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Comparative assessment of two agriculturally-influenced estuaries: Similar pressure, different response

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Abstract

This study compared the spatio-temporal dynamics in two agriculturally-influenced South African estuaries - Gamtoos and Sundays - to investigate how contrasting hydrological alterations influence physical, chemical and biological responses. With the Gamtoos Estuary experiencing regular high flow conditions, a key difference between the two systems is the propensity for natural flushing events to occur; a mechanism largely eliminated from the highly-regulated Sundays Catchment. Phytoplankton blooms (>20Chl-aμgl-1) were persistent and seasonal in the Sundays, inducing summer bottom-water hypoxia (<2mgl-1), whilst those in the Gamtoos were episodic and flow-dependent. Of concern in the Sundays Estuary, was the magnitude (>550μgl-1) and recurrent nature of two harmful algal bloom (HAB) species. This study provides the first account of HAB persistence and seasonal hypoxia in a South African estuary, demonstrating the possible consequences of shifting an ecosystem into a new stable state