Improving navigability on the Kromme River Estuary: A choice experiment application

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ABSTRACT

Navigation of estuaries is a vitally important aspect of boating recreation in South Africa and elsewhere. This paper uses a choice experiment to estimate recreation values of the Kromme River Estuary, a popular estuary along South Africa's east coast. This valuation methodology allows for the identification of preferred management strategies through the trade-offs made by estuarine recreational users. It is found that the level of navigability is the most important predictor of user choice, and argued that more attention needs to be paid to options for improving navigability and methods to fund these interventions. It is concluded that an increase in licence fee of ZAR402 would improve recreational value.

Keywords: estuary, recreational attributes, navigability, choice experiment, willingness-to-pay, conditional logit model, random parameters logit model

INTRODUCTION

The natural beauty, easy access, and range of environmental services provided by estuaries have attracted recreational, commercial and industrial activities (Day, 1980; Forbes, 1998). South Africa's coastline, which stretches for about 3 000 km, from north of Richards Bay on the East Coast to Alexander Bay on the West Coast, has many small estuaries. Not unlike estuaries worldwide, many in South Africa have become a focal point of human settlement, resource use and waste disposal (Hay et al., 2008; Hosking, 2008). There is mounting pressure on estuaries as recreational outlets, which, in turn, has led to their functional deterioration as well as deterioration in the quality of the recreational experience as a whole. A South African estuary system currently facing excess recreational demand pressure is the Kromme River. The Kromme River Estuary is freshwater starved (Baird, 2002). It faces a trade-off between the demand for abstraction of river inflows into the estuary, and the human demand to maintain an ecologically functional estuary habitat, as well as recreational service flows (Hosking, 2011). The expansion of a canal system, as well as the construction of two major dams on the Kromme River, have restricted the water flow into the estuary and resulted in increased sedimentation. The abstraction of this river water has led to the degradation of the estuarine environment in the form of habitat losses, and a decrease in recreational service yield in the form of reduced navigability (Forbes, 1998).

Two options to reduce sedimentation in the Kromme River Estuary and improve navigability are increased instream inflow and dredging. A study by Sale (2007) has shown that the water for upstream use (agriculture and domestic) is far more valuable than the water flowing into the estuary. For this reason, alternative options to instream inflow should be considered for the purpose of improving navigability, such as dredging. Two big questions regarding the dredging option are (i) how could this cost be funded, and (ii) does the navigability benefit exceed the dredging cost. With respect to the first question, we suggest that a potential source of funding for this dredging activity could take the form of an additional tariff imposed on recreational boat users of the estuary. With respect to the second question, we suggest the answer can be revealed through the tariff trade-off boat users of the estuary would be willing to make for improved navigability. This trade-off may be calculated through the application of a suitably designed choice experiment (CE). The primary objective of this study is to apply a CE to estimate the tariff trade-off to improve navigability on the Kromme River Estuary.

The Kromme River Estuary and its recreational demand issues

The Kromme River Estuary (34°08'S, 24°5'E) is located in the Eastern Cape approximately 80 km west of Port Elizabeth and is classified as permanently open (Fig. 1) (Scharler and Baird, 2003; Sale, 2007). The Kromme River runs for approximately 95 km, with the last 14 km of the river regarded as estuarine (Heymans, 1992). Dams have been constructed on the upper reaches of the river leading to a reduction in freshwater inflows into the estuary.

Navigation is hazardous on the Kromme River Estuary (Thorpe, 2010). The level of navigability of the Kromme River Estuary is inextricably linked to the extent of in-situ sedimentation taking place. Increased levels of sedimentation lead to the constriction of the river channel, both in terms of width and depth, and the creation of new underwater sandbanks (shoaling). The constriction of the river channel makes navigation difficult, sometimes impossible, especially at low tide. The Kromme River Estuary is a 'natural sediment trap'. Sediment enters from the tidal head and inlet. In an unmodified system, the net long-term rate of sediment build-up is relatively slow because periodic freshwater floods scour the channels and remove accumulated sediment out to sea (Reddering and

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