Seagrass Beds of Knysna

Prepared by Dr Richard Barnes (Fellow of St Catharine's College Cambridge) for Steenbok Nature Reserve

Knysna is not only, as the advertising slogans tell the visitor, 'South Africa's Favourite Estuary' but it is also South Africa's foremost locality for seagrass, containing more than half the entire country's seagrass meadow. And the shores around Leisure Isle and between Leisure Isle and George Rex Drive on the mainland contain some of the best stands of seagrass in Knysna. Before going any further, it is important to state the non-obvious, that seagrass is *not* a type of grass. Seagrasses form four or more different evolutionary lineages of otherwise freshwater or marshland flowering plants that usually, but not always, have somewhat grass-like leaves. They are in fact more closely related to lilies, gingers and arums than they are to grasses. Grasses they may not be, but the 'sea' part of their name is certainly correct: indeed they are the only flowering plants that are able to live their whole lives submerged in seawater and all but one species even flower underwater.

At Knysna, the dominant species is 'Cape eelgrass' (*Nanozostera capensis*) with some 'oval-leafed saltweed' (*Halophila ovalis*) at low tidal levels.

Seagrass meadows have been described as being the poor relation of coral reefs. Both these shallow-water marine habitats are centres of great biodiversity, are highly productive, and are currently disappearing from the planet at an alarmingly fast rate (some 7% or more than 100 sq. km per annum), yet it is only the fate of coral reefs that seems to have stirred the public imagination and given impetus to their scientific investigation, leaving much seagrass ecology poorly understood. Some of this bias may reflect the overt economic importance of the tourist revenues attracted by coral reefs, although seagrasses also have a huge — albeit largely hidden — economic value, at an estimated US$ 1.9 trillion per annum. Some of the disparity may also be a reflection of the visually obvious richness, diversity and beauty of reefs, whereas many seagrass meadows may appear uniform, monotonous and apparently lacking individual features of interest. However, any such appearance will be an illusion. The Knysna seagrass beds certainly team with a wide

variety of life, it is just that many of the life forms are small and most are hidden from sight.

Walking across seagrass beds is actually not to be encouraged as eelgrass has been shown to be very sensitive to trampling, so let us instead take a 'virtual walk' across the seagrass bed that fronts the Steenbok Nature Reserve and Kingfisher Creek region along the north shore of Leisure Isle.

The virtual observer should certainly see some signs of animal life: the occasional large red 'false plum anemones' (*Pseudactinia flagellifera*), perhaps some of the large 'shaggy sea hares' (*Bursatella leachii*) that come in to mate, and the ubiquitous 'common sand hermit-crabs' (*Diogenes brevirostris*) scurrying along between the seagrass shoots or, at a smaller scale, the tiny 'sandflat crabs' (*Danielita edwardsii*) and 'crown crabs' (*Hymenosoma orbiculare*) climbing over the seagrass leaves, but the seagrass bed does certainly appear, like a stretch of grass on land, to be a world composed of plants with only the occasional animal. This is in fact far from being the case - a fact, of course, well known to bait-collectors! But there is far more underfoot than the mud-prawns (*Upogebia africana*) and bait-worms (*Marphysa* spp. And others) they seek. A survey in late summer 2011 along the north shore of Leisure Isle disclosed an average abundance of over 6,200 small animals living at or just below each square metre of surface, and a total of more than 90 species, including 35 different types of worm, 25 crustaceans, 12 sea-snails, 6 sea-slugs, and one each of starfish, brittlestars, sea-urchins and sea-cucumbers.

Some of these are animals of some national and even international significance. Knysna is the only place in the whole of Africa where one of the sea-slugs (*Elysia hirasei*) and one of the sea-snails (*Cornirostra* sp.) are known to occur. Admittedly, this may reflect the fact that not many people go looking for animals less than 3 mm long and their rarity may therefore be more apparent than real. But even at a larger body-size scale, Knysna supports one of the only two known South African populations of the seagrass false-limpet (*Siphonaria compressa*), originally described by Professor Brian Allanson of the Knysna Basin Project (though from Langebaan on the West Coast), and one of the only two South African seagrass populations of the 'dwarf cushion-star' (*Parvulastra exigua*) (the other one also at Langebaan). Both are threatened at their West Coast site because of loss of its seagrass habitat there, part of the global decline mentioned earlier, but both are doing well along the Steenbok Channel. Knysna is the only known site in South Africa for another pretty little sea-slug (*Favorinus ghanensis*), and so on and so on. So little is known that every visit produces another find or two of animals known only from Knysna.

