

Title: Prototype Development of a New Soil Index Using Econometrics Method: Data Envelopment Analysis

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Abstract:

Index studies in soil science have been discussed and implemented to quantify conceptual assessments of the quality or health of soils. ordination techniques have mostly been used in the literature. However, these approaches do not meet with any of the axiomatic features of an ideal, scientific rigorous indication system. Our approach based on econometric theory using Data Envelopment Analysis (DEA) does meet with those criteria. The DEA has not been explored yet in soil science. Therefore, we constructed a prototype DEA to evaluate its applicability to assess the soil carbon sequestration (SCseq) Capability Index (SCI) based on the SCseq rate and climatic, biotic, and soil hydrologic factors in Florida. A total of 196 collocated samples were collected from the topsoil (0-20 cm) from both current (2008-2009) and legacy dataset (1965-1996) in order to compute the SCseq rate. The SCI scores allowed comparing the spatially-explicit efficiency of carbon accretion as they relate with environmental conditions, such as climate. The SCI scores ranged between 1.00 and 1.09, with values close to 1 expressing high capability for carbon storage. The SCI score infers on the optimum level of SCseq capability based on a given set of relevant environmental parameters. Thus, carbon capability values provide more information to guide management and optimize the ecosystem function compared to traditional soil carbon assessment. Additional benefits of using the DEA analysis entail its

transferability to other geographic regions providing a standardized indication system to assess soil carbon capability and many other soil ecosystem functions. (247/250)