

# Coral and shell mining in the southern coasts of Sri Lanka

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The submerged reefs and living corals on the continental shelf are now being destroyed for the illicit production of lime. Tourism fishing and navigation are also responsible for destroying these resources. Illicit quarrying of buried corals and shells in the interior is also done on a large scale for production of lime and chicken grit. This continued destruction of valuable resources has created a number of ecological and socio-economic problems. This paper focuses attention on such problems and emphasizes the need for management of these resources with a view to protecting the natural heritage as well as to providing a means of livelihood to those engaged in these activities.

## The Study Area

In the western and southern coastal zone submerged channels of some larger rivers, well-marked troughs and terraces which are covered by coralline algae, limestone and calcareous sandstone and submerged forests are the main physiographic features on the continental shelf. The coastal lowlands consist of barrier beaches, barrier islands, buried and emerged coral reef patches, lagoon and lakes, marshes, mangrove swamps and beach-rock shoals. All these landforms have formed due to the post-glacial transgression (Katupotha 1988c, 1988d, 1988e). The coral reefs in Sri Lanka are predominantly of the fringing and barrier like types. They occur in many places around the island as dead and living coral reefs, buried corals as well as emerged reef patches. The emerged coral patches are scattered in small headlands a few centimeters above MHW level (Katupotha and Fujiwara 1988). These coral patches have cemented with beachrock in many localities.

The best examples of buried coral deposits extend at Akurala and Hikkaduwa on the southwest coast and at Dodanduwa, Mihiripenna, Walpola and Madihe on the south coast from the present shore to 250 m and sometimes up to several kilometers towards the interior. The coral deposits lay on weathered charnockite and charnockitic gneiss bed rock. These corals were buried in muddy silt which was washed down to the coral areas by terrestrial waters. Moreover, they were intermittently covered by vast quantities of coral sands and various types of debris move from storm waves. This has been influential in tilting the coral from their position of growth. The coral mining practice for a long time has left many open pits now seen as swamps, mangrove swamps, ponds and ditches at many locations between Ambalangoda and Matara.

Along the southern coast, lagoons are irregular basins bounded on the land side by low bluffs of decomposed gneissic rocks. On the sea-side wide beaches are capped by blown sand (Coates 1935). The coastline exhibits a somewhat 'scalloped' pattern with points on the headlands and curves with continuous sand beaches between the embayments (Katz and Comenar 1975). Dunes are usually aligned in a NE - SW direction according to the prevailing winds during the NE monsoon. Lagoons form a prominent feature in the area. Several are lewayas (salt pans), others are marshy wetlands which were former lagoons. Some have been modified into water storage tanks for paddy cultivation. Estuaries of the present lagoons have been blocked by beach deposits during the dry season. Extensive molluscan shell deposits particularly Veneridae, Cerithidae

and Nasseridae are found along the rims of lagoon floors on the southern coast (Katupotha and Wijayananda 1989). These shell deposits also can be seen a few centimetres above MHW level.

(Mean High Water Spring level)

Around 10,000 people are engaged directly or indirectly in the exploitation of these resources. Breaking of coral reefs on the southwest coast has resulted in coast erosion due to changes in the existing bottom conditions in the nearshore zone. Therefore, hundreds of lime kilns and piles of lime are lined up on both sides of the main road along the SW and south coasts. Polluted stagnant water holes and ditches are found where the buried corals and shells have been quarried and air pollution occurs around lime kilns.

## Discussion

Living corals of the lagoon reefs in the nearshore consist of branching (Acropora) and massive corals (Porites, Favites and Gonjopora etc.). They thrive from mean low water spring (MLWS) level to 4 m depth in lagoon reef areas and to 8 m in fringing reef areas (Mergner and Scheer 1974). These lagoon reefs, limestone and calcareous sandstone reefs protect the coast from high waves during the South-west Monsoon period. Yet high explosive and crowbars are used by local people to break these corals for production of lime and for navigation and fishery. It is estimated that about 7,000 tons of coral are broken and collected from nearshore annually (Amarasinghe and de Alwis 1979). Many glass bottomed boats are operated by local people which offer to tourists an opportunity to enjoy the reef. These boats, when driven across the shallow coral colonies break the coral rocks and sandstone reefs. These activities have resulted in coast erosion due to changes in the bottom conditions. Undamaged corals have a beautiful appearance and are collected as souvenirs and to produce ornaments for tourists. Furthermore, coral reefs are very high primary productivity habitats for living species of several groups viz;

Serranidae, Scaridae, Labridae, Pomacentridae, Pomacanthidae, and Chaetodontidae (ESCAP 1985). Some of these species bring considerable foreign exchange. Thus, the use of explosives to break coral reefs, operation of glass bottomed boats to show the coral habitats and collect living corals as souvenirs and ornaments for tourists, disposal of sewage directly into the coastal areas from tourist resorts and oil pollution from fisheries harbours have evidently caused much damage to the coral reef habitats.

