# Conserving Shells in Kenya

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**Over-collecting of shells on the Kenya coast, mainly for sale to tourists, has almost denuded some popular and accessible sites. In some formerly rich areas few molluscs can now be found, and collecting has shifted to more inaccessible sites. The authors describe an investigation they made in 1972 and 1974 into stocks held by dealers and the effects on the wild populations. They emphasise the importance of the marine national parks at Malindi and Watamu, where regular patrolling effectively prevents collecting and there are signs that cowries at least may now be re-establishing themselves. The creation of a third and much larger marine national park, near Shimoni, will protect another area rich in shells.**

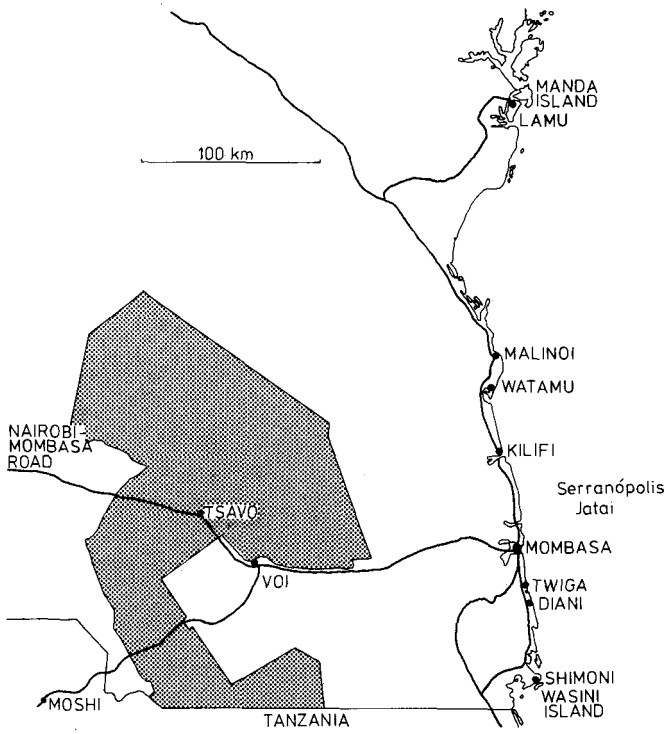
Coral reefs in many parts of the world have suffered considerable damage as a direct or indirect effect of human interference. Polunin and Frazier found that 25 out of the 27 coral reefs they investigated in the Western Indian Ocean showed evidence of disturbance; spear-, shark- and bottom-fishing, mollusc collecting and oil pollution all contributed to this interference in the reef ecosystem.[1] Many of the reefs they visited were remote, and there can be little doubt that more accessible reefs, such as those off the Kenya coast, are subject to even greater depredations. A world-wide trade in exotic mollusc shells has grown up and has led to what appears to be vast over-collecting of certain species in some parts of the world; some mollusc populations, it is thought, are now suffering, or may have already suffered, irreparable damage.

In Kenya, although there is cause for concern, the situation is more encouraging than in some other parts of the world. The Kenya Government is keenly aware of the need to conserve its wildlife; it has established marine national parks at Malindi and Watamu, which are regularly patrolled by rangers and where the collecting of shells or other living organisms is prohibited. Government legislation in 1968, amended in 1971, made it an offence to collect shells or corals anywhere on the coast without an official permit (issued by the Department of Fisheries). It is difficult to assess the success of these measures, either in controlling collecting or in promoting the re-establishment of molluscs in over-collected areas. One problem is that there is little published information on populations in the past and therefore no basis on which to assess the effects of commercial exploitation. Such information is urgently needed, and in the present study data was obtained in the following ways:

1. The extent of the shell-trade in Kenya was investigated by visits to dealers in Mombasa, Malindi, Diani and Watamu. Rough estimates were made of the numbers they held of certain species – cowries, helmet shells, rock shells, tritons, stromb shells, harp shells, vase shells and shells of the cephalopod, *Nautilus*. Initially, specimens were bought, and identified (using Spry,[3,4] and Verdcourt[5,6,7]);
2. Fifteen amateur conchologists, with considerable experience of the Kenya



https://doi.org/10.1017/S0030605300014538 Published online by Cambridge University Press




marine fauna (the average time they had been acquainted with the reef was 22 years) gave their opinions on the current states of these populations and their knowledge of collecting and trading activities;

