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**Year in Course:** 1st (Sophomore)

**Topic:** Coral Reef Restoration, Counteracting the Negative Effects of Climate Change, Finding Effective Restoration Techniques

**Mentor:** Dr. Orion McCarthy, Scripps Institution of Oceanography UC San Diego

**Title:** Effects of Climate Change on Coral Reefs and Restoration Efforts

**Abstract:**

Coral reefs are declining at a rapid rate. These ecosystems are being affected by both local and global threats, which has resulted in various restoration projects to try to help rehabilitate the world’s reefs. One strategy that has been proven to be successful is remote sensing, which is the process of discovering and surveilling the physical traits of an area by measuring its reflected and emitted radiation from a distance. Although remote sensing has been effective in determining overall reef health, its research lacks in investigating factors such as coral health, coral species identification, regional ecosystem health, and predator abundance. Thus, the goal of this research is to design a global database that uses remote sensing to track those four factors of coral reefs. The collected data will contribute to creating unique strategies of restoration. This research can be applied to establishing environmental parameters and Marine protected Areas. Anticipated results are that there will be a wide variation of coral health due to certain regions being more threatened than others, and places with more frequent temperature changes will be more impacted. The various remote sensing technologies that are discussed are thermal stress satellites, Regional Virtual Stations and Seven-day Sea Surface Trend, Spectral Angle Mapper, GPS tagging, LiDAR, photographic, multispectral, hyperspectral, and infrared imaging, and laser-, radar-, radio-based settings, and scanning approaches. Despite the numerous forms of remote sensing, there are also limitations to the technology that can make it difficult to obtain accurate information. For example, inaccurate coverage of estimations of benthic types, inability to target specific species, failure to show complexity of habitats, etc. However, regardless of the disadvantages, remote sensing offers many advantages and opportunities for advanced coral reef research.