5.1 Introduction: Geoarchaeological studies are of immense help in reconstructing the evolutionary history of an area during the late Quaternary period. In the past few decades numerous studies have been carried out on the coastal and offshore sites to ascertain the archaeology and palaeogeography of such sites (Jardine and Morrison, 1976; Chappel, 1982; and Delano 1976). Since no dating either C or TL could be made from the Palaeo-beach ridges, the support from archaeological investigations have been taken into account to unravel the regressive phase of the sea. The study area, particularly the Kodungallur region engrave lots of archaeological information.

The first Geoarchaeological study in India was carried out by Robert Bruce Foot (1863). De Terra (1939) carried out an integrated study in the river terrains of Narmada valley and in the terraces of Kortalayar river in Madras coast. A number of workers later on carried out extensive studies on the prehistoric remains in various parts of Peninsular India. Some important work in the recent time are done by Gardner (1986) in Tamil Nadu, Pappu (1974) in Maharashtra, and Kale and Rajaguru (1983) in Konkan.

However, very few such studies have been carried in the Kerala region. The prehistoric and paleoenvironment of the region was studied by Rajendran (1984). He has carried out extensive studies on paleolithic and mesolithic industries of Kerala and was able to reconstruct the cultural sequences and paleoenvironment of paleolithic and mesolithic industries. Besides this, a number of workers have also studied on various
archaeological materials mainly the megalithic remains from different parts of the state (Sathyamurthy, 1992).

5.2. Results

Extensive field works have been done in the study area in order to locate archaeological remains. Conducting archaeological exploration in the study area has been very difficult as the terrain was highly populated and cultivated. However, the exploration in the study area has resulted in the finding of mesolithic, neolithic, megalithic and early historical remains. A total number of 18 archaeological sites have been discovered out of which only one belongs to mesolithic, 2 neolithic, 13 megalithic and 2 to early historic period.

Mesolithic period: Microlithic tools are found in a place called Thevakkal, about 15 km north east of Ernakulam. Here four points, three flakes and one core are found in a lateritic soil cover. The presence of flakes along with the core shows that this was a stone age factory site. The tools are made of quartz (Plate 8) which is abundantly available in the site in the form of veins in laterite country rock. The site is situated near a water locked paddy field which would have been a palaeochannel of river Periyar.

Neolithic period: Neolithic tools are discovered from two sites in the study area. They are Aduvassery and Elavoor, respectively about 15 and 20 km north west of Alwaye. At Aduvassery, a neolithic celt (Plate 8) is found in a lateritic terrain adjoining an extensive river terrace of Periyar while at Elavoor, three celts are spotted in the present Chalakkudy river channel. All the four tools are made of granite. The location of the sites indicates that neolithic people might have used the fertile land adjoining the river beds for cultivation.
Plate 8 Mesolithic flakes and neolithic celt from Kalamassery and Elavoor respectively.

Plate 9 Megalithic burial Jar, Kunnukara
Megalithic period (iron age): Hundreds of megalithic urn burials (Plate 9) are found in the study area (Fig. 3). Most of the megalithic remains are currently being destroyed by the people as most of the lands are brought under either for cultivation or used for house building. The important sites in the mid land regions are Kalamassery, Alwaye, Aduvassery, Chengamenad, Kurumassery, Kunnukara, Puthenchira and Pullut. A number of sites are also found in the coastal region between Kodungallor and Chavakkad. The prominent sites are Perinjanam, Acheswaram, Chendrappinni, Thripayar and Engandiyur. Unlike the midland sites, coastal sites have yielded more number of urn burials. Details of few important sites and their findings are given below.

a) Kalamassery: Kalamassery is about 12 km north east of Ernakulam and the site is situated within the Cochin University campus (Plate 10). The site is unearthed while building operation. Archaeological remains have been found one meter below surface level in a laterite slope overlooking a water-logged paddy field. A total of twelve buried jars are found in the site. The megalithic burials here are composed of a medium sized burial jars containing associated pottery, iron implements and disintegrated bones and the jars are capped with laterite block or with a pottery lid. The jars are hand made red ware pottery, ranging in size from 50 to 80 cm in height and 40-60 cm in diameter. The associated pottery include bowls, pots, dishes, vases and cups, they are all wheel made and are essentially of black and red ware type. The burials have also yielded some disintegrated bones.
Plate 10 Megalithic site, Kalamassery

