



Research Paper

Interference of Mid-Holocene Hunter Gathers to Coastal Shell Bearing Habitats at Southern Coastal Zone of Sri Lanka

Suranga E.G.J¹, Gamini Adikari¹.

¹ Postgraduate Institute of Archaeology, University of Kelaniya, Sri Lanka. jeewanasuranga@gmail.com.

ABSTRACT

The South coast of Sri Lanka is currently an understudied area of archaeological importance in South Asia. The aim of this research paper is to use of Archaeological materials found from shell bed, study the cultural patterns of the pre historic people in the Holocene of southern coast of Sri Lanka. The south coast is a highly dynamic and evolving coasted system over the Holocene. Major phases of geomorphic change occurring along the south coast of Sri Lanka during the terminal Pleistocene Holocene epochs. Along the southern littoral of Sri Lanka can be seen submerged shell bed appear to be remnants of chenier ridges and plains from Rekawa to Kirinda. Shell middens represent a unique archaeological phenomenon and a complex remnant of the prehistoric human-modified landscape. Shell midden research has a long history in archaeology and comprises an important component of understanding human exploitation of aquatic and maritime resources during the Holocene. Kalamatiya and surrounding area identified as the key area of this study. Chronological framework suggests human interference with shell bed occurred in several habitation stage in the southern littoral area. The first human intervention in the shell bed is reported from Mini etiliya and Pathirajawela between 5,200-4600 years B.P. The second human intervention, which dates back to 4100 - 3300 B.P., provides evidence of the third human intervention on the shell bearing site is reported to date from 2800 B.P. According to the current research, natural habitats on shells bearing can be classified as shell bearing habitation site or shell bearing midden site.

ARTICLE INFO

Article History:

Received 22 December 2022

Accepted 18 August 2022

Available 01 October 2023

Key words: Holocene, midden, southern, shell, archaeology.

1. Introduction

Over the past 140 kya, people have created singular and prominent landscape features mainly made of shells and other remains of human activity. These landforms are known to archaeologists as “shell middens”, and can be found in coastal, lacustrine and river environments worldwide. Characterized by alkaline conditions, shell middens have great potentials for archaeological enquiry as they favors good preservation of organic remains and provide high-resolution records to study human environment interaction and understand past socioenvironmental settings (Myrian Álvarez et al., 2010).

The term “shell midden” is commonly used to indicate a shell accumulation that is the result of food discarding activities. However, were used for ritual and domestic purposes in some part of the world. While gastropods deposits related to industrial processing of shells are typical of some Bronze Age

(Harappan) sites of North Gujarat in India (Bhan et al., 2005). Shell middens became a subject of archaeological research in the 19th century within the interdisciplinary research framework prompted by the Danish scientist J. J. Asmussen Worsaae. The history of researches on shell midden can be considered with the research work done in Sri Lanka and around the world. In most of the countries in the world various researches have been done on the places of naturally created shell mounds and different theories were emerged. There had been researches on the same done through the point of views of geology as well as archeology. Geologists have studied the process of creating the deposits of sea shells together with the fluctuations of the sea level while considering and assessing the relationship of man with the sea shells.

The Holocene is the name for the most recent interval of earth history and includes the present day. Ever since the beginning of the Holocene period, fluctuations in sea levels

have changed the positions of many coasts of the world (Allchin 1997, Jackson et al. 2014, Sarkar et al., 2000, Weerakkody 1988) Geologist have investigated that in many regions of the world, the coastal plains have been subjected to massive physical changes due to environmental changes, such as ice-meltdowns and earthquakes that have begun more than a 10,000 radiocarbon years. The sea level rise during the Holocene period is also common in the Indian Ocean region, and research on the past few years has shown that the impact is directly on Sri Lanka (O'Connor and Sullivan 1993, O'Connor and Sullivan 1994, Henderson, Anderson, and McGimsey 2002, Chen et al. 2008, Premathilake and Risberg 2003, Ranasinghe 2010). Sri Lanka, dramatic climatic shifts during the Last Glacial Maximum and Holocene amelioration are known to have created important new ecological niches along the southern coast (Katupotha 1988, 1990, 1995, Weerakkody 1988, 1992). Accordingly, the South littoral areas of Sri Lanka have been identified as a unique region for coastal archaeology. A number of important prehistoric archaeological investigations have been performed along the Southern littoral of Sri Lanka over the past century by Deraniyagala (1992), Katupotha (1995), Somadeva and Ranasinghe (2010), Kulathilake et al., (2014). Katupotha (1995) have been investigated of fossilised deposition of the Southern Coastal Zone, described and mapped of extension of shell bed.

