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POSSIBLE EFFECTS OF WATERTABLE RISE ON AGRICULTURAL LANDUSE IN NORTHWESTERN JUTLAND, DENMARK

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For soils with a shallow lying water table, drainage often is the most important means of reducing possible effects of water logging and yield decline. To the contrary, temporary water logging or stagnant water will contribute to the build up of a humus rich topsoil. Especially on sandy soils, this counterbalances the lack of adsorption capacity of the clay fraction. Changes in drainage volume as a consequence of water table rising will result in decrease in harvest yield and possibly affect future land use patterns.

Investigations were carried out on one study plot in the Hanherred district, northwestern Jutland/Denmark, located approx. 100 km NW of Aalborg. The predominant soil type in the study area is a Gleysol from marine and aeolian deposits with a distinct texture in the range of fine sand. Two profiles dug out on a meadow and a ploughed field situated next to each other and in direct neighborhood to a RAMSAR wetland where used for the study, as well as several drillings carried out with a hand auger.

Disturbed and undisturbed soil samples taken from different depths (0-140 cm) were used to determine texture, soil organic matter, porosity, permeability, and hydraulic conductivity. Also, ground penetrating radar was used to collect data on the depth of the water table as well as to reconstruct the build up pattern of the beach of the then coastal area.

Ground penetrating radar revealed a coastal outbuilding towards NNE/NE. Also, the position of a former lagoon was revealed that consists of heavy clayey deposits at approx. 130 cm below ground surface. Water logging has produced a humus enriched A horizon, while soil organic matter content rapidly declines with increasing soil depth. Illuvial clay resulted in the formation of a compacted pan at approx. 40 cm below ground, leading to temporary water logging just beneath the A horizon. Roots were only encountered in the A horizon. Hydraulic conductivity K (m/s) for subsurface horizons varies between 3.8 E-06 and 8.1 E-06.

The obtained results clearly show that a propagated rise of the water table of 0.6 m in the study area will lead to severe water logging problems and have devastating effects on recent land use patterns. Water logging effects might even reach proportions of the A horizon, leading to a thorough decline in crop yield and agricultural usability of an area covering approx. 11 km^2.