

9.6 Sand Mining in Estuaries

Golden beaches and sandy bays are a primary asset of the KZN coast but often taken for granted with little consideration given to the source and supply of its key ingredient: sand. While sand may appear to be in abundance, this is not always the case as sandy beaches are dynamic ecosystems with sand continuously on the move and in need of replenishment.

The main supply of new sand to the beaches of KZN is derived from riverine sources via its 77 estuaries. Interrupt the supply of sand and beach nourishment, suddenly beaches fade and disappear. Port cities such as Durban know only too well what happens when the natural supply of sand to their beaches is compromised.

However, the construction industry values this supply of clean sand, and often “mine” their sand from environmentally vulnerable estuaries. Sand mining is largely driven by demand

for development of houses and associated infrastructure.¹ Sand mining is a consumptive activity that results in a net decrease in the resource, such that less sand may be available for coastal replenishment and hence other, often non-consumptive, uses such as recreation and tourism.² A number of estuaries are now under threat from sand mining activities.

Estuaries are one of the most important ecosystems found within the coastal zone, as discussed in *Section 3.3*. Estuaries are known for their high levels of biodiversity and services, such as nursery areas for fish, shrimps and crabs, as well as feeding and roosting sites for waders and other migratory birds.³

A study in 2007 showed that there were approximately 60 sand mining operations within 18 of KZN’s estuaries, predominately occurring in the bigger systems.³ The number of operations occurring on a single system varied, from a

Sand mining activities in the Umgeni Estuary.



Photo: Bronwyn Goble



single operation on the Thukela to 10 on the Mvoti Estuary.³ A previous study, done in 2003, showed that the total mining volume for all KZN estuaries was approximately 742 900 m³ per annum, split across 14 systems in the Province.² Of concern is that sand mining activities have an adverse effect on estuarine and river functioning through the depletion of sand.

Types of sand mining in estuaries

There are various ways in which mining activities are undertaken in estuaries, including dry-pit mining, wet-pit mining, bar skimming and pits on the adjacent floodplain; all of which have varying impacts on the natural environment. Dry-pit mining refers to pits excavated on dry ephemeral streambeds or exposed bars; this is done using bulldozers, scrapers and loaders.⁴ Wet-pit mining is more complicated, requiring the use of a dragline or hydraulic excavator to remove sand from below the water table or in a perennial stream channel. Dewatering is often undertaken in order to make the site more accessible and allow for easier excavation.⁴

Bar skimming or scalping is the process of “scraping off” the top layer of sediment from a bar without excavating below the summer water level.⁴ Depending on elevation, pits are often located above or below the water table on the adjacent floodplain away from the main channel. However these can be integrated in-stream following sudden changes in the channel course as a result of flooding.⁴

Impacts of estuarine sand mining

The removal of material from within or near the streambed has a direct impact on the physical environment and habitats within the estuary. It affects, amongst others, the channel geometry, substrate composition, depth, velocity, turbidity and the transportation of sediments.⁴ This in turn has an adverse effect on the instream biota and riparian habitat; biota are adversely affected due to three main changes: 1) alteration of flow patterns due to modification of the river bed, 2) an excess of suspended sediment and 3) damage to riparian vegetation and instream habitat.^{3;4} Instream mining effects natural functioning through bed degradation and sedimentation, as this is dependent on the balance of stream flow, sediment supply and channel form.⁵ This in turn effects channel and habitat development, and can result in effects on

downstream habitats.⁵ Species generally require specific habitat conditions in order to ensure their survival. Disruptions to these habitat conditions results in declines in biological diversity and productivity. Alterations to riparian vegetation can cause changes in channel functioning, affecting aquatic ecosystems. In addition, the disturbances caused by the activity may have effects far greater than those seen at the site, negatively affecting upstream and downstream functioning.⁴

Effects of sand mining can be much further reaching than the immediate habitat, whereby the quantity of sand that reaches the coast is negatively affected. This affects coastal stability and functioning of beaches. Sandy beaches are identified as critical for a range of socio-economic reasons, with direct benefits from eThekweni sandy beaches being estimated at R 113 596 667 per km, through value for recreation, tourism and aesthetics. In addition, indirect benefits were valued at R 915 000 per km for factors such as erosion control, biological control, habitats and existence value.² Depletion of sand instream and at the coast can result in alterations to estuarine mouth functioning, the effects of which are compounded by sea-level rise and coastal erosion.⁵

In some cases sand mining can in turn lead to damage of infrastructure and properties, through the undercutting of banks, increased erosion and a change in the carrying capacity of the stream.⁵

Sand mining in KZN estuaries has an adverse effect on both estuarine and coastal functioning, having contributed to the reduction of natural buffers, predisposing sections of the coastline to damage from increasingly variable seas and storm surge events. Impacts on the biological function of estuaries have also been recorded. While the need for building material is unquestionable, other terrestrial sources of sand should be preferred. Moreover, estuarine sand mining should be better and more wisely managed by the permitting authority, the Department of Mineral Resources, in order to halt a cascade of negative environmental effects. ■

Copyright:

This publication may be reproduced in whole or in part for educational or non-profit purposes without special permission from the copyright holder, provided that acknowledgement of the source is made. No use of this publication may be made for resale or for any other commercial purpose whatsoever without prior written permission from the KwaZulu-Natal Department of Agriculture and Environmental Affairs and the Oceanographic Research Institute.