2. Aim of the research

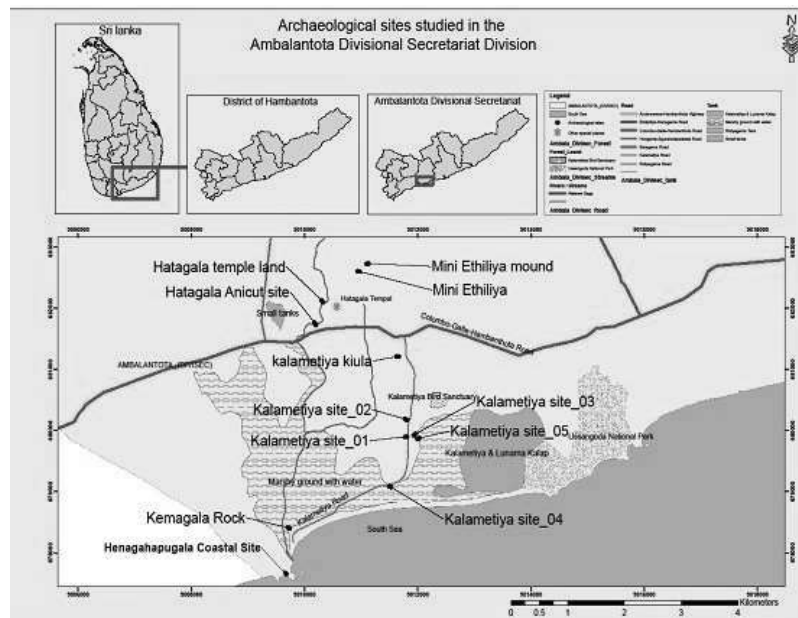
The present research paper is aimed at a better understanding of relationship between Holocene hunter gathers and shell middens in the Southern Coastal Zone of Sri Lanka. The basic goals of this investigation were to obtain information concerning Holocene shell middens habitation stages and subsistence activities at coastal hunter gathers and to develop an understanding of the formation of shell middens layers. To meet these goals a cultural ecological approach was used including a thorough evaluation of relevant paleo-environmental and archaeological data.

3. Research Question

What relationship is between Holocene hunter-gatherers as well as that of shell midden site along the Southern Coastal Zone in Sri Lanka? This research question will be addressed in this study. Currently, there exist large gaps in our knowledge of the relationship between Holocene hunter-gatherers and the extensive shell bed (Chenier features) along the Southern Coastal Zone of Sri Lanka. Number of studies conducted on shell bearing site of Southern Coastal Zone in past decades, there are lack of detail how shell bed become human occupation. This research seeks to fill some of the gaps.

4. Study area

The study area belongs to the coastal plain of the southern region of Sri Lanka. Climatically, it belongs to the semi-arid zone (Map 01). The Kalamatiya area which was identified as the main site of this area consists of mangroves, bays, sand dunes, sandy beaches, fade fled, estuaries, salt marsh, natural saltpans (Katupotha 1995). This area is a major ecosystem and has been designated as a sanctuary from Kalamatiya beach to Kiwula. The area from Kiwula to Meniethiliya has been used for agriculture and there is much human intervention in the area. This area can be identified as an area directly related to the created to shell bed during the Holocene sea level fluctuations. It can be seen submerged and emerged shell are contained in this area. Kalamatiya lagoon is located on the southern coast of Sri Lanka extending from latitudes 6°04'26"N to 6°07'19"N and from longitudes 80°54'43"E to 80°57'25" covering an area of 8.9km² formerly (now 7.5km²). More than 75% of the lagoon is shallow (<0.5m) and muddy and covered by marsh vegetation, except the southern corneratthemouth, which has open waterofabout1.5mdepth (Jayatissa et al. 2002). Kalamatiya lagoon is connected to another small lagoon, Lunama lagoon that does not have a direct opening to the sea and is located 2km east of Kalamatiya, by a shallow canal. The Udawalawa irrigation scheme lies 40km to the north of Kalamatiya lagoon.



Map.01. map showing site of archaeological significance area.

