The Dead Forest of Chiefs Island: extreme floods and rainfalls drive rapid vegetation change in the Okavango Delta (Botswana).

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Résumé

Rapid global climate change driven by anthropic activities has now become an obvious reality, leading to global warming, enhanced rainfall variability, extreme rainfalls, floods or droughts. The last Intergovernmental Panel on Climate Change report especially noted the vulnerability of African freshwater and terrestrial ecosystems to climate change (IPCC, 2022). Those ecosystems situated in arid and semi-arid regions such as southern Africa are likely to be the most affected as they rely on limited water resources and face high mean and maximum temperatures. Savanna type forests are strongly affected, with an increasing tree dieback linked to drought, extreme temperatures, fire or increased biotic attacks. The flood-controlled wetlands of the Okavango Delta in northern Botswana form an oasis within the arid to semi-arid Kalahari Desert. The Delta sustains an unique association of ecosystems, from rivers to floodplains, riverine forests to savanna forests. This complex environment is nearly pristine from anthropic activity although it must be affected by global changes. While most ecological studies looking at the effects of climate change in semi-arid savannas are investigating the impact of increased temperature and drought conditions, we demonstrate that drowning events should also be considered as a major catastrophic driver for the ecosystems. Using field analysis, sediment logging, geochemistry and remote sensing analysis we describe extensive tree dieback in the savanna forest of southern Chiefs Island, the largest permanently emerged island of the Delta. We show that the destruction of the *Acacia* sp. and *Colophospernum mopane*dominated forest unexpectedly results from drowning during a succession of major floods and abundant rainfall seasons. This result highlights the necessity of transdisciplinary studies in understanding the autogenic functioning of the Delta as a prerequisite to describe the effects of global change.

Mots-Clés: Extreme floods, Vegetation drowning, Vegetation change, Savanna forest, Subtropical wetlands

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