Identification of the Issues regarding Disposal of Unsuitable Soil Under "Section-1" of the Southern Expressway Extension Project

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Abstract
The excavated unsuitable soil of the Southern Expressway Extension project has been dumped in various sites. Some sites show poor re-vegetation and there are concerns about the impacts of unsuitable soils in the dumping sites. This study aimed to identify the basic properties and problems of these unsuitable soils and potential solutions to the problems. Main experiment examined the soil properties and existing problems. Three sites were selected for the main experiment based on the period of storage: *Magahenawatta* (45 months), *Paragahawatta* (42 months) and *Miriswatta Walawwa* (36 months). Soil samples were collected from nine points (in a 3 × 3 grid) at 0-15, 15-30 and 30-45 cm depths. Soil pH, EC, Organic Matter (OM) and bulk density (BD) were measured. The second experiment (pots) examined the possibility of managing the extreme acidity observed in the soil of *Ruppewatta* site, which was actual acid sulfate soil (AASS). Two treatments with two controls were arranged in completely randomized design. The 15 pots of the first treatment (Ø - 11.8 cm and depth-11.5 cm) were filled with acid soil and red-yellow podzolic subsoil as four alternating layers (layer thickness: 2 cm), keeping top layer AASS. The second treatment (9 pots) had, five alternating layers, where the top layer was subsoil. Daily water application was 75 ml. The pH of each layer was measured once a month (5 replicates, destructive sampling) for three months and the pH of the drained water was measured every week. The *Magahenawatta* had been filled with subsoil which has low fertility, while *Paragahawatta* site had been filled with gley soils that does not show strong acidity. The *Miriswatta Walawwa* site had soil close to AASS yet pose no threat of extreme acidity. The organic matter content (9.58%) and the sulfate content (1540 mg/ kg) were significantly lower than the *Ruppewatta* site. A large variability exists in the studied unsuitable soils. Therefore, their disposal or implications of disposal should not be generalized. Characterization of the original excavation sites could help to decide the ultimate uses of the unsuitable soils. In the pot experiment, when the AASS layer is exposed to the air, the pH increased slightly, from initial value of 3.2, to 3.5 and 3.4 in treatment 01 and the control having AASS, respectively. The pH of the concealed layers increased up to 3.7 in treatment 01 and, up to 4.2 and 4.1 in the first and third concealed layers of the treatment 02. Accordingly, covering of soil layers could reduce further acidification of AASS and raise the pH considerably. However, long-term and scaled-up studies are necessary.

Keywords: Acid sulfate soil, Dumped soil, Soil management, Soil problems
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