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3.7 Rocky Shores

The shoreline is often called the littoral zone, which embraces the area between the highest tidal reach and the lowest ebb; more precisely defined as the intertidal zone. This is one of the most physically volatile zones with twice daily alternating tidal inundation and exposure, huge temperature fluctuations, dehydration and constant violent wave action. While the littoral zone in eastern Africa can comprise a number of ecosystem types, along the KZN coast this is essentially either sandy beach or rocky shore.

Rocky shores account for about 20% of the coast and are mainly located on the southern and central coast. They are composed of dolerite, granite, as well as Quaternary, Ordovician and Ecca sandstone.[1; 2; 3] North of Cape Vidal, the rocky shores are interspersed between long stretches of sandy beach and are composed of Quaternary sandstone.[1; 2; 3] As on other rocky shores, the interplay of physical stresses and biological processes have resulted in a highly diverse biota, displaying various adaptions to intertidal life. Because the physical stresses vary as one moves from low to high points in the intertidal zone, so the biota vary in regular bands across the rocky shore with the hardiest organisms nearest the high water limits. This vertical zonation is a characteristic of rocky shores.[4]

Rocky shores in KZN span two bio-geographical regions: the southern warm-temperate Natal bioregion and the northern subtropical Delagoa region.[3; 5] The rocky shores of the Natal bioregion are dominated by the brown mussel, while in the more tropical Delagoa region, redbait and the Natal reef-worm occur in much higher densities, especially in the lower intertidal zone.[3] This might be due to the significantly higher riverine input in the Natal bioregion.[3] Intertidal invertebrates are subject to high levels of subsistence harvesting in the Delagoa region, whereas intertidal harvesting in the Natal region is lower, being mainly undertaken by recreational fisheries.[3]

Rocky shore zonation

High on the shore, the supra-littoral or littorina zone is the area usually moistened by sea spray, only occasionally being washed by waves during storms or spring high tides.[3; 6] Few species can tolerate the temperature extremes, high light intensity and exposure experienced in this zone.[3; 4; 6] In KZN, this zone is dominated by the very small *Littorina spp* snails.

Rocky shores of KZN.

Photo: Judy Mann

Unique to the East Coast of South Africa, the Natal rock oyster usually occurs in a band directly below the littorina zone, forming an identifiable oyster belt.[3; 4; 6]

Below the littorina zone and oyster belt lies the mid-littoral zone which is subject to alternating periods of exposure and submersion by the tides, resulting in an increase in species diversity.[3; 4 6] Temperature extremes and exposure times decrease, while wave energy and the possibility of sand inundation increases.[3; 4; 6] Notable in this zone are species well adapted to withstanding strong wave action by being of low profile and very tightly adhering to their rocky substrate. Here we find a diversity of barnacle and limpet species as well as occasional dense beds of tube worms. Here too we can find species of crabs, especially the Natal rock crab. Towards the lower part of the mid-littoral zone, densities increase where fauna and flora compete for space. The main competitors here are the beds of brightly coloured anemone-like zoanthids, brown mussels and seaweeds: especially tufts of coralline seaweeds and beds of the common *Hypnea spp*.[4; 6]

Directly below the mid-littoral zone, is the infra-littoral fringe, which is only exposed during spring tide lows, and where wave intensity is at its highest; consequently species numbers are lower.[4] This infra-littoral fringe is home to the commonly known clusters of redbait, often found in the lee of wave action or in more sheltered areas of this zone. Here too are found the commercially important Cape rock oyster. However, in most places, the infra-littoral fringe is dominated by a wide variety of seaweeds, many of which generate nutrients through photosynthesis and are pioneers of reef recolonisation.[1]

Although corallines often dominate the seaweeds (*Section 4.1*), the diversity amongst green, brown and red seaweeds is striking. Moreover, there is considerable variance in seaweed composition from north to south among the KZN coast, with a progressive integration of more tropical species amongst temperate varieties. The tropical varieties north of St Lucia comprise low tufts with an amazing diversity of up to 100 species found in a single 1.5 m^2 section of reef. These short and dense turfs of seaweed in the infra-littoral fringe,[6] are heavily grazed by fish and other animals but are known to have exceptionally high growth rates, thereby contributing a source of organic nutrients to the rocky shore ecosystem and beyond. Larger seaweed species include beds of the green multi-species *Caulerpa* and the brown seaweeds *Sargassum* (air-bladders) and turkey-tail characteristic of KZN rocky shores.[6]

Larger, non-sessile animals also occur in this wave exposed zone, although their presence is clearly influenced by the state of tides. Sea urchins, sea stars, brittle stars and sea cucumbers all thrive in this zone where most graze on the seaweeds, although often located in sheltered sections away from fierce wave action. Octopus, several species of crab and at least three species of valuable rock lobster may also be found holed up in this zone.[7]

Aside from their zonation, rocky shores may also be enriched by tidal and sheltered pools. These are important nursery areas, providing protection and food for juvenile fish, crustaceans and other forms of marine life.[8] Notable groups of fishes include the blennies, gobies, damselfishes and the juveniles of blacktail, stumpnose, flagtail and occasionally butterflyfishes.

Threats to rocky shores

The main threat to KZN rocky shores, as with many ecosystems, is coastal development. It can lead to habitat loss and degradation, decreased biodiversity, disrupt ecosystem functioning and decrease the resilience of the ecosystems.[5] High levels of marine pollution (*Section 9.3*) are associated with waste discharges derived from coastal urbanization and development. Toxic bioaccumulation of waste water contaminants can occur in filter feeding organisms such as mussel and oysters, and subsequently move higher up in the food chain.[9] Excessively high levels of exploitation using inappropriate gear pose a threat, especially as it can upset the succession of biota resulting in stands of seaweeds that were once rich beds of mussels.

Climate change and episodic events may also impact on the rocky shore biota. Sand inundation and temperature extremes are of special concern to this rich and diverse ecosystem.

It is evident that rocky shores represent an important and highly vulnerable part of the coastal zone. Species here are specially adapted to this turbulent environment which is subject to a range of physical stressors. Yet the rocky shore biota plays an important role in organic nutrient generation, cycling and biological interactions, which drive a highly diverse community of fauna and flora. For this reason these systems need careful protection in order to ensure long-term sustainability and productivity. ■