5. Material and methods

The study mainly utilizes field and laboratory methodologies. Based on these previous studies, a correlative temporal Mesolithic phase specific to the mid to Late Holocene along the south coast was characterized by:

- (1) The prevalence of lithic debitage or tools with emerge shell deposits.
- (2) The prevalence of lithic and ceramics.

- (3) The prevalence of emerge shell deposits and submerged Chenier deposits.

Much of the information so far reported on the human activities related to shell bearing site has been covered in Kalamatiya and Pallemalala areas. Accordingly, the two micro exploration zones were decided around Pallemalala and Kalamatiya. Katupotha investigated the fossilized deposition of the southern Coastal belt and mapped the extension of shell bed (Katupotha 1995). Deraniyagala conducted spot surveys to existence of prehistoric culture along the Southern coastal plain (Deraniyagala 1992). That methods used in these studies were considered. Based on the results of the research, the exploratory methodology was designed to fit the study's problem and hypothesis. Testing at shell mound in 2019 was limited to the excavation 1.5 x 1.5 m, 4 test pits in the Kalamatiya Kiwla area (Fig.2). Survey of the Kalamatiya Lagoon to Hatagala, Miniethiliya during the year 2017 revealed that Kiwula was identified as the most suitable area for the study of human interference and formation processes. Radiocarbon data was derived from studies conducted by Deraniyagala (1992), Katupotha (1995), Somadeva (2006) and Kulathilake (2014).

6. Result

In this research revealed that the deposition of shells during the Middle to Late Holocene was concurrent with the phasing of prehistoric occupations along the Southern Coastal Zone. Table 1 provides a comparative chronological sequencing of the seven major sites investigated in this research (Patirajawela, Hatagala, Kalamatiya, Miniathiliya, Pallemalala, Karagan lewaya and Henagahapugala) in relationship to estimated sea-level transgression and major periods of geomorphic change (Katupotha 1995) ca. 7000 to 3000 yrs. BP. Archaeological evidence suggests human habitation with shell bed occurred in several stages. It is classified into four habitation stages.

Table.1. Major Radiocarbon dates recorded from shell bearing site.

Pathirarajawela	4700-4600 B.P. 5260 – B.P. (Deraniyagala 1992)
Pallemalala	2700 – 2500 B.P. 3400 – 3330 B.P. 4100 – 3900 B.P.(Somadeva 2007)
Karagan lewaya	3375 B.P. (Katupotha 1995)
Miniethiliya	3330 – 2800 B.P. 4100 – 3800 B.P. 5200 – 5000B.P.(Kulathilake 2014)
Kalamatiya	4000 – 3800 B.P. 5100 – 4900 B.P. 6600 B.P. (Katupotha 1995)
Henagahapugala	3370 – 2880 B.P. (Deraniyagala 1992)
Hatagala	2 nd Millennium BCE (Katupotha 1995)

- 1st habitation stage – 5200 – 4600 B.P.
- 2nd habitation stage – 4100 – 3200 B.P.
- 3rd habitation stage – 2800 B.P. on words.
4. Iron Age habitation stage.

Early radiocarbon date for shell bearing site recorded in the Kalamatiya lagoon from 6600B.P. (Katupotha 1995). But there is no evidence of human culture. Cultural materials have been recorded in the Kalamatiya kiwla shell mound in present study. That cultural material corresponds to early historical human activities. The earliest habitation stage intervention the shell bed can be traced back to 5200-4600B.P., Investigations carried out by Deraniyagala in Pithirajawela shell midden found stone tools belonging to the Mesolithic context. According to its chronological date, there is a radiocarbon date of 5260 B.P.. Vembu in red lotosol fresh water available close to the site. Floating as a lens upon brackish water in coastal sands (Deraniyagala 1992: 610).

