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The Contribution of Highly Productive but Leaky Wetlands to the Carbon and Greenhouse Gas Dynamics of sub-Saharan Africa.

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The tropical wetlands of East Africa represent hotspots of carbon and greenhouse gas (GHG) exchange the dynamics of which vary across the site, landscape and regional scale. The wetlands of the Nile headwaters including Lake Victoria, the world's largest tropical lake, are dominated by the emergent macrophyte sedge Cyperus papyrus L. (papyrus), which under favourable environmental conditions has been shown to exhibit high rates of photosynthetic carbon dioxide assimilation ($\geq$40 μmol CO_2 m-2 s-1); high rates of net primary productivity ($\geq$50 g DM m-2 d-1); and the accumulation of significant peat deposits resulting in carbon stocks ($\geq$640 t C ha-1) that exceed similar estimates from tropical rainforests, often considered to be the primary land based reserve of carbon. However, while these wetlands represent significant carbon pools, they are inherently "leaky" systems due to the lateral loss of particulate and dissolved carbon and this has implications for riverine carbon and GHG emissions which have been shown to increase with wetland extent and upland biomass. This paper utilises a range of empirical and published information to report on the eco-physiological controls on carbon, water and GHG exchange in papyrus dominated wetlands and considers the contribution of these highly productive wetlands to the GHG dynamics of the inland waters of East Africa, and in particular the Lake Victoria basin and the headwaters of the river Nile.