419/D

Formation of acid sulphate soils after the Nilwala development project at Matara, Sri Lanka

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Acid sulphate soils (ASS) are characterized by the occurrence of pyritic minerals in subsoil. When such soils are drained and aerated, pyrite is oxidized and hydrolyzed often release toxic quantities of sulphuric acid, iron, aluminium and heavy metals. The south-west coastal belt of Sri Lanka is subjected to frequent flooding and high urbanization with development activities which facilitate the formation of ASS. The 'Nilwala Flood Protection Scheme' based on the Nilwala *Ganga* basin near Matara, is a drainage project, implemented to protect the town of Matara, and other villages from floods. Implementation of the project has lead to several environmental problems and mainly affected on paddy cultivation. Investigations were done in order to find out the possible formation of acid sulphate soils in Malimboda and Kapuduwa sites where large paddy lands were abandoned and the rice yields severely reduced due to said project.

Identification and characterization of ASS were done using field investigations and laboratory measurements. Four meters (4m) thick peaty layer was observed in many borehole logs starts at a depth of 2m below. Soils in both sites contained potentially acidic substances of jarosite, ferric hydroxides, gypsum and arogonite. The pH of these soils appears to be maintained at about 4.0. Total actual acidity (TAA) of the Malimboda and Kapuduwa sites were 0.52-76.68 and 0.00-33.92 moles H^+/ton, respectively. Total potential acidities (TPA) at the Malimboda site were in the range of 17.95-541.72 moles H^+/ton whereas the values at the Kapuduwa site were in the range of 60.93-660.16 moles H^+/ton both of which exceeded the action criteria values (after Ahern et al. 1998). Malimboda site had actual acid sulphate soils and potential acid sulphate soils (PASS) whereas in the soils of the Kapuduwa site recorded high amount of PASS. Eh-pH diagrams for iron and sulphide showed a trend to formation of iron (III) from iron (II). During the formation of acid sulphate soils, sulphuric acid may form from pyrites and iron (III) species in the soil. The results seem to suggest that a potential acidity study of soils should, therefore be, include in the management plan of Matara district to minimize the impacts on acid sulphate soils. Currently abandoned paddy lands may be re-cultivated with a proper soil management system and selecting of rice varieties tolerant to this specific environment.

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