



Minimum peat thickness to prevent oxidation of underlying sulfidic mineral soil in peat extraction sites

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Large areas of sulfide bearing sediments are worldwide located along deltas, coastal plains and inland settings (170,000 km²) and pose a great threat (e.g. occasionally extensive fish kills) to their surrounding aquatic environment if disturbed, i.e. the oxidation of sulfides in contact with air produces extremely acidic soils (pH <4) with increased acidity and metal loadings flushing to the recipient streams. There are extensive studies on acid sulfate soil formation related to intensive agricultural drainage, but studies on acid sulfate soils in peat lands are scarce, because they have been of less economic importance. However, peat mining is an important industry in Boreal environments (e.g. Finland, Russia and Ireland) and sulfidic sediments and/or sulfidic-rich black schists underlie parts of these peats. In peat extraction, peat lands are drained with open ditches before extraction of peat and because peat is of economical value commonly only a shallow or no peat layer has been left causing a risk for oxidation. In this study, the characteristics of peat and the underlying sulfidic mineral soil of 10 peat extraction sites in northwestern Finland were investigated. These sites have been extracted for several years and, thus, the c. 60-80 cm deep drainage ditches with c. 20 m intervals reached mostly the underlying mineral soil. We found that despite the drainage, a peat layer relatively well protects underlying sulfidic mineral soil from oxidizing; i.e. the acidic load was insignificant compared to the potential load still remaining in the sediments. Preliminary results showed that there was no sulfide oxidation if the peat layer was >0.5 m thick but occasionally oxidation in the riparian zone (c. 0 to 2 m from the ditch wall) if the peat layer was 0.3-0.5 m thick. Moreover, the sulfide oxidizing depth was still thin (<0.5 m) compared to sulfidic farming lands in Finland with up to 2 m oxidizing layers.

This study was conducted within the Sulfa2-project funded by European Regional Development Fund (ERDF) via the North Ostrobothnia ELY Centre. Additional funding has been obtained by K.H. Renlunds foundation, The Bioenergy Association of Finland, Nordkalk Oy Ab and Stora Enso.