

'Alternative futures' of the Okavango Delta simulated by a suite of global climate and hydro-ecological models

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Abstract

The natural resources of the Okavango Delta, a large wetland in semi-arid Botswana, form the basis of livelihoods of the local population and support economically important high-end tourism. The hydro-ecological system is dynamic at various time scales, responding to climate variability, and both flood and drought conditions have in the past put pressure on the system's users. Human-induced climate change can potentially exacerbate the effects of existing climate variability. In this paper, we present simulated future hydro-ecological conditions in the Okavango Delta generated by a step-wise modelling procedure. The outputs of three different global climate models are used to drive a suite of hydrological models. Lastly, a rule-based dynamic model relates hydroperiod conditions to vegetation assemblages. The simulated future conditions vary from much drier to much wetter than those recorded in the past. Models indicate that climatic change would result in change in both extent and distribution of the major ecotopes of the Okavango Delta. Importantly, the different ecotopes will be affected to varying degrees. The projected changes will have consequences for the wildlife-based management of the system. They will affect, for example, available grazing and migration/movement patterns of large herbivores, as well as fish. Such consequences can have rapid up-trophic level effects, ultimately leading to potentially substantial impacts on the economy. The main conclusion to be drawn is that management planning and land-use systems should be as flexible as possible.

Keywords: climate change, development planning, GCM, hydro-ecological modelling, wetland management