



## 5<sup>th</sup> Intercontinental Geoinformation Days

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### Assessment of variation in water table of Quetta valley of 2010 & 2020

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#### Keywords

Aquifers  
Groundwater  
ArcGIS

#### Abstract

Groundwater has always been and continues to be an essential source of drinking water in Balochistan. Which is extracted from tube wells. Since the 1970s, the number of tube wells has increased from 5,000 to 40,000. The rapid increase in the number of drillings has caused the water table to drop hundreds of feet deep. So, Assessment of water level variability of aquifers is an important step to explore the appropriate groundwater management. Therefore, this study is designed to assess the variation in water table of Quetta valley of 2010 & 20. This research is done on the basis of statistical analysis using computer based software (ArcGIS and Microsoft office) to detect the change in groundwater level. An overall characterization method has been used on the water table of Quetta valley. The analysis was conducted using groundwater level data from 132 tubewell monitoring sites in Quetta valley of 2010 & 2020. The average water level of tube wells in 2010 was 281 feet while in 2020 it was 372 feet. Both mean values are included in the standard deviation. Where, it turns out that the difference between the two data sets is 64 feet. Maps and graphs were also evaluated by comparing the observed values of groundwater levels of 2010 & 2020. This analysis demonstrates the water table variation of Quetta valley of 2010 & 2020.

#### 1. Introduction

The subsurface border between the soil surface and the region where groundwater (water found in an aquifer) saturates spaces between cracks and sediments in the rock is known as the water table (also known as the water level). At this limit, the water pressure and air pressure are equal. The unsaturated sector of the soil is the area above the water table where water and oxygen enter the spaces between the sediments. Due to the oxygen content of the soil, the unsaturated zone is also known as the area of aeration (the phase of land above the water table, holding air between particles). The saturated area, when water fills all spaces between sediments, is located under the water table. The land surface that is above it has an impact on the height and form of the water table, which rises beneath hills and descends beneath valleys. Even within one location, there might be differences in the water table level. Precipitation variations and excessive groundwater pumping are the main causes of water table instability. (National Geographic Society, 2019).

#### 2. Study Area

At an average elevation of 1680 meters above sea level, the Koi-i-Murdar, Koi-i-Chaltan, and Zarghun mountains encircle the Quetta Valley (figure 2). Due to constant population increase and the influx of Afghan migrants, Quetta is currently experiencing several socio-financial problems. Along with other problems, a major issue in Quetta has been the lack of water, and times of low rainfall would make the situation worse (Zainuddin Kakar, 2018).

#### 3. Method

The research is a “descriptive” type of research, during research several departments of were visited for data collection. Then data was arranged, analyzed and interpreted. The data was collected as secondary and statistical tools were applied for arranging, analyzing and interpreting.

The variation of water table is analyzed statistically, using mean, variance and standard deviation. Further, GIS (Geographic Information System) and excel were used to generate maps, graphs and tables.

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Cite this study

Ali L, (2022). Assessment of variation in water table of Quetta valley of 2010 & 2020. 5<sup>th</sup> Intercontinental Geoinformation Days (IGD), 30-32, Netra, India

