

Use of rock properties in classification of weathering grades: A Sri Lankan case study

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Rocks utilised for the Samanalawewa project, have undergone severe weathering after they were excavated late 90's. The rate of weathering is incomparably high with respect to the normal soil formation processes. Different weathering grades of rocks that were used as construction materials, foundation materials and road aggregates are found in the project area. Consequently, they have been threatening to the sustainability of the project. The access adit and rip-rap zone of the dam are vulnerable to damage owing to the rapid weathering. Even though charnockite, marble, biotite and garnet granulitic gneisses were utilized for the project, only pyrite-sillimanite-garnet gneiss has shown extensive weathering. The rapid weathering of this rock is being observed since the commissioning of the project. Rocks were subjected to a petrographic study under the optical microscope. Point load strength, slake durability, loss on ignition and water content tests were employed to distinguish weathering grades. Water-rock interaction was experimented to study the pyrite oxidation. Comparatively to charnockite and marble, pyrite-sillimanite-garnet gneiss is weaker according to point load strength and slake durability indices. Rock strength and chemical properties illustrates that the weathering process takes place at a rapid and a normal stages. It is mainly observed on set of weathering. Corroded grains boundaries and decayed minerals in the rock are consequences of weathering induced by the acidic water generated by pyrite oxidation. The abundance of pyrite in pyrite-sillimanite-garnet gneiss is uneven. Thus, different weathering grades of the rock can be seen over the study area. Extensive fractures, which might be generated during tectonic activities or during excavations, facilitate better interaction with the atmosphere. It also effectively reduces the strength of the rock. It is another reason for differential weathering.

Keywords: Point load strength index, Rapid rock weathering, Loss on ignition, Samanalawewa project, Pyrite oxidation, Pyrite-sillimanite-garnet gneiss