

## What is Green Infrastructure?

Green Infrastructure “is a strategically planned network of natural and semi-natural areas with other environmental features designed and managed to deliver a wide range of ecosystem services. It incorporates green spaces (or blue if aquatic ecosystems are concerned) and other physical features in terrestrial (including coastal) and marine areas. On land, GI is present in rural and urban settings.” Linked together, these strategically planned networks of green elements are able to provide multiple benefits in the form of supporting a green economy, improving quality of life, protecting biodiversity and enhancing the ability of ecosystems to deliver services such as disaster risk reduction, water purification, air quality, space for recreation and climate change mitigation and adaptation.

## The European Green Infrastructure Strategy

The Green Infrastructure Strategy proposed by the European Commission, promotes the development of Green Infrastructure across the EU delivering economic, social and ecological benefits and contributing to sustainable growth. It guides the implementation of Green Infrastructure at EU, regional, national and local levels. A main feature of the Green Infrastructure Strategy is its integration into relevant policies through: ecosystem-based adaptation into climate change policies; nature-based solutions into research and innovation policies; natural water retention measures into water policies; and through its focus on delivering multiple ecosystem services and their underlying factor - a rich biodiversity - into nature policies. The Natura 2000 network in particular plays a major role in protecting many of the core areas with

healthy ecosystems. The Green Infrastructure approach also features in regional and cohesion policies, disaster prevention and the greening of the Common Agriculture Policy.

As Green Infrastructure can make a significant contribution to many sectors and EU policy objectives, Green Infrastructure is being integrated into many funding streams including Structural Funds (the European Regional Development Fund (ERDF); European Social Fund (ESF)), the Cohesion Fund (CF), the European Maritime and Fisheries Fund (EMFF), the European Agricultural Fund for Rural Development (EAFRD), LIFE+ and Horizon 2020 project funds and the Natural Capital Financing Facility (NCF) of the European Investment Bank (EIB).

## Costs & benefits of Green Infrastructure

Green Infrastructure can often provide more benefits at less cost than single-purpose grey infrastructure. A growing body of research and experience demonstrates Green Infrastructure’s high potential due to its multi-functionality, i.e., its ability to perform several functions and to provide several benefits in the same spatial area. These functions can be social (providing healthy environment or green space for leisure and sports), environmental (conserving biodiversity or adapting to climate change and related water issues), and economic (supplying jobs, raising property prices and reducing damage recovery costs). These benefits will however only be fully delivered if Green Infrastructure elements are functional: they need to be big enough, at the right place and well connected. At the same time, these multiple benefits need to be weighed against the costs of establishing and maintaining Green Infrastructure, ideally over the expected life cycle.

## Green Infrastructure and the European Semester

Green Infrastructure can play a role in the European Semester, for instance through natural flood prevention or job creation. Floods are among the most common and most costly natural disasters in Europe, and flooding events are likely to become more frequent with climate change. Benefiting from nature’s own capacity to absorb large quantities of excess water is cost-effective and can play a major role in sustainable flood risk management. Investing in Green Infrastructure for flood protection typically yields benefits 6-8 times the costs. Investments in Green Infrastructure can help boost new markets in services, such as planning, implementing and monitoring Green Infrastructure.

## Green Infrastructure in Portugal

Green Infrastructure is not an established concept in Portugal as such, but considering ecological systems in planning has been an accepted principle since 1999. In Portugal, an inter-ministerial coordination mechanism is in charge of promoting the integration of conservation and sustainable use of biodiversity into the various sectoral policies (Council of Ministers Resolution N° 41/99 of 17 May), including considerations in ecological network planning. In the context of the ecological network, the National Ecological Reserve Act (REN) is of critical importance. As one of the components of the fundamental network for the conservation of nature, the REN supports the integration of the connection between the core areas of nature conservation and biodiversity into the National Classified Areas. In the REN, various Green Infrastructure elements are planned, including protected areas, sustainable use areas and natural connectivity features.



## Policy setting & ongoing implementation

The Portuguese land use planning policy is based on a hierarchical system of territorial management, which operates at three spatial levels: national, regional and municipal. At the national level, the REN aims to:

- 1) Protect water and soil resources and ensure environmental goods and services essential to the development of human activities;
- 2) Prevent and reduce the effects of degradation of groundwater recharge, flood risk maritime, drought, soil erosion and mass movements on slopes contributing to the adaptation to the effects of climate change ensuring environmental sustainability; and
- 3) Contribute to the connectivity and ecological coherence of areas and natural connectivity features.

The REN thereby relates to policies on water (including the EU Water Framework Directive), agriculture and adaptation to climate change.

Action 5 of the EU Biodiversity Strategy to 2020 calls on Member States to work on the “Mapping and Assessment of Ecosystems and their Services” (MAES). However, Portugal had already completed a national ecosystem assessment following the conceptual framework of the Millennium Ecosystem Assessment.