Plate 11 Megalithic bowl and rim of burial Jar, Kunukara and Chendrappinni
b) Chendrappinni: Chendrappinni is 15 km north of Kodungallur. The site is situated 500 m east of NH 17, on a prominent palaeobeach ridge overlooking a swale and the Pullut channel is on the eastern side. While digging for a pipe line on the side of Chetuva-Perinjanam road the site is said to have yielded hundreds of urn burials aligned in a linear fashion. However, the author could find only ten burials either in full or broken. The megaliths in this area comprise of burial jars containing black and red ware pottery (Plate 11) and iron tools, they are covered with either laterite cap stone or pottery lid. The jars are 0.75 - 1 m in height and 0.60-1 m in diameter and conical in shape. These jars are found at a depth of 0.5 - 1.0 m below the surface. In one instance, the jar is found covered with semispherical laterite cap stone while all other jars are found covered with pottery lid. The occurrence of laterite cap stone within the beach ridges is significant as no laterite exposure is found in the area. The nearest laterite exposure is in the midland region to the east of Pullut channel.

c) Engandiyur: It is situated about 25 Km north of Kodungallur. Megalithic burials are found on both the sides of Chetuva-Perinjanam road. According to the local people, hundreds of burials are found in this area. The maximum concentration of burials are noticed in a 200 m wide and 500 m long area near the Catholic Church, Engadiyur. However, the author could find only broken pieces of 10 burial jars. The jars are found 0.5 to 1 m below the ground level and covered with pottery lid. The significant feature of the site is the occurrence of russet coated painted pottery (Andra ware) which is an early historic
cultural trait of Peninsular India. The russet coated painted pots have been recovered by local people and are now exhibited in the Thrissur museum.

Early historical period: Archaeological remains, supposedly of early historic period, were recovered by the author from two sites in the coastal area near Paravur. A well preserved terracotta ring well was found at a depth of 1 m from the surface, in Kottuvally village about 5 km SW of Paravur (Plate 12). The ring well was made up of 70 cm in diameter, 4 cm thick and 2 m deep. This site lies just 500 m west of Valluvally, the famous Roman coin hoard site. Discovery of Roman coins from Valluvally was made by some labourers while sand quarrying in the area during September 1983. The coins were found buried inside a pot and according to local public, the hoard may exceed one thousand coins. Most of the coins in this hoard were mint-fresh with legible inscriptions and it is an index to Roman gold coinage found in Kerala. The obverse side of a Roman gold coin is shown in plate 13.

Early historical objects like pot sherds and bricks are noticed on an elevated place called Pattanam, situated about 2 km NW of Paravur and 8 km SW of Kodungallur. Three glass beads and one agate bead also were recovered from this site (Plate 14). The most significant finding is a potsherd obtained from a depth of 0.70 m, which Dr. Selvakumar, Dept. of Archaeology, Deccan college post graduate Research Institute, Pune has identified as a piece of an amphorae (personal communication). The other significant feature is the presence of large sized pot sherds, probably of megalithic affinity.
Plate 12 Terracotta ring well (Early Historical Period), Kolluvally

Plate 13 Roman coin (Early Historical Period), Valluvaly
Plate 14 Piece of amphorae? (top left) pottery and beads (Early Historical Period), Pattanam, north west of Paravoor
5.3. Discussion

One of the research objectives of geoarchaeology is to reconstruct the landscape that existed around a site or group of sites at the time of occupation. The changing sea levels, during the late Quaternary have dramatically affected the distribution and preservation of sites of early coastal adapted people and the evolution of these landscapes has affected the loci of human activity. A reconstruction of the original relationship between settlements and coastal geography is often necessary starting point for any adequate interpretation of their economy and form. Geoarchaeological investigation in the study area revealed the existence of various archaeological cultures and the geographical distribution of these cultural remains can be effectively used to study the land form evolution in the past.

