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DEVELOPMENT OF ACID SULFATE SOILS IN COLOMBO SUBURBS IN SRI LANKA

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Acid sulfate soils (ASS) are abundant in submerged, tidal, anaerobic coastal areas and inundated inland areas. ASS consist of pyrite as the major constituents, and jarosite, pyrrhotite, marcasite, mackinawite, goethite, natrojarosite, and schwertmannite as minor or accessory minerals. It has been reported that 12.6 million hectares of land worldwide are affected by sulfuric acidity due to ASS. The wetlands predominantly in the western coastal belt have been subjected to massive urbanization and probably may lead to developing ASS due to exposures of peaty layers to the atmosphere. Thus, the identification and mitigation of impacts of ASS are more important than the amelioration methods during the construction. This study aims to identify the potential acid sulfate sites in Colombo and its suburbs, including Thalangama Tank, Kotte Marsh, Kollonnawa Marsh, Diyatha Uyana, and Muthurajawela. Sixty-five soil and water samples were collected and analyzed at Ecotech Industrial Solutions (Pvt.) Ltd. Titration method was used to measure total actual acidity, total potential acidity, total sulphidic acidity, whereas pH, conductivity, iron, aluminium, chloride, and sulphate concentrations were measured by spectrophotometry. A method adapted from the Australian Acid Sulphate guideline was followed to measure the pH and peroxide of soil samples. According to the action criteria based on Australian ASS guidelines, soils containing more than 6 moles H^+/ton are ASS. The results revealed that the potential acid sulfate soils are highest in Muthurajawela and Thalangama wetlands, and values range from 45 moles H^+/ton to 280 moles H^+/ton. Tested soil samples from other sites showed various acid values between 11 moles H^+/ton and 165 moles H^+/ton. Muthurajawela soil samples had high peroxide reaction rate and those samples showed pH less than 1 after the oxidation process indicating sulphate acidity. But normal soils show mild reaction rate in peroxide oxidation and soil pH can range 5-8 after peroxide oxidation. Tested water samples from several points except from few points in Thalangama wetland showed concentration of sulphate ion to chloride ion ratio above 0.5. It is an indication of presence of ASS according to Australian guidelines.Further investigations are required to assess the behaviour of this ASS.

Keywords: Acid Sulfate Soils, Pyrite, Sulfuric acidity, Wet zone, Sri Lanka