

Evaluation of Monthly Water Consumption and Land Surface Temperature Derived Using Landsat 8 and MODIS Data

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Abstract: Land Surface Temperature (LST) is one of the important factors in monitoring urban climate. Observing the variations of LST can provide a better understanding on the Surface Urban Heat Islands (SUHI) and the Urban Heat Islands (UHI) phenomenon. Thermal infrared data using remote sensing has been widely and increasingly studied. The aim of this research is to assess the effects of LST in Zamboanga City's water consumption for the year 2016 and 2017. Zamboanga City Water District and Philippine Statistics Authority data were used to compute the per capita water consumption (PCWC) of 49 adjacent barangays, out of the 98, in the city. Landsat 8 LST data were computed using the inverse Planck function and other parameters such as proportional vegetation and surface emissivity to assess LST in barangay level while MODIS Terra data were used to assess monthly LST. Result shows that Landsat LST and PCWC have positive moderate correlations, where warmer barangays consume more amount of water, with a correlation of 0.59 and 0.55 for March and April 2016, respectively while March and April 2017 recorded 0.49 and 0.56, respectively. On the other hand, monthly MODIS LST data and the computed PCWC equated a -0.71 correlation and an r^2 of 0.51. This negative correlation indicates that as months become warmer, lesser amount of water is used. This correlation does not directly indicate that the city consumes less water during warmer months but rather that the city's water supply are lesser in warmer months. As the temperature trend in the city is still continuously increasing, the results shows that LST must take into important consideration, as the city tries to fix its water supply problems.

Keywords: Remote Sensing, Land Surface Temperature, Per Capita Water Consumption, Landsat, MODIS