

# Estuarine, Coastal and Shelf Science

## The influence of mouth status on pH variability in small temporarily closed estuaries

Aadila Omarjee <sup>a,b,\*</sup>, Susan Taljaard <sup>a,c</sup>, Steven Paul Weerts <sup>a,d</sup>, Janine Barbara Adams <sup>e</sup>

<sup>a</sup> Council for Scientific and Industrial Research (CSIR), P.O. Box 59081, Umbilo, Durban, 4075, South Africa

<sup>b</sup> Department of Botany, Nelson Mandela University, P.O. Box 77000, Port Elizabeth, 6031, South Africa

<sup>c</sup> Institute for Coastal and Marine Research, Nelson Mandela University, P.O. Box 77000, Port Elizabeth, 6031, South Africa

<sup>d</sup> Coastal Research Unit of Zululand, University of Zululand, Private Bag X1001, KwaDlangezwa, KwaZulu-Natal, 3886, South Africa

<sup>e</sup> DSI/NRF Research Chair: Shallow Water Ecosystems, Nelson Mandela University, P.O. Box 77000, Port Elizabeth, 6031, South Africa

<https://www.sciencedirect.com/science/article/pii/S0272771420307745>

### Abstract

Land-based nutrient enrichment of estuarine waters is emerging as a major factor influencing pH and has been referred to as “the other eutrophication problem”. Small temporarily closed estuaries with high residence times are likely to be especially prone to these impacts. This study investigated changes in pH during the open and closed phases in four small temporarily closed estuaries in KwaZulu-Natal, South Africa. The relationship between pH and mouth state was investigated in each estuary (6–16 surveys), based on conceptual relationships derived from the literature. The results indicated that pH is highly variable and influenced by estuary morphology and mouth condition. In a non-perched system, physical mixing due to strong tidal fluctuations influenced pH when the estuary was open; however, in perched estuaries in situ biological processes were more important. In all estuaries during the closed phase, either primary production and/or remineralisation emerged as the dominant influencing factor attributed to longer residence times. Thus trends in pH were evident based on mouth state (i.e. open or closed) and the degree to which these systems were perched, however, further research is needed to understand the complexity of pH variability including the impact and mitigation of anthropogenic change.