CHAPTER 5: CONCLUSION

Coral reefs are one of the important ecosystems on the earth, with high biological production and complicated environmental conditions. Coral reefs can be found along the shore and off the shores of islands and continents in tropical waters (Buchheim, 1998). Reefs are teeming with life and are as rich as tropical rainforests in terms of diversity. They are home to a diversity of colourful exotic fish, corals, and countless other marine flora and fauna. They provide food and shelter to the many species that live in reefs (Meesters et al., 1998). Coral reefs are expected to be home to 25% of all marine species, with as many as one million unique species (Davidson, 1998). Coral reefs are one of the important ecosystems on the earth, with high biological production and complicated environmental conditions. Coral reefs can be found along the shore and off the shores of islands and continents in tropical waters (Buchheim, 1998). They can also be seen from space as spectacular colour patterns tracing the borders of coastlines and spreading far out into the oceans (Spalding et al., 2001).

So far, it has been shown that remote sensing technologies are efficient tools for monitoring coral reefs (Mumby et al., 1999; Hedley et al., 2016). Ocean remote sensing has generated a great lot of interest since it has made it feasible to research the oceans in greater depth with worldwide coverage (Guerra et al., 2016). Ocean Colour (OC), a technique used widely in the field of ocean remote sensing, is currently used to examine how various environmental factors affect coral reefs. Ocean Colour (OC) is sometimes referred to as spectral water-leaving radiances because OC satellite instruments provide estimates of the light that exits a water mass and determines its colour (Werdell et al., 2018). These sensors commonly use wavelengths in the distinct visible and near-infrared (400-1000 nm) areas to measure the spectral radiation coming from the top of the atmosphere (Werdell et al., 2018). In order to manage fisheries and aquaculture, manage coastal areas, evaluate the health of ecosystems, and contextualise behavioural changes in the context of climate change, Ocean Colour Remote Sensing (OCRS) sensors have the potential to continuously measure physical, environmental, biological, and biogeochemical variables (Le Traon, 2011; Payne et al., 2021). And identifying the bleaching effects of coral reefs using of this remote sensing as tool is a main of this study.

The effects of a number of environmental factors, including sea surface temperature (SST), sea surface salinity (SSS), turbidity, total suspended matter (TSM), and photosynthetically available radiation (PAR), on corals have been examined in the current study using both in-situ data and satellite-based observations. Coral bleaching has been the effect that has been most frequently seen on corals. The ultimate goal is to use environmental data to pinpoint the settings that are less susceptible to stress. Here, the sensitivity of coral reefs to bleaching is predicted using environmental factors and data from in situ bleaching surveys. The selection of variables that are known to influence coral bleaching and the adaptation of coral reef ecosystems was the first stage. The data was then retrieved and pre-processed to obtain the primary variables. In a statistical analysis, observational data on coral bleaching was used as the response variable along with the primary variables and/or their corresponding derived parameters. Anomalies of the parameters were also calculated to correlate the parameters' short- and long-term effects on corals and coral bleaching.

Results of Bleaching Response Index (BRI) stated that in summer months of 2019 coral colonies of all the genera in Narara were falling under the moderately bleached corals. At Poshitra, bleaching response of varies from resistible to highly susceptible amongst the coral colonies of different genera. Apart from *Pseudosiderastrea sp.* and *Goniopora sp.* most of coral colonies are moderately susceptible to coral bleaching condition at Poshitra. While in the process of coral health assessment, geo-references of healthy, bleached and sedimented corals were also recorded. Using this data spectral reflectance of different classes was generated. With the intention to identify the difference between healthy and bleached corals, the spectral response of different colonies was analyzed using the SNAP software. Using this software reflectance separability between sedimentation and bleached corals was clearly visible in all the bands ranging from 440 - 940 nm wavelengths. The reflectance values of sedimented corals are also high in all the bands compared to bleached corals. However, spectral separability of healthy corals in compare to bleached corals were only visible in the spectral response results of Poshitra, using that results, Coral Bleaching Index was calculated successfully and the use of these index is to calculate the bleaching of corals without any in-situ data. The results of these anomalies indicates that, throughout the span of three years, SST have positive anomalies. This also have positive correlation with PAR. These means that bleaching recorded during the study, does have effects of higher than usual intensity of solar radiation. Salinity ranges from 33 PSU in winter season to 39 PSU in summer is normally seen at these sites. Thus, the coral colonies of these sites are used to this high level of salinity. Kd490 is also the variable of turbidity and TSM. Thus, positive anomalies of these variables indicated that both the reefs experience higher loadings of sedimentation and suspended particulate matters and turbidity which makes the reefs on GoK, one of the most stressed reefs in India.