Mangroves represent one of the most natural forest ecosystems susceptible to constant threat by human activities. They have the ability to grow where no other vascular plants can. The mangroves exist under stressful conditions such as violent environments, high concentration of moisture, high and low tides of water, and abundant living micro organisms and insects. They thrive in a very peculiar environment and serve as a bridging ecosystem between fresh water and marine system.

Mangrove wetlands are effective in retaining heavy metals and nutrients from seawater, but it is essentially anaerobic. All soil nutrients vary seasonally, in response to wet and dry periods of climate. Results of the previous studies show that most pollutants are accumulated in the top layer of the soil tray. The wastewater inputs and salinity would have more significant effects on the microbial activities in mangrove soils.

Since anaerobic conditions are prevalent in these ecosystems, the chemistry of Sulphur and its compounds are important. The work is mainly concentrated on Sulphur Chemistry in mangrove sediments. Sulphur is an essential nutrient for vegetation. It is also a major element of seawater and marine sediments. Sulphur is an important redox element, existing in a wide range of oxidation states from −2 to +6 and enter into a variety of biogeochemical processes. The role of sulphate reduction in anaerobic condition and the resultant production of sulphide minerals are very much pronounced. Therefore the Sulphur cycle has received considerable attention. Major forms of sulphur include sulphate and sulphide minerals, dissolved sulphate, and dissolved sulphide and hydrogen sulphide gas. In this attempt, various fractions such as acid volatile sulphur, pyrite sulphur, gregite sulphur, sulphate sulphur, elemental sulphur, organic sulphur and
total sulphur in the water and sediments of a few tropical mangroves are accessed.

For the speciation of sulphur, water and sediment samples were collected from three mangrove systems from Cochin area. Station 1 is Mangalavanam a protected forest close to Ernakulam city. This ecosystem is known for the protection it offers to various migratory birds and is named as the green lung of the city. There is one outlet in the form of a canal opening to backwaters. *Avicennia*, *Rhizophora* and *Acanthus* are the three main mangrove species seen here. Station 2 is Nettoor, which can be considered as a vanishing mangrove ecosystem with a long strip of mangrove plants along the canal. This is an ecosystem with much anthropogenic input. The increasing prawn culture and the urbanization affects this area more than the other two. Station 3 is Vypeen, which is semi-enclosed system and lies adjacent to the brackish waters. The Vypeen Island has a number of mangrove species. This is closer to the sea than the other two. Bimonthly collections of both water and sediments were made from all the three different stations from Nov'99-Nov 2000.

The thesis is divided into six Chapters. First Chapter covers a brief introduction about tropical marine ecosystems, significance of mangrove ecosystem and the importance of the sulphur cycle in the aquatic realm. The aim and scope of the present work is also mentioned in this chapter.

Second Chapter is about the study area, sampling procedures and various analytical methods adopted for the work. Besides, variations of hydrographical parameters such as salinity, alkalinity, dissolved oxygen, pH and temperature are given.

Third chapter reveals the sulphur chemistry of water column. The values of the concentrations of dissolved sulphates and sulphides are given in this chapter. Along with this the tidal variations of above describe its influence on the sulphur chemistry of water column.
Fourth Chapter gives Chemistry of Sulphur in mangrove sediments especially in the surface sediments. This has helped in the prediction of the fate of sulphur in the surface sediments.

Fifth Chapter explains Geochemistry of sediments and distribution of various fractions of sulphur throughout the core. In addition to the comparative study between the water, surface sediment and core, the reasons for the variations of sulphur species in above three are given here.

The summary given at the end of the work explains how and partially why the different species of sulphur varies in the different samples. The quantification of the six species of sulphur in these ecosystems has revealed to some extent the nature of the system. Above all the study has contributed much insight into the anoxic conditions, of mangrove ecosystem.