts

Sector

Biodiversity, Coastal Areas, Disaster Risk Reduction, Health

Key system

Ecosystems and Nature Based Solutions, Health and Wellbeing



Climate Threats

Climate change affects the Guincho-Cresmina dune system's health, stability and how well the ecosystem can adapt to its impacts. Coastal erosion is one of the main threats due to rising sea levels, jeopardising the coastal protection function of the dunes and local biodiversity. The dunes also face an increased frequency and intensity of extreme weather events such as storms, which accelerate both the loss of sand and destroy the vegetation stabilising the dunes. Additionally, heatwaves favour the spread of invasive species competing with native vegetation.

Changes in wind patterns also affect the dynamics of this dune system, as strong winds displace large amounts of sand, destabilising the dunes and exposing them to erosion. Finally, changes in rainfall patterns affect groundwater dynamics and hydrological processes in the dunes, interfering with vegetation adapted to the sandy soil. For example, prolonged droughts weaken the vegetation, increasing soil degradation, while heavy rainfall can increase surface runoff and erosion.



Figure 1: Guincho-Cresmina dune system in Cascais. Image Credit: Cascais Ambiente.

Municipal strategies and policies for environmental protection and enhancement

In response to climate threats, Cascais has adopted Integrated Coastal Zone Management, as advocated by the <u>National Strategy for Integrated Coastal Zones Management</u>. This strategy aims to protect natural systems such as dunes and recommends implementing specific measures to adapt to climate change.

Cascais has implemented a <u>Municipal Climate Change Adaptation Action Plan</u> (2017) which addresses the vulnerabilities of the coastal zone and the protection of dune ecosystems. This plan includes actions to manage coastal erosion, revegetation with native species, recovery of dune vegetation and dune stabilisation.

The main objectives of the actions carried out in the dune include the reduction of coastal erosion, coastal dune ecosystem restoration and biodiversity enhancement. The ecological restoration project started with eradicating invasive species, followed by planting native perennial herbaceous species whose branching root systems help with sediment retention.

Cascais has invested in creating natural protection infrastructures for the dune system, such as walkways that allow guided visitors access, reducing the human impact on this system. In addition, environmental awareness initiatives educate the local community and visitors on the importance of protecting the dunes and highlight why intervention measures are necessary to protect the dune system.



Figure 2: Walkway allowing guided visitor access to the dunes in Cascais and protecting valuable habitats. Image Credit: Cascais Ambiente.

"The dune system has long required an intervention to control the shifting sand, which is already encroaching the road and the campsite",

Carlos Carreiras, vice-president and environment councillor for the Cascais City Council (November 2010)

Ecological restoration measures

Câmara Municipal de Cascais (Cascais City Council) in partnership with the Instituto de Conservação da Natureza e da Biodiversidade, developed a project for the dune system's recovery "<u>Recuperação do</u> <u>Sistema Dunar Guincho-Cresmina</u>". The ecological restoration activities involve three main habitat management actions:

- The project team installed natural regenerators made from posts of dry wicker (Salix species) on earliest-stage and primary dunes, where vegetation was absent. This technique, known as "ripado móvel," mimics the role of pioneer vegetation by reducing wind speed and erosion, helping to control the spread of sand. The team placed the posts in parallel strips 9-12 meters apart, perpendicular to the prevailing south-westerly winds and buried each 180cm palisade in 50 cm depth. Spacing the posts evenly, using 3 kg of material per linear meter is a low-cost, easy-to-assemble, and environmentally friendly method. After two years, the initial structures needed replacement, but the team used the same materials and technique.
- Recovery actions to re-establish native vegetation, such as eradicating invasive species, by manually plucking the plants and roots. Then, replating native species to support natural processes.

- Fences prevent vehicles from entering the sensitive habitat and repeatedly damaging the native vegetation.
- Continuous monitoring of the management actions helps understand the dynamics in the system, responding to change and adapting management strategies if necessary. Monitoring also enables evaluating project success.

Summary

The rehabilitation of the Guincho-Cresmina dune system with natural solutions provided valuable lessons on how to integrate nature and sustainable design into coastal management. The choice of native plants, public use management, continuous monitoring and community involvement are essential to the success of ecological restoration. The main learnings indicate that the restoration of native vegetation and adaptive management are crucial to ensuring the resilience of the dunes. The rehabilitation of the dune system is aligned with climate change adaptation and environmental conservation policies, reflecting a commitment to minimising the impacts of climate change and protecting biodiversity, guaranteeing a sustainable future for this vital ecosystem.

Further information

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- Economics of Nature-based Solutions (Invest4Nature)
- 97/266/EC: European Commission Decision. (18 de december de 1996). Concerning a site information format for proposed Natura 2000 sites.
- Correia, I., Neto, A., Silva, V., Saraiva, S., Romana, J., & Melo, J. (2012). Ecological Restauration of Guincho-Crismina Costal Sand Dune. Cascais World Forum, (pp. 281-288). Cascais
- Silva, C. A. (2015). Dinâmica sedimentar em sistemas dunares litorais: Aplicação ao sistema dunar da praia do Guincho, Cascais. Instituto Superior de Agronomia, Universidade de Lisboa, Lisboa: Dissertação para obtenção do Grau de Mestre em Arquitetura Paisagista.

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