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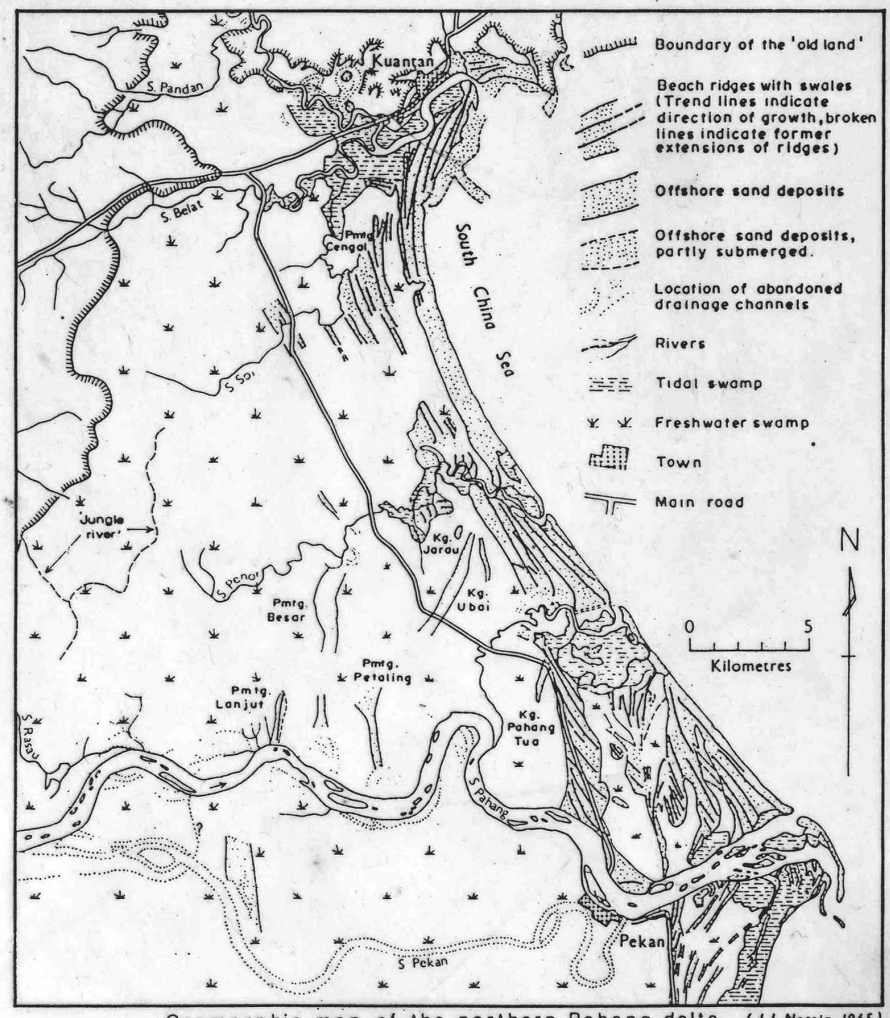

Geomorphic map of the northern Pahang delta. (J.J. Nossin, 1965)

Conservation of post-glacial morphology: A case study of the west and south coasts of Sri Lanka

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Abstract

Marine features on the continental shelf and the coastal lowlands record the changes in sea-level in Sri Lanka during post-glacial transgression which began around 17,000-18,000 yr B.P. These features are being destroyed as a result of tourism, fishing, navigation and the production of lime and chicken grit. This continued destruction has created a number of ecologic and socio-economic problems. It is necessary to conserve and manage this natural heritage with a view to achieving a sustained yield for tourism, for palaeoecological, educational and other scientific research as well as to provide a means of livelihood.

Introduction

The post-glacial rise in the sea-level appears to have started around 17,000-18,000 yr B.P. from about -80m in many tropical and Mediterranian coasts (Fairbridge 1961, Walcot 1972, Clark 1980, Pirazzoli 1987). Fairbirdge (1961) reported that the sea-level remained about 3-5 m higher than the present level during the period around 6,000-4,600 yr B.P. while minor oscillations were continued later. Marine features such as submerged channels of some larger rivers, well-marked troughs and terraces covered with coralline algae, limestone and calcareous sandstone and submerged forest along the western and southern continental shelf of Sri Lanka record changes in the sea-level during the post-glacial trasgression. Recently obtained 14C dates of buried corals and emerged coral reef patches indicate that there were two different age groups related to high sea-level episodes: mid-Holocene (6,170±80 - 5,170±70 yr B.P.)

and Late Holocene (3,210±70 - 2,330±60 yr B.P.). It is suggested that this transgression culminated around 5350±80 yr B. P. and former sea-level was at least 1 m above that of the present level (Katupotha 1988a; 1988b). During the mid-Holocene, buried corals had thrived as reef patches in inland bays or lagoons. The shell deposits along the southern coast also indicate that a coastal progradation had continued from the Late Holocene (Katupotha 1988b). They have a national significance for research of the Late Quaternary period of Sri Lanka.