Recent research has also shown that far from being the uniform habitat that it may appear, the animals of the Steenbok seagrass bed are distributed very patchily, with areas only a few metres apart possessing markedly different faunas. This state of affairs is currently being

investigated with a view to understanding what controls the distribution and abundance of the various species and faunas, where the richest parts of the Knysna seagrass meadows are located, and generally how the ecology of the system varies with spatial scale.

Seagrass is not just scientifically interesting, it is a valuable resource; indeed it is globally ranked the third most valuable natural habitat per unit area to humans. Seagrass beds filter nutrient and various chemical inputs out of the water, stabilise sediments, and most importantly provide a nursery area for commercially-important species of prawns and fish, later to be caught in deeper water and offshore. But their fate hangs in the balance. The beds along the north shore of Leisure Isle lie within the Marine (Bait) Reserve declared by the SANP within which the collection of invertebrates is forbidden. Such 'no-take zones' form an important part of management strategies for sustainable exploitation; nevertheless, especially near its mouth, the Steenbok Channel bears copious and very clear signs of illicit pumping for mud-prawns and, more seriously, of being trenched for worms. As in many parts of the world, it is simple to declare areas to be reserves but enforcement is a completely different matter, not least when the infringements are a matter of subsistence rather than leisure activity. For socio-economic reasons subsistence bait-collection is unlikely to diminish at Knysna.

How this might affect the system is still uncertain, but the worry concerns not the invertebrate species harvested nor those affected incidentally but the habitat itself. Fortunately, as a whole, the Knysna seagrass beds are suffering less than most. Unfortunately, however, experience from equivalent eelgrass beds elsewhere (not least at Langebaan) gives rise to the fear that bait-collection pressure of this magnitude could lead inevitably to eventual loss of the seagrass, particularly when collection techniques such as trenching are so environmentally unfriendly. In this context, it is particularly unfortunate that it has been shown that most bait collectors at Knysna do not believe that their activities have any adverse effect on the environment. Granted that pressure on the habitat is unlikely to decrease,

it would seem that novel measures will be required to ensure a safe future for this premier South African site's seagrass.

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Nb The animal and plant common names above are as per *Two Oceans*, the guide to South African marine life written by Branch, Branch, Griffiths & Beckley; the smaller animals in the seagrass have no common names. The small crab *Danielita edwardsii* has been known for many years under the generic names *Cleistostoma* or *Paratylodiplax* – its distinctiveness from other genera has only just been scientifically noted.

About Richard Barnes

Dr Richard Barnes was on the staff of the Zoology Department of the University of Cambridge in the UK for 40 years, from where he carried out research on the ecology of the inhabitants of seagrass beds and bare sediment flats in northwest Europe and in the Indo-West Pacific. Now by virtue of advancing years free of teaching and administrative responsibilities (although still with links to that university, including remaining a Fellow of St Catharine's College Cambridge), he is able to devote more time to his research and so fortunate as to hold various honorary staff appointments at academic institutions in warmer parts of the world that permit him to do this.

He spends 3 months of each year (late Sept – late Dec) as a Research Fellow of the School of Biological Sciences in the University of Queensland, based at their Moreton Bay Research Station, and another 3 months (early Jan – early Apr) as a Research Associate of the Department of Zoology & Entomology of Rhodes University, based in their Knysna Field Laboratory on Waenhout Street. He also spends time as Senior Intertidal Scientist at the Pusat Penelitian Bawah Laut in the Taman Nasional Wakatobi in Indonesia, and on the island of Curieuse, Seychelles, as part of the *Coral & Coastal Ecology of Seychelles Research Programme*. And whilst in the U.K., he works in the Scolt Head National Nature Reserve on the East Anglian north Norfolk coast. One of the advantages of his years is that he can also now do collaborative work with the two of his children who have followed him into marine biology, at the British Antarctic Survey and Plymouth Marine Laboratory respectively.