UNIVERSITI PUTRA MALAYSIA

ADAPTATION OF DRASTIC MODEL FOR GROUNDWATER POLLUTION POTENTIAL IN SELANGOR, MALAYSIA

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ADAPTATION OF DRASTIC MODEL FOR GROUNDWATER POLLUTION POTENTIAL IN SELANGOR, MALAYSIA

By

HANIM FARHANA BT ABD RAHMAN

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfillment of the Requirement for the Degree of Master Science

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Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfillment of the requirement for the degree of Master of Science

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February 2014

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The problem of groundwater pollution can be expected to increase due to rapid development of urbanization, industrialization and intense agricultural activities. Hydrogeological environmental factors are important parameters to determine the groundwater pollution potential to predict the affected area caused by point source and non point sources of pollutant. In 1985 US Environmental Potential Agency published DRASTIC model to assess groundwater pollution potential. DRASTIC is corresponds to the initials of seven acronym standing for Depth to the water table, Recharge, Aquifer media, Soil media, Topography, Impact of the vadose zone and hydraulic Conductivity of the aquifer. This study describes the results of a groundwater pollution potential using DRASTIC model and GIS based on hydrogeological environmental of Selangor. The modification of ranges and ratings index in DRASTIC were done using Geostatistical Analyst to accommodate hydrogeological settings to implement and adopt data according to Selangor hydrogeological environmental parameters. Results show that DRASTIC Index ranges from 63 to 94. The map of groundwater pollution potential showed that the high risk groundwater pollution potential covered 17% of study area in west side of Selangor. However, only 27% of the east side of Selangor exposed to low risk groundwater pollution potential. Most of the affected area was considered in low land area along the coastal in shallow groundwater table alluvial aquifer. The Pesticide DRASTIC Index ranges from 57 to 110 with highest risk groundwater pollution potential for pesticide covered 5% of study area in northwest side of study area and the lowest risk located at the east side with 25% of study area. The groundwater pollution potential map was successfully developed using hydrogeological parameters for Selangor area. The Pesticide DRASTIC Index is higher than DRASTIC index, it can be concluded that the potential source of groundwater pollution derived from agricultural activities.

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Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Master Sains

MENGADAPTASI MODEL DRASTIC UNTUK POTENSI PENCEMARAN AIR BAWAH TANAH DI SELANGOR, MALAYSIA

Oleh

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Pencemaran air bawah tanah akan bertambah teruk dengan kepesatan bandar-bandar, perindustrian dan perladangan dalam skala yang besar. Persekitaran hidro-geologi adalah parameter penting untuk menentukan potensi pencemaran air bawah tanah untuk meramalkan kawasan yang terjejas disebabkan oleh pencemaran sumber setempat dan sumber bukan setempat. Pada tahun 1985, US Environmental telah membangunkan model DRASTIC untuk menilai potensi pencemaran air bawah tanah. DRASTIC terdiri dari singkatan daripada beberapa hidrogeologi. Tesis ini mengkaji potensi pencemaran air bawah tanah dengan menggunakan model DRASTIC dan GIS berdasarkan keadaan hidro geologi negeri Selangor. Pengubahsuaian julat dan indeks penilaian dalam DRASTIC telah dilakukan dengan menggunakan Geostatistical Analyst bersesuaian dengan parameter hidrogeologi Selangor. Keputusan menunjukan indek DRASTIC berjulat antara 63 hingga 94. Peta potensi pencemaran air bawah tanah menunjukkan bahawa risiko tinggi air bawah tanah yang berpotensi pencemaran meliputi 17% daripada kawasan kajian di sebelah Barat Selangor, 27% daripada bahagian timur Selangor terdedah kepada risiko rendah pencemaran air bawah tanah yang berpotensi. Kebanyakan kawasan yang terjejas berada di kawasan tanah landai di sepanjang pantai, air bawah tanah yang cetek dan akuifer jenis aluvium. Indek DRASTIC racun serangga berjulat antara 57 hingga 110 dimana risiko tinggi di kawasan barat laut meliputi 5% daripada Selangor dan risiko rendah terletak di timur meliputi 25% daripada Selangor. Kesimpulannya, peta potensi pencemaran air bawah tanah telah berjaya dibangunkan dengan menggunakan parameter hidro geologi bagi negeri Selangor. Indek DRASTIC racun serangga lebih tinggi dari indek DRASTIC, oleh itu dapat disimpulkan sumber yang berpontensi dalam pencemaran air bawah tanah adalah berpunca daripada aktiviti-aktiviti pertanian.

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