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Spatial variability of organic and inorganic carbon stocks in Hungry Steppe (Uzbekistan)

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Desertification is an important soil treat, affecting soil functions and ecosystem services in arid and semiarid climate zones. Salinization is one of the principal processes which follows desertification and has a negative impact on soil properties and functions. Carbon sequestration is considered a principle soil function and the decline in soil carbon stocks in one of the main negative consequences of soil degradation. Soil salinization is caused by combination of natural factors (e.g. dry climate condition and high table of mineralized ground waters) and human activities such as improper water management. Globally, soils of the areas affected by salinization are considered to be poor in organic carbon due to low biomass and hampered microbiological activity. However, the contribution of inorganic carbon to the total carbon stocks in these areas can be comparable. Considering that soil inorganic carbon is more stable to mineralization compared to organic carbon, soil carbon stocks in saline landscape shall not be neglected.

Central Asian regions and especially the Aral Sea basin have been historically affected by desertification enhancing soil salinity. Hungry Steppe (Mirzachul) is an area of historical desertification and salinization, covering around 10000 km² at the territories of Uzbekistan, South Kazakhstan and Tajikistan. The region has a sharp continental climate with large seasonal fluctuations. Dry and semidesertic steppe vegetation dominates the natural areas (mainly coincided with high soil salinity), whereas most of the areas is managed to produce cotton, perennial grasses, melons and gourds. Soils are dominated by serozems corresponding to Calcisols in WRB soil classification. The research aimed to analyze the effect of salinization on carbon stocks in Hungry Steppe. To achieve this aim, soil carbon stocks were estimated at the four collective farms, referred as Water Consumer Associations (WCAs) or 'shirkats' in Syrdarya province: Khavast district in Yangier WCA, Mirzaobod district in Beruniy WCA, Oq Oltin district in Andijan WCA and Syrdarya district in Sobir Rakhimov WCA. The selected sites belonged to different in land quality classes, based on the land evaluation survey carried out by the melioration expedition of the Ministry of Agriculture and Water Resources of Uzbekistan in 201, from the lowest (Mirzaobod) to the highest (S. Rahimov). Soil pH, electroconductivity, chlorides,

organic and inorganic carbon stocks and total nitrogen stocks were estimated for each of the areas. Although the internal variability in the analyzed parameters was high we clearly showed the highest stocks of soil inorganic carbon in the most salinized area, whereas the highest stocks of organic carbon were shown for the most fertile lands. However, we didn't find significant difference in the total carbon stocks between the sites. It can be concluded that desertification has more effect on the redistribution of organic and inorganic forms of carbon, rather than on the total carbon stocks.

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