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3.8 Subtidal Reefs

The subtidal reefs of KZN can be partitioned into two groups: coral reefs and rocky reefs. The coral reefs are located in the northern subtropical region of the province, where the warm climate and clear water have resulted in rich coral growth and abundant fish life. The rocky reefs are scattered intermittently along the rest of the KZN coast, with the most extensive reef structures found south of Durban, approximately 5 km offshore of the Umkomaas River.

Coral reefs

Coral reefs are limestone (calcium carbonate) structures that have been created over millions of years. The basic building blocks are tiny animals called coral polyps that are cup-shaped and have tentacles surrounding a central mouth. Coral polyps grow in clusters called colonies. These colonies grow continually as new polyps attach to the existing structure.

There are two main types of corals: hard and soft corals. Hard corals are termed reef-building corals because their calcium carbonate skeletons form the foundation of the reef. In contrast, soft corals do not have a skeleton, but tiny needle-like splinters called sclerites that are embedded in their tissue. The sclerites are widely-spaced which allows the colonies to bend and sway in the current. Hard corals extract calcium compounds from the surrounding seawater to make their limestone skeletons.[1] After centuries of growth, coral

Coral reefs of KZN.

Photo: Camilla Floros

skeletons accumulate to form large, complex structures or reefs that provide a myriad of habitat types for thousands of fish and invertebrate species.

Coral polyps owe their ability to create such prolific structures to microscopic, symbiotic algae that live within their tissue. Through photosynthesis, these tiny algae (zooxanthellae) provide approximately 90% of the nutrients needed by the coral polyps for reproduction and growth.[1] Corals grow in water that contains relatively few nutrients, thus the zooxanthellae are vital for their survival. Because the zooxanthellae depend on sunlight for photosynthesis, reef-building corals are found in shallow, clear water. Corals also require tropical or sub-tropical temperatures for growth.[2]

Photo: Camilla Floros

Acropora digitata, a coral found in KZN waters.

Coral reefs are one of the most diverse ecosystems on earth, despite occupying less than 0.1% of the Earth's surface,[3] with a diverse range of species relying on them as a source of food and shelter.

The coral reefs in South Africa are classified as subtropical reefs, because they occur at the southern limits of coral distribution, only being found along the Maputaland coast.[4] They extend for approximately 150 km along the coast from the southern Mozambique border near Kosi Bay to Leven Point, 12 km north of Cape Vidal.[5] The Maputaland coral reef system can be geographically separated into three reef complexes: the Northern Reef Complex, the Central Reef Complex and the Southern Reef Complex.[6] They are classified as patch reefs and consist of coral communities that have colonized fossilized sand dunes that were submerged during the most recent rise in sea level.[5]

The Maputaland coral reefs are different from tropical coral reefs in that they are on average deeper (9-30 m) and geologically younger, having been aged at 3 870-5 000 years BP.[5] Their relatively young age and high latitudinal location have resulted in coral communities that grow as a thin carpet over the underlying bedrock, unlike their tropical counterparts, which grow into a thick base of coral skeletons. Nevertheless, corals are the dominant life form on the reefs and have created an ecosystem that is rich in species diversity and abundance.[4]

Worldwide, there are about 735 species of hard corals, of which 96 species have been recorded on South African reefs, compared to the 40 species of soft coral reported from the same area.[7] The coral communities consist of a rich mix of Indo-Pacific species, and coral cover is between 50-60% on most of the shallow reefs.[6] There are at least 500 species of reef-associated fish, which are also of Indo-Pacific origin. A number of endemic fish and coral species are found in these reef communities, including the tiger rockcod and several soft corals.[7]

Value of coral reefs

Coral reefs are valuable ecosystems, providing ecosystem services and shore protection, through the absorbtion of wave energy.[3] Coral reefs provide habitat for a quarter of

all the fish species in the ocean.[8] In total, one billion people are estimated to depend on coral reefs for food and income.[9] The global economic value of these services is estimated to be at least US$ 375 billion per year.[3] Tourism generated through coral reefs is estimated at several billion dollars a year and numerous island nations depend solely on coral reef-orientated tourism for their economic growth.[10]

