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## Supporting land degradation neutrality assessment by soil organic carbon stock mapping in Hungary

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'Strategic objective 1' of the United Nations Convention to Combat Desertification (UNCCD) aims to improve conditions of affected ecosystems, combat desertification/land degradation, promote sustainable land management, and contribute to land degradation neutrality. The indicator 'Proportion of land that is degraded over total land area' (SO1) is compiled from three sub-indicators: 'Trends in land cover' (SO1-1), 'Trends in land productivity or functioning of the land' (SO1-2), 'Trends in carbon stocks above and below ground' (SO1-3).

Soil organic carbon (SOC) stock can be adopted as the metric of SO1-3, until globally accepted methods for estimating the total terrestrial system carbon stocks will be elaborated. SOC can be considered as one of the most important properties of soil, which shows not just spatial but temporal variability. According to our previous results in the topic, UNCCD default data of SOC stock for Hungary is strongly recommended to be replaced with country specific estimation of SOC stock.

SOC stock maps were compiled in the framework of DOSoReMI.hu (Digital, Optimized, Soil Related Maps and Information in Hungary) initiative, predicted by proper digital soil mapping (DSM) method. Reference soil data were derived from a countrywide monitoring system. The selection of environmental covariates was based on the SCORPAN model. The elaborated SOC stock mapping methodology have two components: (1) point support modelling, where SOC stock is computed at the level of soil profile, and (2) spatial modelling (quantile regression forest), where spatial prediction and uncertainty quantification are carried out using the computed SOC stock values.

We analyzed how SOC stock changed between 1998 and 2016. Nationwide SOC stock predictions were compiled for the years 1998, 2010, 2013, and 2016. For the intermediate years, we do not recommend to calculate SOC stock values, because we have no information on the dynamics of change in the intervening years. Based on the 1998 SOC stock prediction, we compiled a SOC stock map for 2018, using only land use conversion factors, according to the default data conversion values.

According to the elaborated scheme during the respective period, significant changes cannot be detected, only tendentious SOC stock changes appear. Based on our results, we recommend to use spatially predicted layers for all years when data are available, rather than calculating SOC

stock change based on land use conversion factors.

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