The earliest archaeological remains obtained from the study area are the microlithic tools obtained from a site called Thevakkal. The beginning of mesolithic culture in India has been dated to 8000 yrs B.P. and the mesolithic cultural phase in Kerala has been dated to around 5000 yrs B.P. (Rajendran, 1984) which indicate a late mesolithic habitation. The period of neolithic occupation in Kerala is uncertain, as no sites has been reported in a stratigraphical context. It has observed that neolithic cultural phase in India can be assigned a time span of around 2350 to 1200 B.C. Therefore, the mesolithic and neolithic cultural phase might have existed from 5000 to 3000 yrs B.P. in the coastal region. Eventhough, no generalization is possible on the basis of the limited number of tools recovered from the study area and also in the absence of stratigraphic context, the
mesolithic and neolithic phase can be dated to the above time span in the study area. The absence of mesolithic and neolithic implements in the coastal area indicate that man inhabited only in the mid land region of the study area during this period.

The extensive occurrence of megalithic iron age cultural remains throughout study area and their particular concentrations in the innermost strand plains is very significant. Megaliths in India, particularly in Peninsular India, include a variety of sepulchral and commemorative monuments which are either built of large stones or else associated with a somewhat homogenous group of black and red ware pottery. By and large, they are collective burials in which post exposure bones of more than one person are found buried. C dates place the megalithic cultures of India between 1000 B.C and 1000 A.D. However, the period of their maximum popularity appears to be between 600 B.C.-100 A.D. The urn burials are the most common variety of megalithic burials found in Kerala, especially in coastal regions. In Kerala, only two 14 C dates are available for urn burials at Mangadu from Kollam Dt., and they show an age of 2890±70 and 2850±90 yrs B.P. (Sathyamurthy 1992). On the basis of typological studies of the excavated materials, the urn burials of Porkalam to a period from 300 B.C. to 100 A.D. So the time span of Kerala's megalithic culture can be assigned at 900 B.C to 100 A.D.

The absence of stone age sites and the presence of vast numbers of megaliths in the interior strand plain areas are clear evidences of a migration of human settlements towards the coastal plains as the sea started receding. Mathai and Nair (1988)
observed a periodic cyclicity in the emergence of landscape. The presence of early historical remains in the coastal plains where megalithism are once flourished indicate a gradual cultural development from the primitive megalithism to a settled early historical cultures.

The accounts of classical writers of Greece and Rome contain reference to Kerala. Some of these writers are Megasthenes, Pliny, and the author of the Periplus of Erythrean Sea, Ptolemy and Cosmos Indicopleustus. Most of these references give accounts of shipping routes to various ports on Malabar coast like Muziris, Tyndis, Barrace and about the export and import items. All these references indicate that Muziris was a chief port on the west coast of India and the geographical account given by these authors help us to identify that a port was situated near the Periyar river mouth in Kodungallur area. Kodungallur or Cranganore was variously called as Muziris, Muchiri, Mahodayapuram, Mahadevapattanam, Makotaipattanam, Muyirikodum Tiruvanchikulam etc. in the earlier periods. The author of the Periplus speaks in admiring terms of the chief Malabar ports of Muziris (Cranganore) and Barace (Porakkadu).

The Tamil sangam literature of early Christian centuries also give a good account of the port of Muziris. In Ahananuru, it was mentioned that the Yavanas sailed into the Muziris located at the mouth of the Periyar river, Kerala with gold and sailed off with pepper. Another sangam text of first century AD also mention that pepper were exchanged for gold with the visitors arrived at Muziris by ship. The Chera King Kuttuvan presented to the visitors the rare product of the sea and mountains.
The fact that cultural remains of early historical period have only been found in the coastal areas around Paravur, is highly significant in the context of location of the famous ancient Port "Muziris". It was mentioned earlier that the classical accounts of the writers of ancient Greece and Rome and also the Sangam literature give vivid description of this port city. In the light of available evidences in the form of early historical archaeological remains from the sites around Paravur, it can be rightly pointed out that the location of ancient Muziris might be somewhere in the south east of Periyar river to present Paravur town. The absence of stone age, megalithic and early historical sites in a 3 km wide stretch in the nearshore coastal area indicate the recent emergence of the coastal landscape in central Kerala region.