



Towards ecosystem functionality: the case of sulphide mining tailings colonization.

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The enormous diversity of variables that come together in the functioning of ecosystems makes it very difficult to establish reliable patterns of functionality, understood as the ability of ecosystems to progress in a balanced way with their own resources. The natural colonization of spaces degraded by mining offers us the opportunity to study the construction of an ecosystem from its beginnings. The scarcity of resources and the geochemical conditions that occur in these spaces carry out a screening of species and, consequently, the communities that establish in these soils are much simpler. In a mining area close to the city of Ciudad Real (Spain), large deposits of fine material, originating from mining processes, have remained untouched for more than 70 years and have become an exceptional place to study the rate of natural colonization and soil formation on a short scale of time and space. The transition between a bare regolithic substratum and a functional soil was monitored and analyzed to find out which are the key factors on which the functionality of the ecosystem is based. The special abilities of some pioneer plant species, the collaboration between them and the climatic factors of the study area, establish a unique path towards the achievement of a viable and functional ecosystem. In our work we have studied the natural colonization process that has occurred in a mining tailings dump (6 ha), analyzing the essential role of the reed (*Phragmites australis*) as a colonizing plant. Indeed, this species creates a dense network of rhizomes that favors the retention of edaphic resources such as organic matter, water and clay that will help other species to settle. In this way, a process of creating a new ecosystem begins, whose evolution will be conditioned only by the restrictions imposed by climatic patterns of rainfall and extreme temperatures. Plant species specific distribution, the standing biomass the microbial composition and enzymatic activity of the soil have been monitored, as well as the standardized soil parameters such as pH, texture, organic matter characterization, etc.