

The use of a botanical importance rating to assess changes in the flora of the Swartkops Estuary over time

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Abstract

The Swartkops Estuary has the third largest salt marsh area in South Africa and conservation of this area is essential. Industrial and residential developments since 1939 have encroached into areas that were previously salt marsh and have reduced the botanical status of the Swartkops Estuary. Supratidal salt marsh was estimated to cover an area of approximately 40 ha before any development occurred, however presently only 5 ha remains (a reduction of 88%). The intertidal salt marsh was reduced in cover from 215 ha to 165 ha (a reduction of 23%). The reed and sedge communities and submerged macrophyte, *Zostera capensis* were affected by natural processes such as floods. This study showed that the supratidal salt marsh has been most affected by development and that which has survived remains vulnerable in terms of loss due to further developments.

A means of assessing changes in estuarine flora over time using a botanical importance rating system was tested on the Swartkops Estuary. The botanical importance score is based on the area covered by the different plant community types as well as an average primary productivity index for each plant community type. The most important botanical components in the Swartkops Estuary from the point of view of the importance score, are the intertidal salt marsh, and intertidal benthic microalgae. If the mouth remains open thus ensuring regular tidal flushing and providing bait digging does not escalate, these plant community types should continue to function optimally.

Introduction

Encroaching residential and industrial development and the increase in demand for freshwater threaten South African estuaries. In order to ensure their continued survival, there is a need to identify estuaries that have a high conservation status. An estuary might have a high conservation status if it is a reservoir of high species diversity, contains a high number of plant community types or its state of intactness is adequate to ensure continued functioning. A botanical importance rating system was developed to identify these estuaries (Coetzee et al., 1997). The botanical importance rating system can be used to assess changes in the botanical condition of an estuary over time. By comparing the present condition to the past, or pristine condition, an assessment can be made of the present botanical status of an estuary. The botanical status can be used as an indicator of ecosystem status as the plants are the primary producers and their condition will influence the status of higher trophic levels.

The Swartkops Estuary has the third largest area of salt marsh along the South African coastline and exhibits a variety of estuarine flora (Baird et al., 1986). There are six different plant community types, namely supra- and intertidal salt marsh, submerged macrophytes, reeds, sedges, phytoplankton and benthic microalgae. Plant community types not found in the estuary include mangroves and swamp forest. Macroalgae species occur in the Swartkops Estuary (Hilmer et al., 1988), but the area covered by this plant community type could not be measured from available maps or aerial photographs.

Maintenance of habitat has long been recognised as the essential issue in conservation and environmental management. In

addition, the greater the number of different plant community types in an estuary the greater the variety of habitats. Ecologically, estuarine plants are a source of primary production and the community types which they comprise provide habitats for a large variety of faunal species (Davies, 1982, Bally et al., 1985; Whitfield, 1984; Adams et al., 1999). These species range from planktonic and benthic filter feeders to birds that utilise the marshes for food and breeding (Adams et al., 1999). The ability of plants to improve water quality by retaining pollutants and excess nutrients can have important implications for many beneficial water uses in the marine environment; for example mariculture, recreation and subsistence fishing. A large salt marsh will provide a more effective habitat than a small one (Daly and Mathieson 1981). A comparison of maintaining single large vs. numerous small seagrass beds has shown that density and diversity of species was higher in the many small seagrass beds. However, it was later shown that the single large seagrass continued to function longer if artificial changes were made to the surrounding environment (McNeill and Fairweather, 1993).

The Swartkops Estuary is surrounded by urban and industrial developments of the Port Elizabeth metropolitan area. These developments have resulted in a number of changes to the estuarine flora. These include physical elimination of plant community types as well as changes to the physical environment such as obstruction of water flow in the supratidal regions that has resulted in invasion by terrestrial plant species.

The objective of this study was to determine the effects of human impacts on the extent and distribution of the estuarine flora in the Swartkops Estuary. These effects were assessed from available literature, past aerial photographs, orthophoto maps and the application of a formula to calculate the comparative botanical importance score for the estuary under 'pristine' and present conditions.

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