3. Field studies were made at seven different localities, which had almost certainly suffered different amounts and different kinds of human predation, and a minimum of three days spent at each. They were: Watamu National Park, where collecting has been prohibited since 1968; Shimoni, Wasini Island and Manda Island, which are some distance from the main trading places (Mombasa and Malindi) and relatively difficult to reach; and Malindi (the area to the north of the national park) and Twiga, which are frequented by tourists. Brief visits were also made to Diani, which is a holiday resort, and to the national park at Malindi. As there was not time to investigate populations of all mollusc species, cowries, which are sold in enormous numbers, were used as indicator species. With the aid of masks and snorkels these organisms were searched for in the inter-tidal and shallow sub-littoral; species lists were compiled for each locality, and each species was assessed on the following abundance scale: 0 = not found; 1 = rare; 2 = uncommon; 3 = common; 4 = abundant; 5 = very abundant. Parts 1 and 2 of this investigation were carried out between June and August, 1972, and part 3 from July to September, 1974.

## The Shell Trade

The flourishing trade in shells on the Kenya coast caters mainly for tourists buying souvenirs. Shops in Mombasa and Malindi, and roadside dealers at these places and at Diani and Watamu, often hold considerable stocks. Species offered for sale by the twenty-four dealers we visited in 1972 included the following (figures in brackets indicate the number of dealers holding each species and the mean number of individual shells available for sale): the

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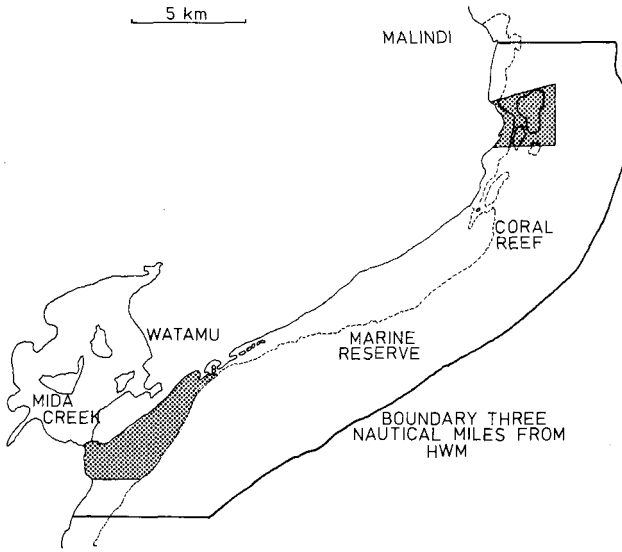


cowries, *Cypraea annulus* (22; 85·1), *C. arabica* (4; 6·0), *C. caputserpentis* (11; 11·6), *C. diliculum* (4; 7·5), *C. erosa* (8; 10·5), *C. histrio* (7; 13·9), *C. helvola* (6; 6·0), *C. lynx* (5; 5·0), *C. mappa* (6; 12·8), *C. mauritania* (6; 13·8), *C. onyx* (3; 3·7), *C. tigris* (20; 27·1), and *Ovula ovum* (8; 8·5), cockles, *Cardium pseudolima* (13; 12·9), helmet shells, *Cassis cornuta* (3; 3·3) and *C. rufra* (18; 23·2), tritons, *Charonia tritonis* (4; 5·0), rock shells, *Chicoreus ramosus* (12; 16·6), harp shells, *Harpa major* (6; 5·3), stromb shells, *Lambis crocata* (4; 3·8), *L. lambis* (9; 15·2) and *L. scorpio* (8; 9·7), vase shells, *Mitraria episcopalis* (7; 3·3), clams, *Tridacna elongata* (16; 21·1) and *T. gigantum* (3; 13·3), and the cephalopod, *Nautilus* spp. (5; 1·8). Many dealers also held large stocks of cones, olives and auger shells but we did not record these. Other items for sale included pieces of bleached coral, dried puffer-fish skins, dried echinoderms, sharks' teeth; Mombasa and Malindi shops also sold imported mollusc shells from the Philippines, the Caribbean, Sri Lanka, Australia and probably elsewhere: for example, large numbers of the queen conch *Strombus gigas* were for sale. Tourists presumably buy these shells in the belief that they are collected locally.

