

THE APPLICATION OF GIS BASED MULTI-CRITERIA ANALYSIS FOR  
SELECTING AN OPTIMUM WATER RESERVOIR SITE

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This work is dedicated to my beloved parents, my father **ALI AHMAD** and my mother **TUBA TAHA** for their resilience in insisting to educate me amidst the absolute poverty in which they raised me.

To **PESHMARGA**, Kurdish forces who devote their entire life to defending the holy land of Kurdistan.

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## **ABSTRACT**

Malaysia is well endowed with abundance of natural water resources, which has significantly contributed to the socio-economic development of the country. However, the situation has somewhat changed over the last decade. The water demand was 174.22 M<sup>3</sup>/d in year 2010 and it is projected to be 270.77 M<sup>3</sup>/d in 2050. In such scenario, a reliable and safe supply of water for future generations, more and more reservoirs will be required. The aim of this study is to apply GIS in identifying the most suitable location for water reservoir for area of Batu Pahat, Johor, West Malaysia. Methodology is designed in such a way to achieve the objectives of this study as to identify the important criteria for locating water reservoir, to model the location of reservoir using Analytical Hierarchy Process (AHP) and to analyze and evaluate the most potential sites for water reservoir using ArcGIS 10.1 software. Based on the criteria chosen, the data are processed and analyzed the existing 52 reservoir locations and their capacities. Based on the projected number of population for the year 2050, as a result, 5 new reservoir locations have been identified to fulfill the future demands of water for the study area. Thus, it can be concluded that the weights derived from AHP integrated in ArcGIS can be a useful tool in GIS analysis for the determination of suitable locations for water reservoir in the study area.

## ABSTRAK

Malaysia dikurniakan dengan banyak sumber-sumber air semula jadi yang telah banyak menyumbang kepada pembangunan sosio-ekonomi negara. Walau bagaimanapun, keadaan agak berubah dalam beberapa dekad mutakhir. Permintaan air adalah sebanyak 174.22 M/l/d pada tahun 2010 dan ia dijangka akan meningkat kepada 270.77 M/l/d pada tahun 2050. Dalam senario sebegini, bekalan air yang boleh digunakan dan selamat untuk generasi akan datang, memerlukan lebih banyak takungan air untuk masa hadapan. Kajian ini bertujuan untuk mengaplikasi GIS dalam mengenal pasti lokasi yang paling sesuai untuk takungan air bagi kawasan Batu Pahat, Johor, Malaysia Barat. Metodologi kajian ini direka sedemikian rupa untuk mencapai objektif-objektif kajian ini yakni untuk mengenalpasti kriteria penting untuk mengesan takungan air, untuk pemodelan lokasi takungan menggunakan proses analisis hirarki (AHP) dan untuk menganalisis dan menilai kawasan yang berpotensi untuk takungan air menggunakan perisian ArcGIS 10.1. Berdasarkan kriteria-kriteria yang dipilih, data diproses dan dianalisis berasaskan 52 lokasi takungan yang sedia ada termasuklah keupayaan masakini. Berdasarkan unjuran bilangan penduduk pada tahun 2050, hasilnya, 5 lokasi takungan baru telah dikenalpasti untuk memenuhi permintaan masa hadapan air bagi kawasan kajian. Oleh itu, ianya dapat disimpulkan bahawa pemberat yang diperolehi daripada AHP yang diintegrasikan dengan ArcGIS boleh menjadi alat yang berguna dalam analisis GIS bagi menentukan lokasi yang sesuai untuk takungan air di kawasan kajian.