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Photo: Ronel Nel

3.2 Sandy Shores

The coastline of KZN is an ocean-exposed, high-energy interface between land and sea. Sandy shores comprise a significant proportion of this dynamic boundary, noting that here the term "sandy shores" refers to the coupled and contiguous dune, intertidal beach and surf-zone ecosystems.

Some of the most spectacular and pristine beaches in the country are found in KZN. Sandy shores also harbour a suite of unique biota, and provide numerous ecosystem goods and services that support human livelihoods, health and well-being and contribute to the province's economy (*see Chapters 7 and 8*).

Complex interactions between tides, wave climate, and nature of the sediment give rise to a continuum of beach morphodynamic types. These range from reflective beaches with coarse-grained sand, a steep slope and narrow surf zone, to dissipative beaches with finer-grained sand, a flat slope and wide surf zone. There are a range of intermediate forms between these two extreme states, characterised by sand bars, rip currents and cusps.[1; 2; 3]

In KZN, conditions are microtidal (<2 m tide range), with strong wave action, a narrow continental shelf, and a supply of sand mainly from rivers and estuaries. Consequently, the KZN beaches tend to be coarser grained and steeper sloped, with narrow surf and intertidal zones. They also often have cusps and rip currents as features of the shore.[4; 5] This means the predominant beach morphodynamic types for KZN are intermediate and reflective.

Global trends show that both diversity and abundance of beach macrofauna decrease from dissipative to reflective conditions.[6; 7; 8] Macrofauna communities in KZN comprise relatively few species (9-10 on average), with a range of 1-16 species recorded on individual beaches.[9] Although species richness is relatively low, it is important to note that these are unique species with high levels of endemism.[9] In addition, the meiofaunal and microbial communities on intermediate to reflective beaches are prominent,[10; 11] which in turn underpin key ecosystem services such as nutrient cycling.[12; 13; 14]

KZN sandy beach.

The sandy beaches of KZN occur within the Natal-Delagoa Bioregion.[15] The Natal-Delagoa is a subtropical coastal bioregion (i.e. an oligotrophic system), making the beach food web particularly dependent on allochthonous inputs from terrestrial and marine sources.

Dune ecosystems comprise four broad categories, including bare/free dunes, vegetated dunes, dunes related to topographic barriers, and wetlands-associated dunes, with three to four different types listed under each category.[16]

Spatial distribution

The KZN coast is dominated by sandy beaches, of which less than 1% are dissipative beaches; 18% are dissipative-intermediate, 29% are intermediate and 8% are reflective.[5] Dunes line the full length of the coast, except where burgeoning population growth, urban development, and shoreline defences (seawalls) have replaced this natural barrier.[16; 17]

Today, the KZN coastline is characterised by three regions. An undeveloped, near-pristine northern section stretches from Kosi Bay to Mapelane, with very good conservation protection in the iSimangaliso Wetland Park. A mixed-use central section is found from Richards Bay to Durban, with areas of complete habitat modification interspersed with untransformed habitat. Lastly, a developed southern section stretches from Durban to Port Edward.[4] Interestingly, the distribution of beach morphodynamic types along the provincial shoreline reflects the same three zones,[4; 5] and the distribution of dune types follows a similar pattern.[16]

The northern section comprises beaches of the intermediate to dissipative-intermediate state with some reflective beaches in sections. Here, large and intact bidirectional parabolic dunes line the beaches, and include well-established coastal dune forests. Scattered among these vegetated dunes are buttress reversing barchanoid dunes (bare sand).

The central section is mainly composed of intermediate beaches, with some reflective portions. For the most part, the dunes backing these beaches are small hummock, blowout and barrier dune types that tend to be associated with bayheads and estuary mouths. Of note are the parallel beach ridges of prograding shoreline at Mtunzini, and a section of cliffed dunes with cirque-like slump scars between Port Durnford and Richards Bay.

In the southern section, the beaches are predominantly reflective, fragmented along the shore by many rocky and mixed shores. The dunes are the same as those found in the central section.

Uniqueness of the KZN sandy shores

The value of sandy shores in KZN is reflected in their ecological, economic and cultural importance, which, at a local scale, is often related to the unique features that are prominent along the coast. From an ecological perspective, and in light of the fact that most of the world's beaches are eroding,[18] a key feature of the KZN coast is the prograding shores at Mtunzini. This is one of two places in the country where the coastline is recognised as accreting.[16] Importantly, the sandy shores of the iSimangaliso Wetland Park (northern KZN) are nesting grounds for loggerhead and leatherback turtles (*Section 4.3*). Several shorebird species also use beaches as nesting, foraging and/or roosting grounds (*Section 4.8*).