Several dealers told us that they had to get their East African shells mostly from Lamu and/or Shimoni because formerly rich local collecting grounds were now completely devoid of shells. Other dealers claimed that their shells originated from neighbouring Somalia, Tanzania and Zanzibar. In apparent contradiction to this, however, we were led to believe that there was a vast export trade in Kenya shells. We could not assess the extent of this at first hand, but a warehouse near Fort Jesus, in Mombasa, contained large numbers of tea-chests and sacks, all full of shells said to be for export. Helmet shells *Cassis rufra* were sorted separately from other species, and apparently exported to Italy where the orange nacreous layer of the shell is used in the manufacture of cameo buttons. The value of these shells depends on the thickness and quality of the nacreous layer.

**Views of Conchologists**

Some conchologists also told us that commercial collectors had completely devastated parts of the shore and reef of shell life; others were more cautious. Nevertheless, 13 of the 15 interviewed were prepared to say that, in their

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**Table 1 Abundance of cowries *Cypraea* spp. at six localities**

0 = *absent;* 1 = *rare;* 2 = *uncommon;* 3 = *common;* 4 = *abundant;* 5 = *very abundant.*

| Species | Malindi | Manda Island | Shimoni | Twiga | Wasini Island | Watamu |
|---|---|---|---|---|---|---|
| *C. annulus* | 3 | 5 | 5 | 4 | 5 | 2 |
| *C. arabica* | 0 | 0 | 0 | 0 | 0 | 1 |
| *C. caputserpentis* | 0 | 0 | 0 | 0 | 0 | 1 |
| *C. caurica* | 0 | 0 | 0 | 0 | 0 | 1 |
| *C. carneola* | 0 | 2 | 5 | 2 | 4 | 1 |
| *C. depressa* | 0 | 0 | 0 | 0 | 0 | 1 |
| *C. erosa* | 0 | 0 | 1 | 0 | 0 | 0 |
| *C. felina* | 0 | 0 | 3 | 0 | 0 | 0 |
| *C. helvola* | 2 | 2 | 2 | 3 | 3 | 2 |
| *C. histrio* | 1 | 0 | 0 | 3 | 0 | 0 |
| *C. isabella* | 0 | 2 | 2 | 0 | 2 | 1 |
| *C. lynx* | 0 | 2 | 4 | 5 | 4 | 1 |
| *C. moneta* | 2 | 4 | 3 | 2 | 4 | 1 |
| *C. staphylaea* | 0 | 0 | 1 | 0 | 0 | 0 |
| *C. stolida* | 0 | 0 | 1 | 0 | 0 | 0 |
| *C. talpa* | 0 | 0 | 2 | 0 | 0 | 0 |
| *C. tigris* | 1 | 3 | 4 | 2 | 4 | 0 |
| *C. vitellus* | 0 | 0 | 2 | 2 | 2 | 1 |
| Total abundancy score | 9 | 20 | 35 | 23 | 28 | 13 |
| No. species found | 5 | 7 | 13 | 8 | 8 | 11 |
| Mean abundancy score | 1·8 | 2·9 | 2·7 | 2·9 | 3·5 | 1·2 |

experience, there had been a serious decline in the numbers of molluscs on the shore; two preferred to be non-committal on the grounds that there was no quantitative data. Species which they said had suffered badly included cowries, helmet shells, stromb shells and rock shells, although several people pointed out that commercial collectors collected indiscriminately, so that all attractive species had suffered to some extent. Some places, we were told, had suffered more damage than others. Few species could be found now at formerly good collecting areas such as Diani, Malindi and Watamu, but some relatively inaccessible places on the coast and many uninhabited islands were still rich in shell-life. Seven of those interviewed described shell-collecting expeditions in which groups of collectors rowed out to the reef at low water and systematically combed the area for molluscs. We heard of expeditions which dynamited parts of the reef, of lorry-loads of shells being taken regularly from Shimoni to Mombasa, and of senseless overcollecting of shells, corals and echinoderms by holidaymakers. It was agreed, however, there was little collecting in the national parks.