These submerged reefs and living corals are now being destroyed when utilized illicitly in the production of lime. Tourism, fishing and navigation are also responsible for destroying these resources. Quarrying of buried corals and shells in the interior is also undertaken illicitly 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 conservation and management of these post-glacial mophologies with a view to protecting the natural heritage.

Methodology

Information on the nature, extent and rapidity of destruction of marine features and the impact on the coastal environment and to society was obtained from informal discussions with officials from National Aquatic Resources Agency (NARA), Coast Conservation Division (CCD) and Central Environmental Authority (CEA) of Sri Lanka and from interviews with informants in the different localities. Secondary data was obtained from published and unpublished reports.

Study Area

The continental shelf and the coastal lowland on the west and south coasts have been subjected to recent changes of sea-level and consists of different types of lanforms related to the Late Quaternary

(Katupotha 1988c, Wickremaratne 1988). The coral reefs in Sri Lanka are predominately 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. In many areas along the SW and south coasts buried corals and emerged shell deposits extend from the present shore to 250 m and sometimes up to several kilometres towards the interior. The emerged coral patches are scattered in the small headlands a few centimetres above MHWS (Katupotha and Fujiwara 1988).

Around 10,000 people are engaged directly or indirectly with utilization of these resources. As a result hundreds of lime kilns and piles of lime are lined up on the both sides of main road along the SW and south coasts. Polluted stagnant water holes are found where the buried corals have been quarried and air pollution occurs around lime kilns.

Results and Discussion

Living corals of the lagoon reefs in the nearshore consist of branching (Acropora) and massive corals (Porites, Favites and Goniopora etc.). They thrive from MLWS 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 Southwest Monsoon period. High explosives and crowbars are used by local people to destroy these corals for production of lime. Further, tourists use "Glass Bottom Boats" to observe the sea bed. These boats, when driven across the shallow coral colonies break the coral rocks and sandstone reefs. Living corals are also collected as souvenirs and to produce ornaments for tourists. Many youths of the area earn a considerable amount of money per day (between Rs. 50/= and Rs. 125/= or more, 1 $ = Rs. 34/=) by selling coral rocks and rubble from submerged reefs and through mining of buried corals.

The Government has strictly prohibited the breaking of coral reefs on the nearshore zone and the mining of buried corals on the coastal lowlands. People 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 providing a breeding ground for various types of mosquitoes. It has caused environmental damage such as the increasing of salinity in the adjoining cultivated lands and the degradation of wetlands.

The exploitation of these formations has given rise to a number of ecological, socio-economic problems viz: (a) The destruction of coral reefs in the near shore zone using explosive materials and heavy instruments has a negative impact on the growth of coral, coral reef organisms and other marine fauna and flora. (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. (c) Polluted stagnant water holes provide breeding grounds for various types of mosquitoes who threaten the health of human being. 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. (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 conservation and management 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 coastal lowlands using remote sensing techniques. b) Removal of living corals and coral rocks should not exceed

sustainable level. Conservation measures should be adopted to protect coral habitats as a national heritage and as a buffer against coast erosion and for tourism. c) Identification of areas suitable to be declared as marine parks for palaeoecological, 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 and mangrove swamps as alternative employment sources would be of great importance. Recently, NARA and CCD have launched several inland fish projects along the SW coast and provide 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-ecnomic aspects is needed for the effective coservation of these Late Quaternary formations.

Conclusions

Marine features on the continental shelf and coastal lowlands have a national significance for the researchers of the Late Quaternary period of Sri Lanka. These living corals, coral rocks and sandstone reefs, buried corals and shell deposits have being exploited and destroyed which has caused serious damage to the environment and created a number of socio-ecnomic problems. 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 existed between ecological and socio-economic aspects for the effective conservation of these resources.

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