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Understanding desertification in the Mediterranean through soil health descriptors

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Desertification and land degradation are among the most pressing and irreversible environmental threats facing the planet [1]. Land degradation currently affects up to 40% of the world's land area, with nearly half of humanity experiencing its direct impacts [2]. Understanding this phenomenon in the Mediterranean context requires looking beyond drought alone. Regional research combines climate, soil, vegetation and management information to assess sensitivity to land degradation [3]. Soil-health assessment likewise requires indicators that reflect specific soil functions, threats and local conditions, rather than a single universal measurement [4]. In this context, Nemesis is collecting and organizing available information to construct a structured database of Soil Health Descriptors, providing a shared evidence base for understanding desertification across Mediterranean Living Labs [5].

The database brings together soil properties, environmental variables and derived indicators, including soil organic carbon, texture, salinity, rainfall, drought conditions and vegetation indices. Each descriptor is associated with information on its relevance to desertification, data sources, geographic coverage, spatial and temporal resolution, validation approach and applicability to local conditions. This approach reflects the importance of transparent indicator selection and context-sensitive interpretation emphasized by Bünemann et al. (2018 [4]. Published datasets provide important foundations: SoilGrids offers global soil-property estimates with quantified prediction uncertainty [6], while LUCAS Soil provides harmonized European observations of soil characteristics [7]. Combining these resources with national information and site-level observations can support regional comparisons while preserving the local detail needed to interpret degradation processes [6].

Nemesis is examining which information can support repeated monitoring and which provides baseline or site-specific evidence. The project also considers data gaps, overlapping indicators and the feasibility of using descriptors across different Living Labs. Harmonizing terminology and identifying practical descriptor sets with project partners and local stakeholders will help connect scientific assessment with the challenges experienced by land users.

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Living Labs as a Response to Desertification and Land Degradation in the Mediterranean

The structured database is intended to support the assessment of current land conditions, monitoring of change, preparation of future scenarios and identification of appropriate management responses. Its consideration of land cover, productivity and soil carbon connects with the three components used to assess SDG indicator 15.3.1, as explained by Sims et al. (2019) [8]. The EU Soil Strategy for 2030 provides a complementary policy context for sustainable soil management and restoration [9]. By bringing together scientific evidence, transparent data organization and local knowledge, Nemesis will strengthen the link between understanding Mediterranean desertification and developing locally relevant, evidence-informed solutions.

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