


Chapter 1

Monitoring Continental Wetland Dynamics and Drivers of Changes Using Google Earth Engine

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ABSTRACT

Wetlands around the world face anthropogenic and climate pressures that threaten key ecosystem processes such as the water cycle. Such threats are most acute for non-perennial systems that rely on occasional surface water flows to maintain important ecological functions. This work will focus on the use of remote sensing within a cloud-based computing platform to assess the spatio-temporal evolution of Dayet Aoua through the development of a water transition map between 1984 and 2019. It is also question of detecting and spatializing the main drivers of the various challenges, mainly the land use changes operated. This study revealed that a combination of changes in climatic and land use change in the vicinity of the lake has recently affected the dynamic and the recovery capacity of Dayet Aoua. This study highlights the need to increase public awareness and decision-makers' knowledge concerning the relationship between land use change and wetlands degradation.

INTRODUCTION

Wetlands are rich and diverse and host nearly 10% of the world's biodiversity. They play several functions and provide various services to humans (Gardner and Finlayson, 2018). However, wetlands remain the most threatened ecosystems due to climate change and human activities (Dixon et al., 2016) and continue to disappear globally. Authors have investigated relations between surface water and climate variation or agriculture activities (Poudel et al., 2013). In Moroccan context, studies confirmed that the annual rainfall underwent significant downward trends and would certainly have a significant impact on wetlands (Sebbar, 2013). Also, emerging agriculture strategies promoted agriculture intensification even within arid lands. Intensive use of ground water has been subsided (PMV, 2008). In mountainous lands such as Middle Atlas which was mainly devoted to extensive pastoral practices have been reoriented toward arboriculture with as consequence the development and the sinking of boreholes and pumping in the aquifers.

Area of the surface of water bodies have significant inter-annual and intra-annual variations. Unfortunately, due to resources lack, spatial and temporal information of surface water that is mandatory to guide conservation and management strategies remain scarce and a common challenge to scientist and managers in several regions mainly in low and middle-income countries.

To deal with the absence of an in-situ monitoring of the state of these ecosystems, earth observation offers opportunities for periodic and systematic monitoring of these areas and become an important data source for monitoring water surface dynamics. Open access satellite images, mainly acquired by Landsat, MODIS and Sentinel satellites, have opened up very interesting development perspectives with

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