In KZN, coral reefs are important for tourism and associated economic activity. The reefs at Sodwana Bay have a long history of exploitation through recreational fishing and SCUBA diving. These activities provide valuable economic benefit to the local communities in the Sodwana Bay area through employment creation.[11]

Threats to coral reefs

Despite the immense value of these ecosystems, coral reefs throughout the world are being degraded at a rapid rate as a result of human-related disturbances that vary in intensity and scale.[8] Threats such as overexploitation of fish species, destructive fishing practices (e.g. dynamite fishing), coastal development and pollution all affect coral reefs at the local to regional scale, while phenomena such as coral bleaching and ocean acidification threaten coral reefs on a global scale.[12]

At present, it is estimated that 20% of the world's coral reefs have been destroyed and a further 24% are under imminent risk of collapse.[13] KZN is fortunate that its coral reefs are situated within two longstanding MPAs (MPAs are described in *Section 10.4*) that form the marine component of the iSimangaliso Wetland Park, a world heritage site.

Rocky reefs

Moving southwards from the Maputaland region, the coral reefs give way to rocky reefs, which, besides a complex off Port Durnford, occur sporadically along the coast until just south of Durban, where Aliwal Shoal, Landers Reef, and Protea Banks are located, approximately 5 km offshore and running parallel to the coast. These three reef complexes result in a series of prominent rocky reefs that vary in length from 200 m to 1.5 km, and are found at depths of between 10 m and 25 m.[14] Geologically, these reefs are similar to the Maputaland reefs, consisting of submerged fossilized sand dunes. However, the topography is more dramatic with rugged rock formations such as pinnacles, caves, ledges, amphitheaters and gullies.[15]

The benthic communities on the rocky reefs also differ substantially to the Maputaland reefs and are characterized by more temperate communities.[16; 17] Algae are the dominant benthic group on the reefs, followed closely by sponges, ascidians and feather stars.[18] Hard and soft corals also occur on the reefs, but in lower species numbers. Nevertheless, on certain exposed pinnacles, the thistle soft coral can be particularly abundant and on the deeper reefs, large black coral trees can grow as large as 2 m. An array of other benthic species also flourish on the reefs such as shrimps, starfish, clams, cowries, nudibranchs, anemones and crabs, which use the abundant rocky outcrops, crevices and caves as refugia.[19]

Value of rocky reefs

The fish life found on these reefs is also diverse as discussed in *Section 4.4*, with an estimated 500 reef-associated species recorded to date. The fish communities consist of a mix of tropical, subtropical and warm temperate species and many species are present in high abundance.[16] Pelagic fish and sharks are particularly common on the reefs, due to their considerable distance from shore. The ample fish life attracts a range of recreational activities, detailed in *Section 7.4*, and the reefs are internationally known for shark encounters, which draw visitors all year round.[20] These activities on the reefs bring valuable revenue to the small coastal towns in their vicinity, which have grown considerably since they were first discovered in the 1980s.[16] Reef-user conflicts occur due to the diverse services that these reefs offer, and increased concern for the reef biota, particularly on Aliwal Shoal, resulted in the establishment of the Aliwal Shoal Marine Protected Area (MPA) in 2004. The MPA was established to protect and conserve the marine ecosystem around Aliwal Shoal, reducing user conflict and promoting ecotourism.[20] Landers Reef and Protea Banks are not within the MPA boundaries; however, the levels of user pressure are not as high as on Aliwal Shoal.

The KZN coast has a diverse and rich assemblage of reefs, including the southernmost coral reefs in the Indian Ocean. Our reefs provide a suite of ecosystem goods and services from food security and socio-economic benefits derived from tourism to unique biodiversity resources. While we take pride in their considerable levels of MPA protection, these fragile ecosystems still require wise management to ensure sustainability. ■