**Field Study**

The abundance of cowries varied considerably at the different localities visited – see Table 1. Diani and Malindi, both popular tourist resorts, were noticeably poor in shell life; in fact, Diani was so poor that prolonged searches were not made there. Five cowrie species were found at Malindi but only one, *C. annulus*, was common, and there were noticeably few other molluscs or growths of living coral. The most rewarding sites were Manda Island, Twiga, Shimoni and Wasini Island. Shimoni in particular was a rich collecting area and five of the species found there, *C. annulus*, *C. carneola*, *C. lynx*, *C. moneta* and *C. tigris*, were assessed as either common or abundant. In terms of the mean abundance score, the Watamu Marine National Park

was disappointing although more species were found there than at any other site visited except Shimoni; none of these five was common. Brief searches only were made in the marine park at Malindi, but it is noteworthy that the white cowrie *Ovula ovum* was common there although it was not found at Malindi outside the park or elsewhere along the coast. At places where molluscs were abundant there was a lot of collecting; at Shimoni between 15 and 20 women and children regularly collected at low tide each day, systematically turning over rocks and corals, and taking shells indiscriminately. We also saw fishermen bringing collections of shells into the harbour at Wasini, and once a pile of more than two thousand tiger cowries *C. tigris* was awaiting collection from the mainland. There was collecting at Malindi and Watamu (outside the national park boundaries), at Twiga and at a site about 10 km north of Kilifi, which we visited for a day in 1972.

**The Situation**

It is difficult to escape the conclusion that in recent years there has been vast over-collecting of molluscs on the Kenya coast. Most conchologists interviewed believed that this was so, and several shell-dealers claimed that they now have to rely on supplies from relatively inaccessible places in Kenya or on imports from other African countries. Our field study also confirms the belief that some places are now poor in shell life, at least in cowries, presumably as a result of over-collecting. Care must, of course, be exercised in assessing the significance of differences in either abundance or species diversity; many species, as Verdcourt has pointed out,[5] have specific habitat preferences: for example, the tiger cowrie *C. tigris* tends to be restricted to areas of dense weed and eel-grass, and so is commoner at Wasini Island and Shimoni than at Twiga, where this habitat is much less extensive. At Watamu, however, there are extensive eel-grass beds, and its disappearance here is more likely to be due to over-collecting. The differences between Verdcourt's and our assessments of cowrie abundance on the East African coast also provide further evidence of the decline in the numbers of some species. *C. caput-serpentis*, *C. caurica*, *C. histrio*, *C. isabella* and *C. vitellus* were all common at the time of Verdcourt's investigation; in the present study, all were either uncommon or rare except for *C. histrio* at Twiga (Table 1). In addition, *C. kierneri*, *C. lamarcki*, *C. mauritania* and *C. talpa*, described by Verdcourt as common or frequent, are now either rare or were not found at all.

The data from our field study suggests that the sites visited by tourists, particularly Diani and Malindi, have suffered the worst depredations, not because of collecting by tourists themselves, but because tourists provide an easily exploited local market. Twiga, with fewer tourists and little trade in shells, has apparently suffered less damage, and relatively inaccessible localities, such as Manda Island, Shimoni and Wasini Island, are also rich in molluscs. But there is evidence of heavy collecting at these places which will have serious consequences if it continues.

Nevertheless, in spite of this gloomy picture there is some room for optimism. The Kenya Government is clearly determined to restrict shell-collecting, and has been prepared to legislate against it. But laws prohibiting the collection of shells or other organisms cannot be enforced without patrolling the whole coast. Certainly it seemed unlikely that the laws were having more than a minimal effect in 1974; there is little doubt that most of the collecting we saw

A white cowrie *Ovula ovum* which is common in the Malindi National Park. The shell is normally covered by a dark yellow spotted mantle *David Coates*

was illegal. A better way of restricting collecting may therefore be to limit the sale and/or export of shells. In the absence of effective means of doing this, the establishment of marine parks is clearly important. The two existing parks at Malindi and Watamu are patrolled regularly, and there is believed to be little, if any, shell-collecting in them. It is probably too early to assess their effect in promoting the re-establishment of molluscs and too much significance should not be attached to the disappointing abundance of cowries at Watamu. The number of species there was high, and this may be a first indication that species are beginning to be re-established there; the common occurrence of the white cowrie *Ovula ovum* in the Malindi National Park also appears to be an encouraging sign. Moreover, an additional 40-square-mile marine park (larger than Malindi or Watamu) is now being created at Kisite-Mpunguti, near Shimoni, and shell life there is said to be particularly rich.

**Acknowledgments**

The authors would like to thank Mr Perez M. Olindo, Director of Kenya National Parks, for permission to work in the Malindi and Watamu parks. Thanks are also due to the University of Newcastle upon Tyne's Exploration Society, the Gilchrist Educational Trust, the Overseas Development Administration, the John Spedan Lewis Memorial Fund, and trustees of the Treasby-Kapp fellowship fund, who made an award to C.P-S., for financial help to carry out this work.

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