

Effect of water surface area on the remotely sensed water quality parameters of Baysh Dam Lake, Saudi Arabia

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ABSTRACT

Water quality parameters help to decide the further use of water-based on its quality. Changes in water surface area in the lake shall affect the water quality. Chlorophyll a, nitrate concentration and water turbidity were extracted from satellite images to record each variation on these parameters caused by the water amount in the lake changes. Each water quality measures have been recorded with its surface area reading to analyses the effects. Water quality parameters were estimated from the Sentinel-2 sensor based on the satellite temporal resolution for the years 2017–2018. Data were pre-processed then processed to estimate the maximum chlorophyll index (MCI), green normalized difference vegetation index (GNDVI) and normalized difference turbidity index (NDTI). The normalized difference water index (NDWI), was used to calculate and record the changes in the water surface area in Baysh Dam Lake. Results showed different correlation coefficients between the lake surface area and the water quality parameters estimated remote sensing data. The response of the water quality parameters to surface water changes was expressed in four different surface water categories. MCI is more sensitive to surface water changes rather than GNDVI and NDTI. Neural network analysis showed a resemblance between GNDVI and NDTI expressed in sigmoidal function while MCI showed a different behavior expressed in exponential behavior. Therefore, monitoring of the surface water area of the lack is essential in water quality monitoring.

Keywords: NDWI; Partition analysis; Water surface area; Water pollution; Water quality monitoring

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