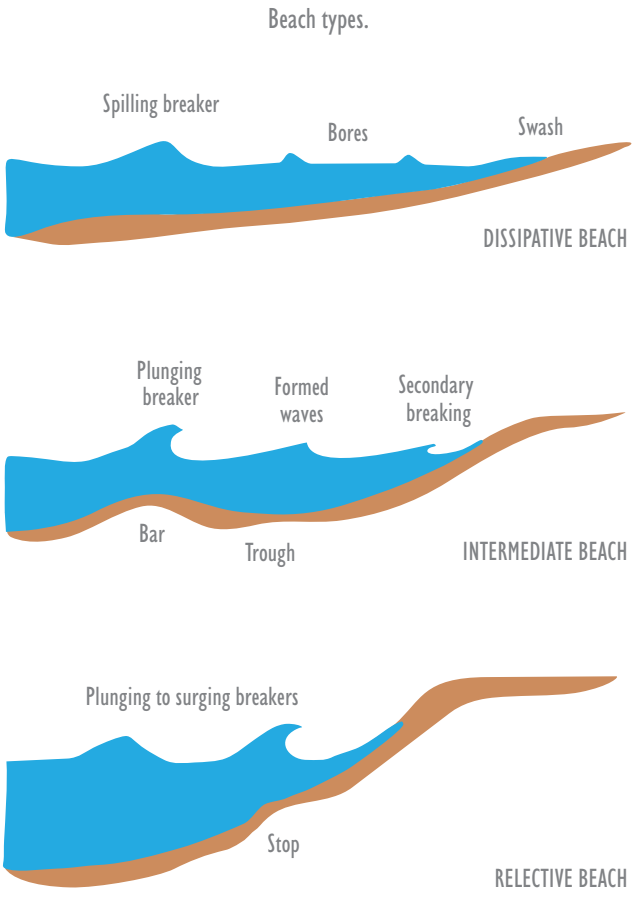

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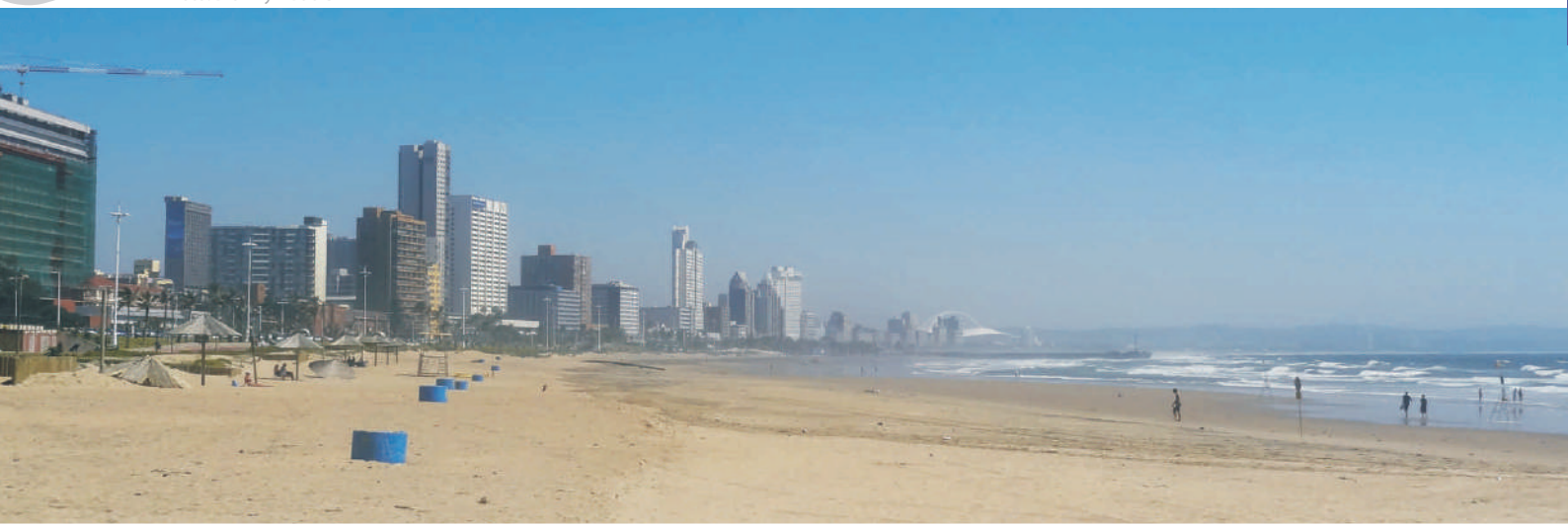
Photo: Bronwyn Goble



KZN sandy beaches offer areas for recreation and tourism.

Sandy shores are highly-valued natural assets, for recreational, cultural and traditional reasons. Sandy shores also provide economic vlaue through tourism and the extraction of natural resources for commercial and subsistence use (see *Chapters 6, 7* and *8*). Apart from their direct economic contribution, sandy shores provide a number of invaluable ecosystem services, such as water filtration, nutrient recycling and disturbance regulation by buffering heightened wave energy during extreme tides and large storms.

Threats to sandy shores

The greatest threat to the sandy shores of KZN is habitat modification, primarily due to extensive coastal development (*Section 9.2*). In many cases, the development is also inappropriately located too close to the shoreline, which leaves no room for the natural landward migration of the coast, and thus results in "coastal squeeze" – the gradual inundation and loss of sandy beaches. In addition, urbanised shores lose the natural barrier provided by dunes, which makes these developed areas vulnerable, as explained in *Section 9.5*. The effect of the KZN storm event of March 2007 was a classic example of this phenomenon.[19; 20]

There are a number of activities in the hinterland that have important downstream effects on beaches and dunes. In particular, damming of rivers, esturine sand mining (*Section 9.6*) and agriculture (*Section 8.6)* have altered the supply and quality of sediment reaching the coast. Generally, the result has been a reduction in the volume of sand supplied to beaches and dunes, which contributes to erosion and further reduces the resilience of the coast to sea-level rise and storms, as explained in *Sections 9.4* and *9.5*.

It is reassuring to note that a diversity of sandy shores with unique ecological attributes is still well represented in KZN, this despite the widespread and increasing levels of disturbance and usage. Mining, sand mining in estuaries, coastal development and damming of rivers all interfere with the dynamic processes that sustain sandy shores and their associated organisms. Deriving sustained goods and services from KZN sandy shore resources is technically possible, but that will take informed planning, sensitive development and good governance. ■