World Academy of Science, Engineering and Technology
International Journal of Environmental and Ecological Engineering
Vol:17, No:10, 2023

Hydrologic Impacts of Climate Change and Urbanization on Quetta Watershed, Pakistan

Authors : Malik Muhammad Akhtar, Tanzeel Khan

Abstract : Various natural and anthropogenic factors are affecting recharge processes in urban areas due to intense urban expansion; land-use/landcover change (LULC) and climate considerably influence the ecosystem functions. In Quetta, a terrible transformation of LULC has occurred due to an increase in human population and rapid urbanization over the past years; according to the Pakistan Bureau of Statistics, the increase of population from 252,577 in 1972 to 2,275,699 in 2017 shows an abrupt rise which in turn has affected the aquifer recharge capability, vegetation, and precipitation at Quetta. This study focuses on the influence of population growth and LULC on groundwater table level by employing multi-temporal, multispectral satellite data during the selected years, i.e. 2014, 2017, and 2020. The results of land classification showed that barren land had shown a considerable decrease, whereas the urban area has increased over time from 152.4sq/km in 2014 to 195.5sq/km in 2017 to 283.3sq/km in 2020, whereas surface-water area coverage has increased since 2014 because of construction of few dams around the valley. Rapid urbanization stresses limited hydrology resources, and this needs to be addressed to conserve/sustain the resources through educating the local community, awareness regarding water use and climate change, and supporting artificial recharge of the aquifers.

Keywords : climate changes, urbanization, GIS, land use, Quetta, watershed
Conference Title : ICWRAE 2023 : International Conference on Water Resources and Arid Environments
Conference Location : Istanbul, Türkiye
Conference Dates : October 16-17, 2023