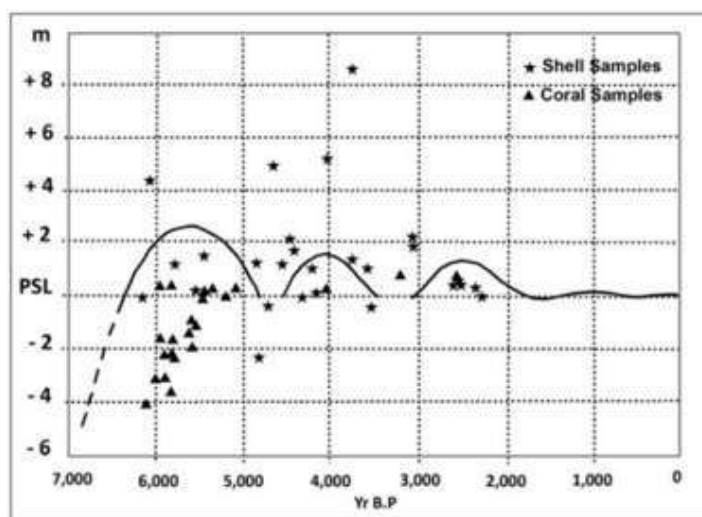


Fig.01. The chart showing Mid and Late Holocene high sea-level episodes in Sri Lanka (using coral and shell sample) (Katupotha 1988, 1994, 1995).

The evidence of human intervention in the first stage can be shown in the records of the Pallemalala. Excavations carried out at the shell midden have uncovered seven human skeletons and a number of animal bones and stone tools. Chronological record of the existence of a settlement from 5000 to 4100 B.P. The Pallemalala settlement is between six and seven kilometers from the present sea level and the impact of sea level rise may have been minimal due to the internal location of the country. This is because the sea level transgression has started to rise in the southern coastal belt between 4,500- 4100B.P. of continuous habituated. The second time sea level rise was recorded in the period around 4300 B.P.

The second habitation stage of the shell bearing site has been reported from 4100 to 3200 B.P. This was clearly seen and reported from the Miniethiliya and Henagahapugala. According to Radiocarbon reported from Miniethiliya shell midden, its human impact continues to 4100 to 3,600 B.P.

(Kulathilake et al. 2014). A full human skeleton was found in shell midden, in Miniethiliya, along with a large number of stone tools and animal bones and shells. Excavations carried out by Deraniyagala at the Henagapapugala coastal site, which is Radiocarbon dated to 3370 B.P., revealed evidence of human culture. It is reported that not only stone tools but also periodic black and red were pottery found (Deraniyagala 1992).



Fig. 02. The photograph showing excavated site at Kalametiya



Fig. 3. A general view of shell deposit at Kalametiya .

It is clear that the Henagapapugala coastal site indicate that prehistoric and proto historic human activities from mid Holocene. Due to the rapid human impact of the present day human activities are not suitable for further research. The third habitation stage intervention on shell bearing site has been recorded from 2800 B.P. The rising sea level was gradually regression the current sea level to about 2200 B.P. Katupotha's research at the Hathagala temple land uncovered a number of human bones and stone tools in the context of the 2nd millennium (Katupotha 1995).

Prehistory to the Iron Age, the hunter-gatherers who lived on the South littoral have recorded of black and red were pottery on the shell bearing site of the after 2nd millennium. Pallemalala investigations have recorded black and red were Pottery between 2700-2500 B.P. Also, pottery has been found in Miniethiliya from 3300 to 2800 B.P. (Kulathilake et al., 2014). This shows the proto-historic cultural features. The oldest known Iron Age in Tissamaharama dating back to 2320B.P. (Gorsdorf 2001). Accordingly, the presence of black and red were, red were pottery within the shell midden sites appears to belong to the proto historic Iron Age and early historic period. According to Deraniyagala, suggest who lived in this country have entered the Iron Age rapidly. Mesolithic hunting and gathering economy appears to have been rapidly replaced by farming, based on paddy cultivation and miscellaneous, crops, supplemented by animal husbandry coupled with a progressively decreasing component of hunting (Deraniyagala 1992: 707). The citadel of Anuradhapura is considered to be the site of the suggest of Deraniyagala.

7. Discussion

Archaeological evidence confirms that the history of Sri Lankan prehistoric habitation goes back as far as 125,000 B.P. (Deraniyagala 1992). Often, the habitat of prehistoric humans was determined by the abundance of resources they had and the availability. Environmental changes from the late Pleistocene to the Holocene affected the prehistoric subsistence. Estimated densities for hunter gather population subsisting in the deferent eco zones in Sri Lanka, on the basis of ethnographic data on the Vaddas, Kadar, Chenchu, Anadamanese and Semeng. It has been hypothesized that in general the wet zone would support a much lower density than the dry zone with Eco zone D and D₃ estimated at ca. 0.1 individuals per km² and D₃ being even sparser due to its poor resource base (Deraniyagala 1992). The coastal Andaman's evidence for population concentration of up to 1.5 persons per km has been considered analogous to the potential situation along the coastal tracts of ecozone dry and semi-arid with their rich resources (ibid).

