

# Green Infrastructures as a climate change and risk adaptation tool in coastal cities - the case of Setúbal, Portugal

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## GREEN INFRASTRUCTURE OF SETÚBAL

The Green Infrastructure of Setúbal is an environmental and land management planning instrument that recognizes the territorial ecological systems and guides in a sustainable way the occupation and transformation of the territory. It consists of a set of areas that, due to their biophysical, cultural or landscape characteristics, their ecological continuity and their planning instruments, contribute to the ecological balance and the protection, conservation and environmental and landscape enhancement of rural and urban spaces (Ferreira, 2010). In addition to promoting a more sustainable spatial planning model, this instrument also plays a crucial role in reducing risks for several territorial susceptibilities and vulnerabilities, namely the ones regarding climate change risks, adverse climatic conditions such as heat islands, cold spells and flood and overtopping episodes. Being Setúbal a coastal municipality, its green infrastructure is, thus, a green infrastructure that actively contributes to a more resilient community in the face of climate change.

### Ecosystem Services Identified

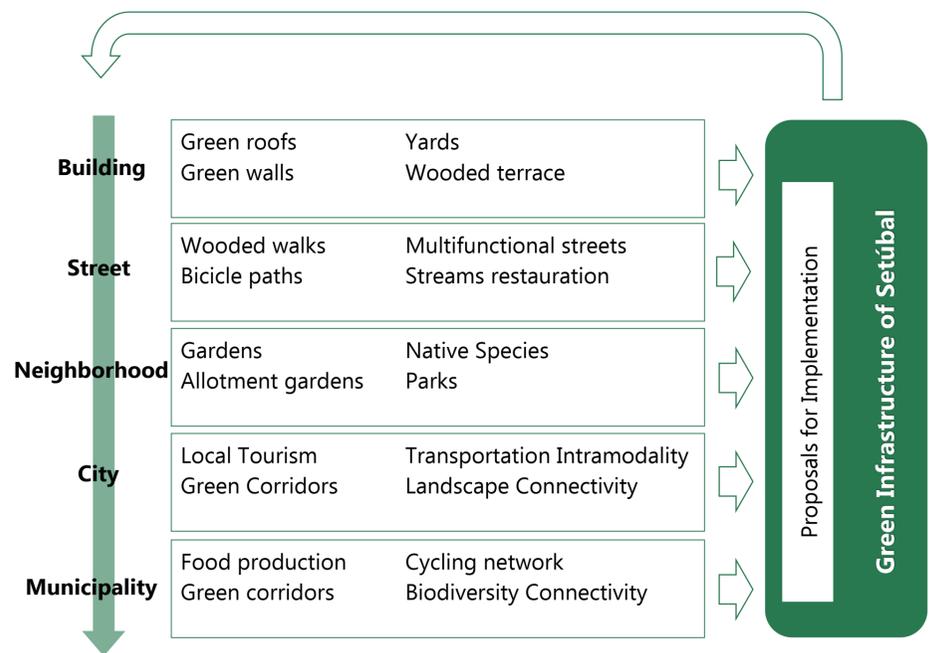


**Municipal system** - all the areas whose ecological interests are more favourable, which include the areas essential for the functioning of natural systems, in particular the ones regarding water circulation, climate regulation and air circulation.

**Urban system** - urban-scale structure that aims to enhance and intensify ecological processes in built-up areas, being, in this way, a protection, climate regulation and biophysical support structure, integrated into the urban area, which include all "artificial" elements, resulting from anthropic actions, such as gardens, for example.



## MULTISCALE ECOSYSTEM BASE MANAGEMENT APPROACH



Water management  
Parque da Varzea - Setúbal



Leisure and mobility  
Avenida Luísa Todi - Setúbal



Landscape Connectivity  
Serra da Arrábida - Setúbal



Cultural Identity  
Convento da Arrábida - Setúbal

## CLIMATE CHANGE AND RISK ADAPTATION TOOL

The spatial structural model of Setúbal actively contributes to improving the quality of life of its residents and visitors, safeguarding a sustainable and well-ordered space, translated into the prevention of territorial risks. In order to increase its resilience, the municipality has a set of tools, strategies and specialized resources for this purpose, such as the Municipal Emergency Plan, the Tsunami Warning System and the Municipal Fire Company of Setúbal. Nevertheless, in addition to being able to respond to territorial risks, it is important to define preventive methods that help to minimize risks, such as floods or heat islands, for example (Demuzere, 2014). The definition and implementation of the ecological structure, not only ensures the maintenance of natural ecosystems, but also meets the needs of the population for recreational and leisure spaces in the cities increasing their territorial resilience.

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