Acidification potential of sulfidic peat swamps in a temperate catchment in southern Australia

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Sulfidic material commonly underlies coastal floodplains and in areas inundated by saline or brackish waters. A number of studies globally have quantified acidification risk in coastal environments and have identified potential coastal acid sulfate soil hotspots (CASS). Similarly, our knowledge of the geochemical processes and acidification risk which occur in inland acid sulfate soils (IASS) is also well established. In these environments in Australia, sulfidic material forms as a result of changes in river regulation or salinity which provides a source of sulfate. These studies on IASS have been largely been focused on floodplain environments, with sulfidic materials located on fluvial sediments.

In some cases, sulfidic material can underlie peat swamps, which follow the same geochemical processes of oxidation as CASS and IASS to transport acidity and trace metals to degrade waterways and sediments. These peat swamps are commonly found in tropical areas and have rarely been studied in temperate catchments. This study identifies and characterises the acid sulfate soils and sulfidic material in two temperate peat swamps located in the upper reaches of a coastal catchment in southern Australia. Fish kills frequently occur downstream following rainfall events, most likely due to the initial flush of acidity from these peat swamps. We found that the acidification risk of these sulfidic peat swamps is very high largely due to the absence of any acid neutralising capacity. Reduced inorganic S concentrations were dominated by pyrite, suggesting that there is limited contemporary sulfide formation. Therefore, managing oxidation of sulfidic sediments and discharges of acidity in to these waterways is challenging as the environment surrounding the peat swamps is largely unmodified.