14C dates record that the deposits at Akurala had been thriving during the  $6,110 \pm 80$  yr B.P. Similar records are seen in the areas of Dodanduwa and Mihiripenna (Katupotha 1988a; 1988b; Katupotha and Fujiwara 1988). People in these areas remove the top-soil of marshy areas to excavate buried corals. Although they are required to fill-up the pits after mining, in practice this has not been done. The open coral pits get filled with polluted stagnant water-holes and ditches environmental damage such as the increasing of salinity in the adjoining cultivated lands and the degradation of marshes and mangrove swamps. This has given rise to a number of problems in the densely populated area from Ambalangoda to Matara.

The emerged coastal embayments and lagoon floors on the southern coast encompass marshy lands, wastelands and scrub lands. Fossil are mainly concentrated between Rakawa Kalapuwa and Bundala Lewaya. The thickness of the shell layers is locally variable, usually up to 1 m (Katupotha and Wijayananda 1989). These shells perhaps live in an intertidal zone of palaeo embayments and lagoons that extend about 3 km or more from the present shore in the mid-Holocene. These shell deposits are also used for production of lime and chicken grit. Due to seasonal rainfall, mainly NE Monsoon period, the open shell pits become polluted water-holes and ditches. Water and air pollution in shell

resource areas also will undoubtedly cause much damage to the environment.

The desultory usage and over-exploitation of these resources has given rise to a number of ecological and socio-economic problems viz; (a) The destruction of coral reefs in the near shore zone using explosives and heavy instruments has a negative impact on the growth of coral, coral reef organisms and other marine fauna and flora. The loss of habitat also will evidently influence the earning of foreign exchange. (b) Destruction of coral reefs which protect the coast can increase the speed of the swells and high waves and bring about coast erosion. The results of this action cannot be seen and assessed easily in the field within a short time. (c) Polluted stagnant water-holes and ditches where the buried corals and shells are mined provide breeding grounds for various types of mosquitoes who threaten the health of human beings. It has resulted in other environmental changes such as increasing salinity in water and soil in the cultivated lands and the degradation of mangrove swamps and marshes, mainly in the buried coral areas. (d) Air pollution occurs from lime-kilns that are highly concentrated along the SW and south coasts. (e) Increased earnings from mining of buried corals and collection of nearshore corals by school children have encouraged them to discontinue their studies.

For effective management and conservation of these resources the following preventive and remedial measures are considered essential for their optimum utilization: (a) Detailed surveying and mapping of marine features on the continental shelf and the coastal lowlands using as far as possible remote sensing techniques. (b) Removal of living corals and coral rocks in the near-shore zone should not exceed sustainable level. Conservation measures should be adopted to protect coastal habitats as a national heritage and as a buffer against coast erosion, to promote tourism and for bringing foreign exchange. (c) Identification of areas suitable

to be declared as marine parks for palaeo-ecological, educational and other scientific research. (d) Identification of the socio-economic problems of the people who are engaged directly and indirectly in the utilization of these resources in order to introduce alternative means of livelihood. The introduction of mariculture (inland fish, prawns and sea-weeds etc.) to the water holes, ditches and mangrove swamps as alternative employment sources would be of great importance to earn foreign exchange. Recently, NARA and CCd have launched several inland fish projects along the SW coast and provided several facilities to encourage inland fisheries. These projects and the resettlement of people who are directly and indirectly involved in the exploitation of corals in the major irrigation schemes, have not been a success. Therefore, more information about the inter-relationship between ecological and socio-economic aspects is needed for the effective management of these invaluable resources.

### Conclusions

Living corals and coral reefs on the continental shelf, buried corals and shell deposits on the coastal lowlands have a national significance for the researches of the Late Quaternary period of Sri Lanka. They are a source for the supply of lime and employment opportunities. But, desultory usage and over-exploitation of these living corals, coral rocks and sandstone reefs, buried corals and shell deposits have caused serious damage to the environment and created a number of socio-economic problems. This destruction has caused the reduction of tourist potential, depletion of marine life, creation of polluted water-holes and ditches and degradation of marshes and mangrove swamps. Some preventive and remedial measures introduced to solve these problems appear to have failed. Therefore, more research should be undertaken on the inter-relationship that exist between ecological and socio-economic aspects for the effective management of these resources.