## Good practices in Portugal

### Furnas Lake

The Azores Islands have implemented a range of activities in the Furnas Lake Hydrographic Basin on Sao Miguel Island. The aim is to protect and restore Furnas Lake, which has suffered for many years from the impacts of intensive agriculture. The “Ecological and Landscape Restoration of Furnas Lake” project began with the closure of most of the farms nearby and consisted of cleaning up and gradually restoring the landscape, with the active involvement of the local stakeholders. The former farmland was turned into natural area, thus increasing the connectivity and quality of the Green Infrastructure elements. The project also aimed at promoting outdoor events, including woodcarving festivals, “rustic” golf, field study visits, and activities for conservation volunteers and partnerships with local enterprises.

The project won Portugal's 2012 National Landscape Award, presented by the Ministry of Agriculture, Sea, Environment and Spatial Planning through the Directorate General for Territory. The ultimate goal is to achieve a truly sustainable area in ecological, economic, social and aesthetic terms. Expected benefits are additional income from tourism, increased social cohesion and biodiversity. The project turned the area into a typical example of a multifunctional Green Infrastructure area, providing socio-economic and biodiversity benefits. Local community development was one of the elements of the plan, explicitly linking Green Infrastructure to socio-economic benefits.

## Green corridor Lisbon

The Municipality of Lisbon established the Lisbon Strategy for 2010-2024, which identified three main objectives for the city: (1) City regeneration – rehabilitation of vacant buildings and degraded city districts and green spaces, to reverse the depopulation process; (2) Climate change adaptation – focus on the challenges of climate change and the consequent natural vulnerabilities (such as flooding), as well as on energy efficiency, reducing the number of vehicles in circulation and increasing the area of green spaces; and (3) Connectivity of green spaces – implementation of a network of green spaces and corridors for recreational activities and protection, appreciation and promotion of biodiversity and of natural and cultural landscapes. Part of this Green Infrastructure project is to develop bicycle lanes which are integrated into the green spaces and elements. As a result of the strategy, the size, quality and connectivity of green spaces in Lisbon increased. Elements include bicycle lanes, bicycle-friendly streets, ecological corridors and allotment gardens. The Green corridor networks and informal open spaces such as allotment gardens provide wider accessibility to urban residents, workers and tourists. Other benefits are a positive impact on health by promoting active transport (walking/cycling), environmental impact gains and additional income (and jobs) from an increased number of visitors.



Bicycle lanes

## Companhia das Lezírias/Mertola

The 'montado' is the Portuguese version of the unique Iberian cork oak landscape, known for its high level of biodiversity and its scenic beauty. Cork production is under pressure for various reasons, in particular from decreasing demand for cork stoppers. In Portugal, WWF has been working with its local partner "Association for the Protection of Mértola Heritage" (ADPM) in Mertola to restore about 200 ha of cork oak landscape using local species produced in a tree nursery. Another example is the Companhia das Lezírias, a large estate practicing sustainable agriculture to produce cork, rice, maize, meat and olives. This is combined with recreational and educational services and a high level of biodiversity. The area is thus developed into a multifunctional Green Infrastructure area capable of combining farming with recreation and education, whilst protecting biodiversity in a rural setting. The area, covering nearly 13,000 ha on the hillsides just north of Lisbon, is to a large extent recognised as a Natura 2000 area because of its high nature value.



Oaks in Portugal

## Challenges and opportunities

- Better integration of policies directed at economic sectors and policies for the environment.
- Promotional efforts emphasising socio-economic growth benefits of Green Infrastructure, in particular in the rural context.
- Search for private funding and cooperation with NGOs to compensate for decline in national funding.
- Streamlining environmental regulations, while strengthening enforcement (OECD recommendation).
- Knowledge dissemination of benefits of Green Infrastructure to managers of national parks.

## References

- <http://www.azores.gov.pt/gra/FurnasLandLab>  
<https://cid.pt/dl/download/bfe190a7-3c1-4bb4-84c9-fa89f62edabc/FurnasLandLab-Oct.2014-EngVer%20-Comp.pdf>  
<http://www.cedr-lvt.pt/content/index.php?action=detailfo&rec=1346&t=Breve-Historial-Losarcos Escalera, L. and Romero Vaquero, L., 2010. Green Infrastructure country file: Portugal. TASK 4.2. COUNTRY FILE – GREEN INFRASTRUCTURE IMPLEMENTATION AND EFFICIENCY – ENV.B.2./SER/2010/0059. OECD Environmental Performance Reviews: Portugal 2013>  
 EU (2013) Mapping and Assessment of Ecosystems and their Services; An analytical framework for ecosystem assessments under Action 5 of the EU Biodiversity Strategy to 2020. Technical Report - 2013 - 067  
 Pereira HM, Domingos T, & Vicente L (2006) Assessing ecosystem services at different scales in the Portugal Millennium Ecosystem Assessment. Bridging Scales and Knowledge Systems, eds Reid W, Berks F, Wilbanks T, & Capistrano D (Island Press, Washington DC), pp 59–80.

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