PERTEMUAN PERSATUAN
Meetings of the Society

CERAMAH TEKNIK (Technical Talks)

M. Yogeswaran : Hydrogeology of Sarawak with some aspects on groundwater development

Laporan (Report)

The above talk was held on the 21 January 1991 at Geology Department, University of Malaya. What follows is a synopsis of the talk as prepared by the speaker, Yogeswaran Mailvaganam, who is with the Geological Survey of Malaysia in Kuching.

Sinopsis (Synopsis)

Sarawak is endowed with abundant surface water resources contributed by the large surplus of over 2 m of rainfall over evapotranspiration. However, the distribution of the rainfall in time and space have resulted in limited availability of water of acceptable quantity and quality for existing and proposed Water Supplies in some parts of the State. This has, in the recent years, forced water-resource professionals to explore and exploit alternative sources, including groundwater.

The distribution of groundwater in Sarawak is illustrated in the Hydrogeological Map of Sarawak, 1986, and this represents the first concerted effort to record the overall groundwater resources of Sarawak; the map, on a scale of 1:500,000 was based on information available as at 1983, and, since its publication, a wealth of new information has been obtained necessitating the updating and, in some cases, revision of the map.

The Quarternary alluvial deposits in the coastal plains form the most important aquifers, with the shallow coastal sands fringing the coast being the most extensively exploited aquifers. The development of these coastal sand aquifers takes into consideration that they are, in most cases, surrounded and underlain by saline water and that the flow of water in these sands is slow with hydraulic conductivities ranging from 5 to about 15 m/d. The two types of well and well-field designs which have been adopted to tap water from these aquifers cater for the transient nature of the flow of groundwater and thus reduce the danger of saline intrusion particularly by upcoming. These well designs consist of:

1. a large number of low-yielding wells which are arranged either singlely or in arrays of 4 wells or 8 wells which are evenly spaced at predetermined locations over the catchment area.
2. a series of horizontal wells which are installed parallel to the groundwater flow front or along the crest of a groundwater mound.

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Connate saline water are not uncommon in these coastal aquifers; mixing of waters from the fresh water portion of the aquifers and the connate water has enlarge the useable size of the aquifers in some of groundwater supply schemes.

The deeper sand aquifers in the coastal plains are multi-layered and are brackish to saline towards the coast, but are of acceptable quality towards the inland areas.

Peat, which underlies about 1.6 million hectares of the coastal plain and some inland valleys is also considered an important source of water. They contribute to the base flow of the coastal streams and also to water wells, particularly the low-humified woody peat. The concept of utilising the water directly from peat aquifers involves the abstraction of water from the peat and allowing for a predetermined drop in the overall natural water-level during the dry spell. This is to prevent an accelerated subsidence normally expected when peat is drained or when oxidizing rainwater is allowed to infiltrate deeper into the peat profile.

Several major sedimentary basins with good groundwater potential occur in Sarawak and notable among them are the late Tertiary rock formations in northwest Sarawak. These formations include the Tukau, Lambir, Miri and Belait Formations; the wells of the large groundwater scheme which supplements the Miri water supply is located within the sandy facies of the Tukau Formation. The rocks of the Nyalau Formation, which has a wide distribution in the Bintulu and Nanga Merit areas are also noteworthy. The Silantek Formation and Kayan Sandstone are cris-crossed by numberous sills and dykes, and these have a tendency to reduce the transmissivities of the rock aquifers.

Fractured rocks occupy more than half of the State of Sarawak, and these include the igneous, metamorphic and the older sedimentary rocks; the aquifers located in these rocks are seldom extensive and are only locally important. These aquifers are being increasingly tapped in the recent years for industrial and agricultural uses.

M. Yogeswaran

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