The world oceans are in the brink of ecological collapse due to powerful forces like overfishing, rapid industrialization creating the marine ecosystem as an ultimate trash bin for dumping toxic chemicals including both inorganic and organics. Without swift action, ocean systems will continue to deteriorate and have been associated to human health such as cancer, birth defects and brain impairments. Reducing or eliminating these toxic components in the products we buy, the air we breathe, the food we eat and the water we drink can help to reduce the fall of human disease and suffering. Safeguard and protection of the environment requires high quality science that is free from conflicts of interest. The appropriate conservation and sustainable development strategies attempt to recognize the diversity in life on Earth as being integral and it enhance ecosystem productivity. As we enter the 21\textsuperscript{st} century, swelling demand and changing climate pattern, clean water as the world biggest health requirement for public are continuous to threaten both quality and life. Estuarine water bodies in many densely populated region of the world are subjected to inducing multiple anthropogenic impacts. Biological activities convert organic compound to \( \text{CO}_2 \) and \( \text{H}_2\text{O} \). But inorganics mainly metals are continuously accumulating in marine environments, except for a minor portion that may be taken away along with marine food and other products. Metals if present in higher amount than normal concentration are toxic to marine biota and humans. Many catastrophic events of human health significance have occurred in the past based on metal pollution. A sense of
avoidances of such unfortunate incidents has led to a great extent in monitoring of toxic metal concentration in the marine environment.

Metal pollution of the natural environment is a universal problem as metals are indestructible and most of them have toxic effect when they exceed threshold levels. Metals are recognized as an important indicator of aquatic environment degradations. Huge amounts of metals are entering the environment each year as contaminants from anthropogenic-related processes by the ways of untreated industrial wastewater, municipal sewage effluent, surface run-off, so on. Population growth and the resultant acceleration of domestic, municipal, industrial, agricultural and recreational activities are the primary cause of anthropogenic pollution of the marine realm. Metals in the environment pose a variety of very interesting scientific questions. The field of work involved cover a wide range of disciplines, showed as an interdisciplinary field of work ranging from geology, mineralogy, geochemistry (origin and natural occurrence is concerned) analytical, physical and colloid chemistry (comes to the detection of metals and their interactions with environmental media such as water, ground water, soil, rock and air) biology, ecology, ecotoxicology medicine (concerned with their impact on global ecosystems and their effects on human and animal health) and finally the remediation of metals requires cooperation of several engineering disciplines such as environmental, chemical and civil engineering.

Metal pollution in the estuarine and coastal sediments is an important component in understanding the exogenic cycling as well as in assessing the effect of anthropogenic influence on marine ecosystem. In recent years, increasing attention was given in the level of metals in the sediment band. Thus, understanding the transport, distribution and characterization of trace
metals in the sediments of the estuaries is a challenging area of research for environmental chemists. Stoichiometric regulation of aquatic ecosystem structure occurs at the sediment interface via altered biogeochemical processes and benthic food webs. Sediments constitute the environment, a solid framework for geochemical reactions during early diagenesis that occur in the pore space between the particles in the water–sediment boundary layer. Marine sediments can be sensitive indicators for monitoring contaminants in aquatic environments. The bottom sediments serve as a reservoir for heavy metal and therefore deserve special consideration in the planning and design of aquatic pollution studies. Core sediments can be used to study the pollution history of aquatic ecosystem and comprises information data set regarding the events that occurred in a pre-cultural time in the estuary. Sediments have been used frequently in the initial phase of environmental assessment to locate areas of possible concern and trace historical changes because they give an integrated picture of contaminants over time. Sediment cores are a pricey and exclusive resource of immense scientific value and are extremely useful gadget for the geochemical studies. The sediment core analysis is interesting as the bottom sediment records the past changes in the aquatic system. It establishes both the effect of anthropogenic and natural processes occur in the environment.

Cochin Estuarine System (CES), one of the largest tropical estuaries in south western side of Indian peninsula faces gross pollution problems following the release of untreated effluents from industries and domestic sectors. Considering the importance of metal estimations in the pollution assessment study in recent years there has been a great spurt of renewed activities were carried out in CES, but there is scanty literature available in the core sediment geochemistry. Sediment core analysis can be used as a gauge of
the quality control in the CES and would provide a clear cut idea about the environmental dynamics of the studied site. No systematic research activities have been conducted in the characterization of metal fractions in the core sediment of the CES. Most of the studies are based on one time or seasonal sampling during a year of sample collection from areas known for environmental pollution. Though in any area in which distribution of inorganic pollutant in sediments collected with a considerable time period can provide a clue for change in the environment and such studies are limited. In this context the present work entitled “GEOCHEMICAL METAL FRACTIONATION PROFILE OF THE CORE SEDIMENT IN THE COCHIN ESTUARINE SYSTEM” mainly intends to remove the gap in the core sediment chemistry by characterizing metal fractions of the core sediment from different hotspot sites of the CES.

The thesis is divided in to six chapters.

**Chapter 1 – ENVIRONMENTAL GEOCHEMISTRY OF ESTUARINE CORE SEDIMENT** comprises a brief introduction deals with literature survey of the environmental geochemistry of estuarine sediment leading to the motivation and problem statement.

**Chapter 2 – METHODOLOGY** deals details of the methodology, the criteria for selection of sampling stations and the precautions adopted for sampling and analysis of each constituent are discussed.

**Chapter 3 – METAL FRACTIONATION OF THE SURFACE SEDIMENT IN CES** describes the spatial distribution and fractionation of metals in the surface sediments of Cochin estuarine system. Also explains the result in comparison with hydrographic parameters and sediment characteristics.
Chapter 4 - METAL DISTRIBUTION IN THE SPECIFIC CORE SEDIMENTS OF COCHIN ESTUARINE SYSTEM (CES) depicts the information of the vertical distribution of metals in the core sediments of Cochin estuarine system and illustrates the depth variation profile with other components under study.

Chapter 5 – GEOCHEMICAL METAL FRACTIONATION OF SPECIFIC CORE SEDIMENTS IN THE CES comprises the geochemical fractionation of metals in the core sediment of Cochin estuarine system along with the evaluation of the risk and mobility associated with these fractions.

Chapter 6- SUMMARY gave précis of overall results and the outcomes derived are presented with comprehensive explanations.