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Assessing and monitoring soil quality at agricultural waste disposal areas-Soil Indicators

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The necessity of elaborating indicators is one of the priorities identified by the United Nations Convention to Combat Desertification (UNCCD). The establishment of an indicator monitoring system for environmental purposes is dependent on the geographical scale. Some indicators such as rain seasonality or drainage density are useful over large areas, but others such as soil depth, vegetation cover type, and land ownership are only applicable locally. In order to practically enhance the sustainability of land management, research on using indicators for assessing land degradation risk must initially focus at local level because management decisions by individual land users are taken at this level.

Soils that accept wastes disposal, apart from progressive degradation, may cause serious problems to the surrounding environment (humans, animals, plants, water systems, etc.), and thus, soil quality should be necessarily monitored. Therefore, quality indicators, representative of the specific waste type, should be established and monitored periodically. Since waste composition is dependent on their origin, specific indicators for each waste type should be established. Considering agricultural wastes, such a specification, however, could be difficult, since almost all agricultural wastes are characterized by increased concentrations of the same elements, namely, phosphorous, nitrogen, potassium, sulfur, etc.; contain large amounts of organic matter; and have very high values of chemical oxygen demand (COD), biochemical oxygen demand (BOD), and electrical conductivity.

Two LIFE projects, namely AgroStrat and PROSODOL are focused on the identification of soil indicators for the assessment of soil quality at areas where pistachio wastes and olive mill wastes are disposed, respectively.

Many soil samples were collected periodically for 2 years during PROSODOL and one year during AgroStrat (this project is in progress) from waste disposal areas and analyzed for 23 parameters. Results indicate that there are soil parameters that can be used as indictors to assess soil quality at such areas. For the two cases, i.e pistachio wastes and olive oil mill wastes, different soil parameters were identified as potential indicators. In specific, for OMW the proposed indicators are: organic matter, electrical conductivity, total N, total polyphenols, exchangeable K, DTPA-available Fe, available P and pH (for the cases of acid soils). For pistachio wastes, it seems that the most appropriate indictors are: organic matter, electrical conductivity, exchangeable Mg, DTPA-available Fe, DTPA-available Cu, available B.

A monitoring system was developed which may assist authorities and policy makers to continuously monitor the disposal areas or areas where wastes are used for fertilization/irrigation. For this, soil parameters were mapped with respect to the depth, date and temporal variations of their spatial distribution (spatial surfaces). Interpolated surfaces based on the Inverse Distance Weighted method (IDW) were created and integrated within a geospatial web based map application tool.