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Monitoring Effects of Climatic stresses on a Papyrus Wetland System in Eastern Uganda Using Times Series of Remotely Sensed Data

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Papyrus wetlands predominant in southern, central and eastern Africa; are important in supporting community livelihoods since they provide land for agriculture, materials for building and craft making, as well as services of water purification and water storage. Papyrus wetlands are dominated by a sedge Cyperus papyrus, which is rooted at wetland edges but floats in open water with the help of a root mat composed of intermingled roots and rhizomes. The hypothesis is that the papyrus mat structure reduces flow velocity and increases storage volume during storm events, which not only helps to mitigate flood events but aids in storage of excess water that can be utilised during the dry seasons. However, due to sparse gauging there is inadequate meteorological and hydrological data for continuous monitoring of the hydrological functioning of papyrus systems. The objective of this study was to assess the potential of utilising freely available remote sensing data (MODIS, Landsat, and Sentinel-1) for cost effective monitoring of papyrus wetland systems, and their response to climatic stresses. This was done through segmentation of MODIS NDVI and Landsat derived NDWI datasets; as well as classification of Sentinel-1 images taken in wet and dry seasons of 2015 and 2016. The classified maps were used as proxies for changes in hydrological conditions with time. The preliminary results show that it is possible to monitor changes in biomass, wetland inundation extent, flooded areas, as well as changes in moisture content in surrounding agricultural areas in the different seasons. Therefore, we propose that remote sensing data, when complemented with available meteorological data, is a useful resource for monitoring changes in the papyrus wetland systems as a result of climatic and human induced stresses.