



FORESTE PER IL FUTURO

XIV Congresso Nazionale SISEF

Padova, 9-12 Settembre 2024



Abstract Book - Posters

(a cura di Lingua E, Bolzon P, Marangon D, Baggio T, Bucci G)



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Nuove sfide per la gestione multifunzionale e la ricerca
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Foto di copertina: Ripresa da drone della pecceta in località Sorarù attaccata da bostrico e del torrente Rio Bianco (F. Bettella)

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Sessione poster: Aperitivo e scienza

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Effects of urban reforestation on soil ecosystem services in Parco Nord Milano

Adapting urban ecosystem to increased anthropic pressure and climate change is an urgent necessity due to its impact on human well-being and livelihood. Soil plays a key role, regulating a wide variety of ecosystem services (ES) linked to climate change mitigation, adaptation and contributing to the overall productivity of the system. Despite their importance, soils are often overlooked, and the impact of urban forest management and reforestation on soil ecosystem services and their relationship with aboveground functions is still poorly quantified. In addition, there is a lack of indicators that can effectively and holistically describe the soils functions and their ecosystem services provisioning. With the present study, we aim to (i) quantify the impact of reforestation on soil ecosystem services provisioning, (ii) link the soil functions with the aboveground compartment, and (iii) create an indicator that can effectively quantify and describe the ES provisioning. We selected seven forest stands with similar soil texture in Parco Nord (Milan), each representing different years of reforestation: 1984, 1987, 1995, 2006, 2010, and 2014, plus a grassland area that was created in 1984 as a control. We evaluated different soil variables at two depths (0 -18cm and 40 - 60cm): soil carbon quantity and its quality in terms of stability, water holding capacity and bulk density. Infiltration rate and microbial biodiversity were assessed in the shallower soil layer (0-5cm). For the aboveground vegetation we quantified tree biomass and biodiversity, and plant species diversity. These variables allowed us to quantify different ES provision related to soil (soil carbon storage, biodiversity, soil water regulation) and aboveground biomass (carbon stocks and biodiversity). We compared all these variables across treatments, i.e., age of forest stand, to quantify the evolution of ES along the reforestation gradient. Soils show a decrease of average soil carbon sink (-0.7 and $-0.04 \text{ mgC} \cdot \text{g soil}^{-1} \cdot \text{yr}^{-1}$ in stable and labile carbon at 0-18 cm depth respectively, and -0.4 and $-0.1 \text{ mgC} \cdot \text{g soil}^{-1} \cdot \text{yr}^{-1}$ in stable and labile carbon at 40-60 cm depth respectively) and no effect on infiltration. These preliminary results underline the difficulty of disentangle the effect of reforestation and the effect of historical soil management, especially where soils have been heavily influenced by anthropic actions. Moreover, they indicate the possible priming effect of revegetation, destabilizing native soil carbon. These results are counterbalanced by the positive effects of restoration on aboveground biomass. The developed 'tricorn' indicator, comprising of variables linked to three main ES (climate change mitigation, biodiversity, and water regulation) is an effective tool to quantify and visualize ES provisioning in soil and biomass and assess the impact of reforestation.

Parole chiave: Soil carbon, Urban reforestation, Particulate organic matter, Mineral associated organic matter, Ecosystem services, Hydrology, Indicators

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