EGU24-19131, updated on 17 Sep 2024
https://doi.org/10.5194/egusphere-egu24-19131
EGU General Assembly 2024
© Author(s) 2024. This work is distributed under
the Creative Commons Attribution 4.0 License.

Soil and Water Bio Engineering (SWBE) techniques effects on Biodiversity, in Tuscany (Italy)

Emanuele Giachi, Federico Preti, Martina Pollastrini, Marco Cabrucci, Carlo Viti, Agnese Bellabarba, Francesca Decorosi, and Andrea Dani
University of Florence, DAGRI, Firenze, Italy (emanuele.giachi@unifi.it)

Monitoring, restoring and enhancing biodiversity is one of the most relevant issues in the transition towards more sustainable environmental solutions, but also to counter the effects of anthropogenic impacts and climate change. The development of new green jobs, together with the promotion of nature-based interventions, has increasingly pushed research to study NBS interventions, particularly those for restoring degraded areas, evaluating their effectiveness on ecological processes and the ecosystems.

The promotion of nature-based techniques (NBS) has seen a growing interest in the use of plants as building materials, as is done in Soil and Water Bioengineering (SWBE) techniques, that combine the technical function for natural hazard control and environmental function for ecological process restoration. With an interdisciplinary approach, a common feature of projects under the NBFC research centre, we seek to study the impact of the use of SWBE techniques on biodiversity and ecological processes from various perspectives.

Four main intervention sites have been identified where degraded areas have been or are to be restored with SWBE techniques. The study areas are in the locality of Pomezzana (LU), Torrente Sova (AR), Montisoni (FI) and Camaldoli (AR), all of which have been followed by the UNIFI DAGRI research group and carried out in different years, respectively: 25 years, 8 years, 3 years and to be carried out. We aim to assess the variation in biodiversity by comparing the areas restored with SWBE techniques to those with natural evolution adjacent to them, analysing various ecological parameters: vegetation, soil microorganisms, macroinvertebrates, and genetics of plant species.

During 2023, the first vegetation surveys (trees, shrub and herbaceous layer) were conducted, and pilot soil sampling was carried out to quantify the microorganisms present. Regarding the vegetation, Braun-Blanquet surveys were conducted for the herbaceous component, in transects of equal size both in the restored area and in the adjacent control areas; for the arboreal and shrub component, a standard-sized (depending on the site) sample area was made with a total plant stand (D>3 cm). For the soil samples, transects were drawn across the restored area following the level curve.

Initial data processing, on botanical survey of the plant species and the result of biodiversity indicators (Evenness, Shannon, etc.) revealed a difference in specific composition, and therefore

environmental and microclimatic conditions, between the control plots and the restored area. The construction of the SWBE works, in timber and stone, and the use of rooted plants together with the sowing, create favourable conditions for the initiation of an ecological succession, even if it is not always in an excellent state compared to the control plots with 'natural' evolution. In the following elaborations we will try to understand the effect on soil microorganisms, and their relation within the vegetation composition, as well as to evaluate possible favourable conditions for the entry of alien and invasive species into the restored areas.

[1] Dipartimento di Scienze e Tecnologie Agrarie, Alimentari, Ambientali e Forestali (DAGRI), Università degli Studi di Firenze