

Prevention of erosion by forests



Serra de Santa Justa e Pias

Located to the south of our school, the "Santa Justa e Pias" complex is an important green lung of the outskirts of Porto. It is a protected area of the Natura 2000 network, 800 hectares of which belong to the Valongo municipality.

Located in a valley, which was slowly excavated by Ferreira River, and the surrounding mountain slopes, the complex presents a large variety of habitats which allow the existence of many different vegetal and animal species.

Along the Ferreira River, it is possible to find a well-preserved riparian zone where the narrow-leaved ash (*Fraxinus angustifolia*), black alder (*Alnus glutinosa*) and grey willow (*Salix atrocinerea*) are the predominant tree species. In the lowlands, but further away from the river, a whole new collection of vegetal species can be found, including disperse specimens of common hawthorn (*Crataegus monogyna*), cork oak (*Quercus suber*), alder buckthorn (*Frangula alnus*), black elder (*Sambucus nigra*), pear tree (*Pyrus sp.*) and even small patches of pedunculate oaks (*Quercus robur*). The mountain slopes on each side of the river are mostly covered by monoculture stands of blue gum tree (*Eucalyptus globulus*) and shrubland.

In the "Santa Justa e Pias" complex, erosion is not significant in forested areas. However, in areas affected by summer wildfires, the absence of vegetation, allied to the impermeable substrate made of schist, and the surface runoff, results in severe soil degradation.



Valongo

Located in the Douro Litoral region of northern Portugal and inserted in the Metropolitan Area of Porto, the city of Valongo rests in a long valley surrounded by many green areas, of which the "Santa Justa e Pias" and "Quintarrei" mountainous areas are the most iconic and closest to our school.



Serra de Quintarrei

To the north of our school, we can find the "Serra de Quintarrei" green area, which is entirely owned and managed by Portugal/Soporcel, a Portuguese pulp and paper company that represents about 1% of the national GDP.

This mountainous area is dominated by monoculture stands of blue gum tree (*Eucalyptus globulus*) and shrubland. Throughout "Serra de Quintarrei", it is not possible to find native forest stands, but only a few disperse specimens of cork oaks (*Quercus suber*) and pedunculate oaks (*Quercus robur*), as well as small patches of riparian forest, usually found near temporary streams and mainly composed of grey willows (*Salix atrocinerea*).

In this elevation that separates the parishes of Valongo, Alfena and Sobrado, the soil erosion is quite severe. The causes of this are the frequent forest fires, which damage the vegetal cover and retard the growth of native flora, and the existence of monoculture plantations that do not allow the development of low vegetation with superficial root systems, making the soil very vulnerable to winter runoff. The terrain's high steepness also aggravates erosion.

What are the main causes of soil erosion in our region?

Forest fires

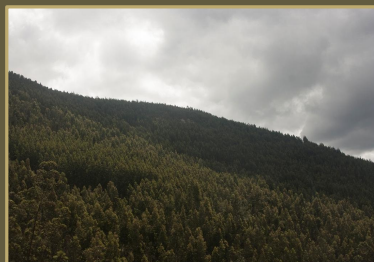
Forest fires, an increasingly frequent occurrence during summers, are among the biggest causes of soil erosion, since they devastate local flora and fauna, erasing vast areas of vegetal cover that provides protection to the ground. Without the forest's protection, the soil becomes much more vulnerable to erosive agents such as wind or rain.



Monoculture plantations

Monoculture plantations, particularly of blue gum tree (*Eucalyptus globulus*), also contribute to soil erosion. With their massive root system and extraordinary water needs, blue gum trees absorb large amounts of water and nutrients in the upper layers of soil very rapidly, leaving nothing for the other plants.

To make things worse, the leaves of blue gum trees produce a biological herbicide oil that prevents the growth of shrubs and herbaceous plants underneath the forest's canopy. The disappearance of low vegetation compromises the stability of the upper layers of soil, which become more vulnerable to erosive agents like wind and rain, and are more easily washed away.



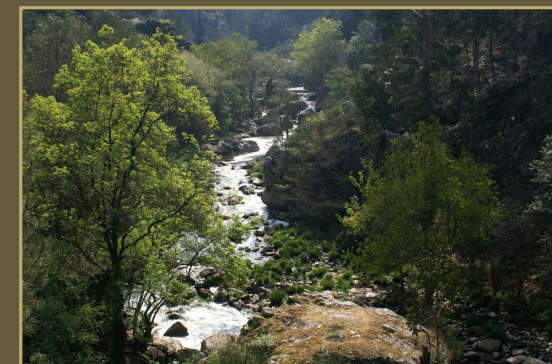
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Forests and erosion prevention

Forests, in their many forms, are home to 80% of the world's terrestrial biodiversity. In order to maintain the fragile ecological balance that allows these rich ecosystems to flourish, forests are capable of preventing soil erosion in several ways.

The root systems of trees and low vegetation hold the soil together, creating a cohesive structure which becomes more resistant to the action of erosive agents and consequent degradation. By intercepting falling rain and holding a portion of it on the leaves and bark, trees also help to reduce surface runoff significantly, which in turn diminishes topsoil erosion and the occurrence of landslides. Part of this intercepted water evaporates and part is gradually released into the soil below. The canopies of forests also block incoming wind, another way of protecting the soil.



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