

Planting Biodiversity: science-based strategic reforestation for ecological restoration and connectivity

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Climate change and biodiversity loss are tightly interconnected challenges, increasingly evident across Italy's urban, rural, and natural landscapes. Ecological restoration and strategically planned afforestation are emerging as key nature-based solutions to recover ecosystem functionality and enhance ecosystem services. Parco Italia represents one of the relevant national initiatives in this field, combining scientific research, on-the-ground restoration, and community engagement to strengthen ecological resilience across the country. Launched in 2021, Parco Italia promotes a long-term vision of a national green infrastructure connecting urban, peri-urban, rural, inland, and coastal areas through ecological corridors and multifunctional forests. Its approach goes beyond tree planting by integrating native species selection, site suitability, sustainable management, and public participation, with the aim of addressing climate change, habitat fragmentation, soil degradation, and biodiversity decline.

Recent spatial prioritization analyses conducted at the national scale identified afforestation opportunities tailored to four strategic objectives: ecological connectivity, human health, climate mitigation, and water regulation. Results show that priority areas differ according to the ecosystem service considered, highlighting trade-offs but also opportunities for multifunctional interventions, particularly in urbanized and intensively managed agricultural landscapes. This evidence confirms that restoration effectiveness depends not only on planting more trees, but on planting the right trees in the right places.

To date, Parco Italia has supported the establishment of 99 ha of new forests, the planting of more than 103,000 trees, and restoration actions across 34 sites nationwide. These interventions contribute to biodiversity recovery while generating co-benefits such as carbon sequestration, improved air quality, enhanced water infiltration, and increased landscape connectivity.

Within the framework of the National Biodiversity Future Center, Parco Italia provides a valuable case study of how science-based restoration can translate ecological knowledge into measurable action. Planting biodiversity means designing resilient socio-ecological systems capable of adapting to global change while supporting long-term human well-being.