***MSc Thesis Proposal***

**Groundwater Investigation, water uses and water suitability for**

**Koysinjaq-Surdash Basin, Kurdistan Region, Iraq**

Increasing population, scarcity of surface water and establishment of agricultural and industrial projects led to use large amount of groundwater in Kurdistan Region for many purposes, therefore study of the quality, availability and suitability for the groundwater are very important. Koysnjaq-Surdash basin is located in the east of Erbil city with an area about 1600 km2, the elevation ranges from 280-1400 m above sea level. The area lies within the foot hill zone and including Lesser Zab River. The aim of this study for determine water quality, uses in different purposes, water suitability map by using GIS-based Multi-Criteria Decision Approach is used to identify suitable locations to use groundwater for irrigation purposes by using various criteria including; physical properties like Electrical Conductivity (EC), Power of Hydrogen (pH), Total dissolved solid (TDS), Temperature (T), and Salinity; and chemical properties including major cation (Ca, Mg, Na, K) and anion (HCO3, SO4, Cl, NO3) with trace elements. The criteria layers are assessed using the MCDA by combining them using the weighted overlay function in ArcGIS 10.1. In this study we will collect 35 deep well samples for chemical and physical analysis during two periods to determine the fluctuation in the concentrations; also we will take some monitoring wells and measuring the groundwater level fluctuation. Determination of water type and source of the groundwater, groundwater classification, hydrochemical formula, and Hypothetical salts in the study area. Creating suitability map using MCDA approach which is an appropriate and significant tool for suitability analysis of groundwater in terms of their adequacy levels by measuring the various criteria under consideration. Also we will classify groundwater by different method and classification.

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