CHAPTER 6

SUMMARY AND CONCLUSIONS

The study deals with Quaternary sediments and sea level changes of the central Kerala region. The geomorphological landforms of the central coastal region and grain size parameters of the kole land of northern region, strand plain sediments of the Kodungallur region and deep borehole samples of the Ernakulam region have been studied. The sea level variation during the late Quaternary period have been studied with the aid of 14C dates, geochemistry, palaeontology, palynology, lithologic variations and archaeological signature.

In the coastal region several land forms have been identified, which show affinity to sea level variation in the study area. The innermost palaeo-coast line is delineted based on the nature of spacial relationship between laterites and alluvium. In the northern part of the study area the coastal plain extends up to 8-10km, whereas in the Kodungallur region it ranges from 6-8km. In the Ernakulam region the coastal plain extends still interior at about 8-12km. It is observed that unlike the present coast, the paleo coastline was highly irregular. Between the paleo coast and the present day beach several linear sand ridges are found aligned parallel to the present day shore line. These ridges are intervened by swales of varying width. The beach ridges range in height from 2-6m and the ridges slope westwards indicating that they are formed during regressive phase of the sea. On the other hand, the beach ridges east of Pullut channel would have formed during transgressive phase. Maximum sea level rise to the tune of about 6m can be proposed for the study area.
The texural studies of Kodungallur region show the medium sand grade predominates followed by fine grained sands. In general, the grain size become coarser with depth in the strand plain. The standard deviation values indicate that the majority of sediments are moderately well sorted followed by moderate sorting. Sorting improves with decrease in grain size. Nearsymmetrical skewness predominates whereas coarsely skewed and finely skewed samples show a subordinate nature. The kurtosis indicates that the platykurtic, mesokurtic and leptokurtic are more or less equally distributed. The mean grain size decreases towards inland and it is due to eolian activity prevailing in the coastal region.

The deep bore hole samples in the Ernakulam region reveal four lithologic units namely, 1) a sandy unit, 2) a silty or muddy unit which is interbedded with a secondary lateritic sediments (unit 3) at different levels and a thick sandy unit at the bottom. The top three units are of late Quaternary, whereas the bottom sandy unit might be of an earlier period, possibly the Mio-Pliocene. The secondary lateritic unit can be correlated with last glacial period and would have been formed between 20000 and 12000 yrs B.P. In accordance with variation in lithology, the grain size parameters vary widely in the bore hole samples.

The sea level variations have been studied with the help of 14C dates. Four dates have been obtained in the deep borehole samples. Samples of Ernakulam region show ages from 25000 to 40000 yrs B.P. In Kodungallur region, the 14C dates indicate that the sediments are of Holocene period. The northern part of the study area also indicate that sediments are also of Holocene
period. The occurrence of peat beds with abundant mangrove pollen in the inland region, such as Vallor which is located 20 km inland and Vellangallur (10 km inland) indicate a high sea level during early Holocene. When the sea retreated the mangroves were destroyed. The geochemical study of the sediments, indicates that Fe, Mn are in a higher concentration in the lateritic horizon at a depth of 21 m. The higher Fe content at this depth indicate indirectly an arid climate. The organic content at this depth is very low. The high contents of Fe, Mn and Cr in the strand plain sediments at depths of 0.6 m coincide with ferricrete concentration. A late Holocene aridity is supported by the above evidence.

The abundant mangrove pollens (Rhizophoraceae) at a depth of 18 m and evergreen type at a depth of 21 m in core III indicate a high sea level and fresh water conditions respectively. Similarly in core I evergreen types of pollen are found at 39 m, 63 m and 70 m depth in Cochin backwater core. Evergreen types predominate even at a depth of 70 m. A general absence of mangrove pollen in the bottom samples of Kaloor and Cochin backwaters indicate that the sediments are of fresh water origin. A marine condition in the early-middle Holocene is also supported by the benthic foraminiferal assemblages. The fossil shell of the kole land region support a change from intertidal to sub-tidal regime in the early to middle Holocene.

The archeological remains, indicate a systematic variation across the coast. Microlithic tools are found in the primary lateritic region. Neolithic tools are found adjoining to the
river terraces in the near coastal areas. In the strand plain sediment, evidences of megalithic cultures are found abundantly. The remains includes urn burials containing associated pottery, iron implements etc. The urns are capped with lateritic blocks or with pottery lids. The megalithic cultures are mainly concentrated in the eastern part of strand plain region. The well preserved terracotta ring well, pottery and coins (Roman) belong to early historical period are some of the evidences found. Kodungallur, once a prominent port city is now situated about 5 kms inland. These clearly support that as the sea retreats, human cultures also advance towards west. The available archaeological evidences point out that the location of ancient Muziris near to the present day Paravur.

The general sea level picture derived from the study indicate marine regression prior to 30000 yrs B.P. and 25000-15000 yrs B.P. Indications of marine transgression are noticed around 30000-25000 yrs B.P. and after 10000 yrs. Evidence for higher sea level during mid Holocene is also observed. A late Pleistocene and late Holocene climatic shift towards arid conditions is also noticed.