

Physical extremes, regime changes and biological shifts in St Lucia, South Africa's largest estuary

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There is increasing reliance on estuarine natural resources while estuarine habitats are lost to community activities around these systems. Changes to natural estuarine functioning may be less deterministic and predictable as climate change exerts a concomitant influence. St Lucia, the region's largest estuarine lake complex supports over half of South Africa's estuarine nursery area. By natural characterisation, it is oscillatory as cyclonic flooding and cyclical droughts have shaped the system ecology over decades. A recent, protracted 15-year drought, exacerbated by artificial alteration of natural surface flows resulted in almost permanent mouth closure. Based on resident biological communities, three functional areas are discernible which are persistent during extreme events. Each event and area is defined by a particular physical state. Two components of the physical state relate to biotic response: salinity and mouth status. The latter in so far as immigration and emigration to complete lifecycles and replenish standing stocks are concerned. The exceptional salinity ranges under this drought (5-200 psu), with a closed inlet have resulted in several physical regime shifts revealed by chronological clustering techniques. This work focuses on the macrobenthos response from a continuous set of biannual data collected for the past decade. Multivariate and time series analyses test the commonalities of macrobenthic assemblages and ecological entropy that occur prior and subsequent to each regime and if species groups and their functional attributes correlate with regime type. Suggestions are that St Lucia is serially unstable and occupied only by opportunistic species. Results show this is untrue in that typical assemblages of comparable states exist, but key species have disappeared from the system under recent salinity regimes. This study provides evidence of altered functioning of important nurseries under extreme conditions and depending on the scale and duration of the shift, the consequences may be of long duration or permanent.