

Evaluation of surface water dynamics for water-food security in seasonal wetlands, north-central Namibia

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Abstract Agricultural use of wetlands is important for food security in various regions. However, land-use changes in wetland areas could alter the water cycle and the ecosystem. To conserve the water environments of wetlands, care is needed when introducing new cropping systems. This study is the first attempt to evaluate the water dynamics in the case of the introduction of rice-millet mixed-cropping systems to the Cuvelai system seasonal wetlands (CSSWs) in north-central Namibia. We first investigated seasonal changes in surface water coverage by using satellite remote sensing data. We also assessed the effect of the introduction of rice-millet mixed-cropping systems on evapotranspiration in the CSSWs region. For the former investigation, we used MODIS and AMSR-E satellite remote sensing data. These data showed that at the beginning of the wet season, surface water appears from the southern (lower) part and then expands to the northern (higher) part of the CSSWs. For the latter investigation, we used data obtained by the classical Bowen ratio-energy balance (BREB) method at an experimental field site established in September 2012 on the Ogongo campus, University of Namibia. This analysis showed the importance of water and vegetation conditions when introducing mixed-cropping to the region.

Key words Cuvelai system seasonal wetlands (CSSWs); flood- and drought-adaptive cropping system (FDACS); Bowen ratio-energy balance (BREB) method; water environments