Geophysical Research Abstracts
Vol. 19, EGU2017-2163-3, 2017
EGU General Assembly 2017
© Author(s) 2017. CC Attribution 3.0 License.

Assessment of the hydrological status of Marshlands in the South of Iraq using a combination of remote sensing and drought indices

Ahmed AlArazah, Anne Verhoef, and Kevin White

Geography & Environmental Science, University of Reading, Reading, United Kingdom,
(A.A.W.A.R.Al-Arazah@pgr.reading.ac.uk)

A combination of permanent and seasonal marshes in the southern part of Iraq play a vital role in the maintenance of biodiversity in the Middle East, due to their large size, as well as because of the richness of their aquatic vegetation and their isolation from other comparable systems. Three major marshland areas are Chibyish, Hammar, and Hawizeh Marshes, that lie between 29°55'N & 32°45'N to 45°25'E & 48°30'E, covering an area of approximately 15000-20000 km2 in the lower part of the Mesopotamian basin where the Tigris and Euphrates Rivers flow.

Over the past decades, these extensive Iraqi marshlands system have been heavily affected by both climate and anthropogenic factors. Desiccation was one of the most dramatic environmental disasters that occurred to the marshlands area. The marshes were artificially drained during the early 1990's for political reasons, converting approximately 90% of the marshes into deserts.

These marshlands were reflooded in 2003, ending the artificial drainage as well as a three-year meteorological drought period (2000-2003). The years 2003-2005 had above-average levels of precipitation, enhancing the effect of re-flooding, thereby causing a significant and rapid rise of water levels and re-establishment of vegetation in the Iraqi marshlands. In November 2005, marshlands extent decreased somewhat due to the high evapotranspiration rates in the preceding hot summer months. Due to drought events in 2008-2009, marshland extent started to shrink further; only to recover very slightly during the winter months of 2009/2010. The recovery rate from January 2010 to January 2011 was the highest in recent years.

This study analyses the effect of artificial draining systems and meteorological drought using LST and NDVI derived from remote sensing data, together with drought indices (SPI/SPEI, derived from ERA/in-situ data), for the years 2001 to 2015. NDVI has been used widely to detect changes in vegetation extent; LST was employed as a proxy of land surface evapotranspiration. NDVI was obtained from MOD13A2 products (16-Day L3 Global 1km SIN Grid VI datasets), which were designed for vegetation. LST was obtained through MOD11A2 products available at a spatial resolution of 1km and a temporal resolution of 8 days.

ERDAS Imagine 2013 was used for image processing and its application 'Remote Sensing Indices' to extract the value of NDVI and LST. ArcGIS 10.1 software was used for the final analysis stages (including map construction). Assessing marshlands ecological function is important in order to evaluate how the recovery processes and the restoration methods that have been used are achieving their goals, as well as the interplay with droughts. We show that remote sensing has a useful role to play in this. Combined with drought indices it allows us to attribute changes to environmental and anthropogenic factors.