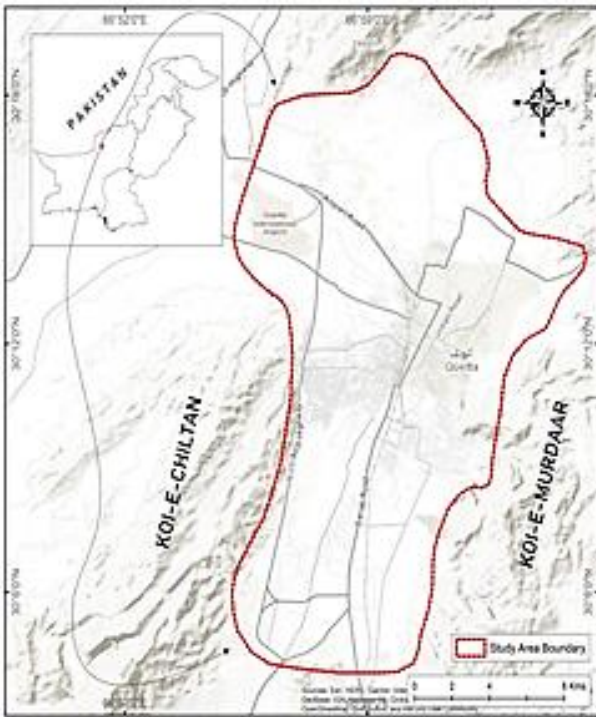


Figure 1. Study area

#### 4. Results

This research titled "Assessment of variation in water table of Quetta valley of 2010 & 2020 " is a descriptive type of research in which data has been collected from WASA, PHE and Irrigation Departments. The data were analyzed and interpreted using statistical methods. Over all 66 tube wells' data in the study area from 2010 to 2020 were analyzed. The average water level of tube wells in 2010 was 281 feet while in 2020 it was 372 feet. Both mean values are included in the standard deviation (in statistics, the standard deviation is a measure of the amount of variation of a set of values). Where, it turns out that the difference between the two data sets is 64.11 feet. The results are also shown on graphs as well as on maps which depict the variations in the water level of the given time period (2010-20).

The results of the study are shown in the Figure 2 and 3.

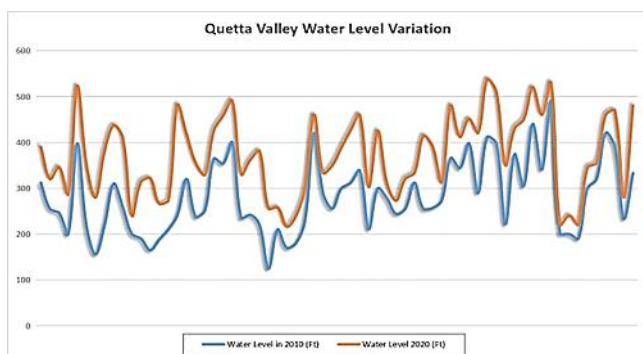


Figure 2. The Line chart showing the variation of water level of Quetta valley from 2010 to 2020 in two separate lines, where the left corner is showing the depth of tube-wells in feet

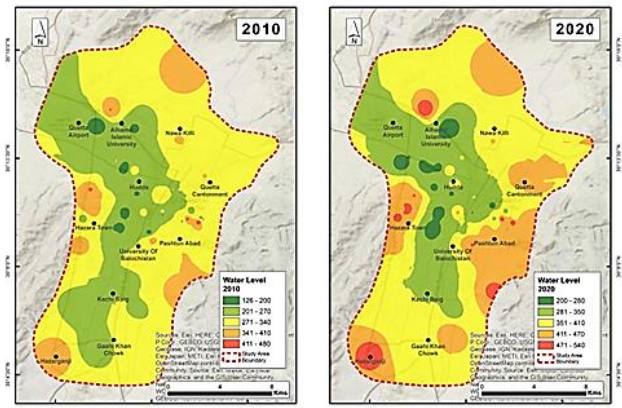


Figure 3. Showing the variation in water level of Quetta valley of 2010 & 2020

#### 5. Conclusion

This research (Assessment of variation in Water Table/Level of Quetta Valley of 2010 & 2020) is completed on the basis of statistical analysis and computer based softwares to achieve the objective set for the study. The analysis was conducted using groundwater level data from 66 tube-well monitoring sites in Quetta Valley from 2010 to 2020. The statistical calculation such as Standard Deviation, Variance and Mean have been used to detect the variation of water level, also some maps and graphs were drawn using ArcGIS and Excel by comparing the observed values of groundwater levels from 2010 to 2020. This analysis demonstrated the water table variation of Quetta Valley from 2010 to 2020. And finally, came to result by using the Mean values of 2010 data set and 2020 data set, and putting the values in standard deviation, which gave the result of 64. Thus, the variation in water table/level of Quetta valley from 2010 to 2020 is 64 feet.

#### Acknowledgement

First and foremost, we would like to praise Allah the Almighty, the Most Gracious, and the Most Merciful for His blessing given to me and my group-mates during my study and in completing this thesis. May Allah's blessing goes to His final Prophet Muhammad (peace be up on him), his family and his companions.

We wish to express hearty gratitude to our supervisor Prof Bashir Ahmed Sumelani for his continuous encouragement, guidance and supervision throughout this study. Also, thanks to all the professors of the staff of Geography Department Prof Tariq Baloch, Prof Muhammad Iqbal, Prof Ismail Jamote, Prof Rahat Ullah and Prof Muhammad Rafiq Ahmed who have taught us in the BS program and helped us step by step due to which we were able to complete the BS program.

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