CERAMAH TEKNIK TECHNICAL TALK

Soil related factors controlling landslides and flooding hazards in Malaysia

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Venue: Dept. of Geology, University of Malaya

This talk was presented by Dr. S. Paramananthan on 14th April, 2017 at the Dept. of Geology, UM. An abstract of the talk is attached below.

As usual, there was a lively discussion session following the presentation.

We thank Dr. Param for his contribution to the Society's activities.

Tan Boon Kong,

Chairman, W/G on Engineering Geology, Hydrogeology & Environmental Geology

Abstract: Malaysia is located in a tropical environment. It has a high temperature and high intensity of rainfall which results in most soil profiles having depths that are to a large extent controlled by the original rock from which the soil is developed from. Consequently, many of the soil properties determine to a large extent the type of soil erosion and the size of landslides and floodings occur on a particular slope/site.

This presentation looks at the differences in soils formed under a temperate and tropical environments. It then compares how the different rock types influence many of the soil properties such as the depth of soil, texture and structure, waterholding capacity, its porosity and clay mineralogy which directly or indirectly influence the size of the resulting landslips and the frequency of flooding that can take place at a particular location. Other factors that influence the landslides and flooding are the vegetation,landuse, the use of cover crop, terracing and intensity of the rainfall.

Recent studies of soils have shifted their focus from agriculture and food production to non-agricultural purposes such as seeking foundation materials for engineering structures or storage basins for water retention to minimise flooding. The importance of the soil as part of the landscape to use for construction of houses, buildings and their resultant impact on the environment have increasingly became important.

All soils, like people, are not the same as they can have different colours, have different amounts of clay, silt and sand. A soil normally occurs on the land surface. It can occur on level, hilly or steepland. It can be shallow (<50 cm), moderately deep (50-100 cm), or deep (>100 cm). A soil can be well or poorly drained. It can be sandy, clayey or consist of mixtures of both. It can be organic or mineral. Soils are formed by the action of climate (rainfall and temperature) and plants with their associated organisms on the parent materials over a period of time. This action is greatly influenced by the relief or slopes or shape of the land on which the soil is found. This can be represented as follows:

s = f (c, o, p, r, t)

where	s	=	soil
	c	=	climate
	o	=	organisms/vegetation
	p	=	parent materials
	r	=	relief
	t	=	time

Where all the five soil forming factors are the same, the resultant soil will be the same. All of these factors are interrelated. Because these factors can vary widely, different kinds of soils can develop.

For example, a steep area allows the rain to runoff the surface resulting in severe erosion and shallow soils result. Temperature and moisture influence the kind of vegetation and hence different soils support different types of crops/ vegetations.

Parent material or rock type influences the texture and some chemical properties of the soils. Sandy soils are formed from sandstones while granites often give rise to soils with coarse sandy clay textures and shales and basalts form clay textured soils. Basalts give rise to soils rich in iron while granites to soils with low free iron oxides. Similarly the fertility, clay mineralogy and soil structure of a particular soilis also influenced by the parent rock or the parent material as modified by climate and time.

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