Exploring the potential of Landsat-8 OLI and Sentinel-2 MSI data for mapping and monitoring Enez Dalyan Lagoon

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ABSTRACT

This study investigated the coastal lagoon monitoring and mapping potential of Landsat-8 Operational Land Imager (OLI) and Sentinel-2 Multi-Spectral Instrument (MSI) in the Enez Dalyan Lagoon, located in Turkey. Five different water indices, including normalized difference water index (NDWI), modified normalized difference water index (MNDWI), automated water extraction index for shadow ($AWEI_{sh}$) and non-shadow ($AWEI_{nsh}$), tasseled cap wetness index (TCWI), and maximum likelihood classification methods were compared to evaluate the potential for mapping coastal lagoons. Additionally, spectral consistency of index algorithms was examined to introduce the coastal lagoon monitoring potential whereas cross-calibration analysis was carried out. Among the methods, the $AWEI_{nsh}$ achieved quite better results compared with the other methods for mapping Enez Dalyan Lagoon while TCWI had relatively poor results independent from the sensors. $AWEI_{nsh}$ had the strongest correlation with 0.989, while NDWI had the poorest correlation value as 0.966. Results pointed out the linear correlation and spectral consistency between almost all corresponding indices derived from the data of two sensors. This research indicated that index algorithms provide a reliable mapping of Enez Dalyan Lagoon. Also, Landsat-8 OLI and Sentinel-2 MSI sensors, which are statistically consistent, provided sufficient monitoring of Enez Dalyan Lagoon to both continuity and combined use.

Keywords: Coastal lagoon monitoring; Landsat-8; Sentinel-2; Spectral water index algorithms; Normalized difference water index