The abundance of resources and the high ecosystem may have contributed to the high density of the coastal dry zone, especially in the low country wet zone. The rainforest system may have caused a low level of subsistence in the dry zone environment. The ethnographic data on settlement indicate that the minimum size of the hunter- gather bands in Sri Lanka during the Quaternary or at least in so far as Homo sapiens sapiens was concerned , would have been 15- 25 individual with the maximum being ca. 50m². The settlement size in prehistoric Sri Lanka from the survey in the IFM indicate a modal extent of ca.50m² for the areas occupied by what seem to be base camps (Deraniyagala 1992). The population density from the middle Pleistocene on words, with range of < 0.1 to 0.8 individuals per km² in the hinter land and up to 1.5 in the coastal dry zone.

The high Biodiversity Ecosystem may have contributed to the expansion of the shell bearing habitation during the Holocene period in the south coast. The coastal basal gravel at Bundala estimated to date between 125000, 74000 and sand dune dated to the late Pleistocene at 28000B.P. (Deraniyagala 1992: 685). Deraniyagala has divided of Bundala stone artifacts is two distinctive cultural phase, middle Paleolithic and Mesolithic. Most of the known above sites are located as a coastal habitation. Such an investigation is beyond the scope of the present research framework. This merely seeks to sketch the broad outlines. Present research mainly deals with mid Holocene shell bearing habitation. The open air of the settlement would have been inhabited. The abundance of resources available from the ocean and lagoon and land has affected the settlement. Stone age man appears to have camp along the shoreline of Eco zone A on beach exploiting the marine (lagoon) and estuarine food resources that characterize the protruding coasts of dry zone (Deraniyagala 1992). In addition to these aquatic resources the terrestrial exploitable faunal biomass is likely to have been the highest for the island for much of the quaternary (ibid). Given the large number of stone tools recorded during the surface exploration of the coastal plain up to Rekawa, Kirinda and Minihagalkanda, it is evident that large human settlements and activities have taken place from the late Pleistocene to the mid-Holocene. The high ecosystem was also a major factor in the expansion of the habitat of shell bearing habitats during the early Holocene. Mid-Holocene, sea-level fluctuations along the southern littoral to the creation of high subsistence capacity. With the new global changes created by sea level fluctuations, the ecosystems or ecological nicks to build the ecosystem have been developed. These ecosystems appear to be areas where hunters remain intact.

8. Conclusion

The research aim presented in above are human habitation occurred on several occasions in comparison with sea level fluctuations during the mid-Holocene and the archaeological evidence associated with the shell bearing site. Archaeological evidence of shell bearing site on the southern coast represents several cultural phases. Research in the shell midden has revealed that the mid Holocene human activity was widespread. This evidence synchronous with other Mesolithic human activities in country. From 5500B.P. To 2200B.P. rich human activities have been represents in the southern coastal plains. Black and Red were potsherd represent two cultural phases.

Accordingly, it depicts the existence of prehistoric and proto historic human settlements in the region. This study confirms the existence of an early historical settlement based on the red were pottery found in the vicinity of the Kiwla. Hence discussion of human culture has been built on the evidence from the excavations and the data revealed in previous research. According to research data, human impacts on shell bed are recorded on three phases in the southern coast during the mid-Holocene period. A clear human intervention

has been recorded from the Pallemalala and Henagahapugala sites between 5200 - 4600 B.P. It is the infancy phase of human intervention in shell bearing site. A radiocarbon date dating back 6,000 B.P. has been reported in Kalamatiya but there is no evidence of human activity. Evidence from the Miniethiliya suggests that human impact on shell bed could be considered as a second infancy. It shows that frequently habitation from 4100 to 3300 B.P. Researches in Miniethiliya has uncovered a wide range of human activities. The oceans and the land have come to be a dynamic human settlement with a clear relationship. The third human intervention in the southern coasts, relative to sea level rise, dates back to 2200 B.P. Evidence of this has been recorded from the Hathagala temple land. The human skeletal remains of the Hathagala have been reported by the Katupotha but no further research has been carried out. The existence of a proto historic Iron Age is evidenced found on the shell bed surface, which coincides with Deraniyagala's view that the Stone Age people of Sri Lanka are entering into an Iron Age. Research indicates that prehistoric settlement was at sea level regression to the present coastal belt when settlement occurred along the southern coastal plain.

9. Acknowledgement

I am also sincerely grateful to Prof. Gamini Adikari helps me design my research programmed. I would like to extend my thanks are also due to Mr. Ranjith Bandara who support me design my excavation. Completion of the excavation would not have been possible without his support. I am also would like to extend my gratitude for support of Post Graduate Institute of Archaeology (PGIAR), Dr. Arjuna Thanthilage and Indika Vithange, who support me to sediment analysis. I would like to thank Shamal Iroshana, Jayampath Senanayake, Kasun Weerasekara, Puspakumara, who support me to my Feld work and excavation.

10. Reference

- Adikari, G., and J. Risberg. 2007. "Sediment and archaeology along the southern coast of Sri Lanka." *Archaeologia: Journal of Archaeology*:1-10.
- Augustinus, P.G.E.F. 1989. "Cheniers and chenier plains: a general introduction." *Marine Geology* 90 (4):219-229.
- Ceci, Lynn. 1984. "Shell midden deposits as coastal resources." *World Archaeology* 16 (1):62-74.
- Deraniyagala, S.U. 1992. *The prehistory of Sri Lanka: an ecological perspective*. 1st, ed. 2 vols. Colombo: Dept. of Archaeological Survey, Govt. of Sri Lanka.
- Ekanayake, S.P., C.N.B. Bambaradeniya, W.P.N. Perera, M.S.J. Perera, R.K. Rodrigo, V.A.M.P.K. Samarawickrama, and T.N. Peiris. 2005. *A Biodiversity Status Profile of Lunama-Kalametiya Wetland Sanctuary*. In Occasional Papers of IUCN Sri Lanka: IUCN - The World Conservation Union, Sri Lanka.
- Harmsen, Hans, and Priyantha Padmalal Karunaratne. 2016. "Coastal hazards, resiliency and the co-evolution of

- human-natural systems along the southeast coast of Sri Lanka during the Late Quaternary (c. 30,000-3000 BP): Preliminary findings of the 2013 Bundala Archaeological Survey." In Marine Ventures International Symposium 2013: Diversity and Dynamics in the Human-Sea Relation, edited by H. B. Bjerck. Trondheim, Norway: Equinox Publishing.
- Katupotha, J. 1994. "Geological significance of marine mollusk beds: evidence from southern coastal zone of Sri Lanka." *Journal of the Geological Society of Sri Lanka* 5:141-152.
- Katupotha, Jinadasa, and N.P. Wijayananda. 1989. "Chronology of inland shell deposits on the southern coast of Sri Lanka." *Quaternary Research* 32 (2):222-228.
- Kulatilake, S., N. Perera, S.U. Deraniyagala, and J. Perera. 2014. "The Discovery and Excavation of a Human Burial from the Mini-athiliya Shell Midden in Southern Sri Lanka." *Ancient Asia* 5 (3):1-8.
- O'Connor, S., and M. Sullivan. 1993. "Middens and cheniers: implications of Australian research." *Antiquity* 67 (257):776-788.
- Perera, H. N. 2010. *Prehistoric Sri Lanka: Late Pleistocene rock shelters and an open air site*, BAR International Series 2142. Oxford: Archspores.
- Premathilake, Ratnasiri. 2006. "Relationship of environmental changes in central Sri Lanka to possible prehistoric land-use and climate changes." *Palaeogeography, Palaeoclimatology, Palaeoecology* 240:468-496.
- Ranasinghe, P.N. 2010. "Holocene coastal development in southeastern-eastern Sri Lanka: Paleo-depositional environments and paleo-coastal hazards." PhD Doctoral, Geology, Kent State.
- Ratnayake, A.S. (2016) 'Evolution of coastal landforms during the Holocene Epoch along the west and southeast coasts of Sri Lanka', *Interdisciplinary Environmental Review*, Vol. 17, No. 1, pp.60–69.
- Somadeva, R., and S. Ranasinghe. 2006. "An Excavation of a Shell-midden at Pallemalla in Southern Littoral area of Sri Lanka: Some Evidence of Prehistoric Chenier Occupation in c. 4th millennium BC." *Ancient Asia* 1:14-24.
- Weerakkody, Upali. 1988. "Mid-Holocene sea level changes in Sri Lanka." *Journal of the National Science Council, Sri Lanka* 1:23-37.