MODELING THE IMPACTS OF AN OCEAN THERMAL ENERGY CONVERSION PLANT ON PLANKTON POPULATIONS IN KANEOHE BAY

A THESIS SUBMITTED TO
THE GLOBAL ENVIRONMENTAL SCIENCE
UNDERGRADUATE DIVISION IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF

BACHELOR OF SCIENCE

IN

GLOBAL ENVIRONMENTAL SCIENCE

DECEMBER 2020

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ABSTRACT

Adoption of alternative energy is a key component in reducing adverse anthropogenic impacts on the environment. Ocean thermal energy conversion, or OTEC, has been considered as an alternative to conventional energy production due to its capability to provide consistent power with less environmental impacts than conventional powerplants. However, OTEC has been previously predicted and modeled to pose impacts towards the surrounding environment. These impacts include elevated nutrient concentrations near the effluent discharge point due to the addition of nutrient-rich waters sourced from depth to shallower waters. Previous studies and modeling efforts have assessed the impacts of an OTEC plant on the leeward coast of Oahu, however there is little knowledge on the impacts of an OTEC plant situated on the windward coast. Therefore, the effects of a 100MW OTEC plant in Kaneohe Bay on the biogeochemistry of the waters were modeled. This model was conducted using the Regional Ocean Modeling System (ROMS) to simulate ocean physics coupled to the Carbon, Ocean Biogeochemistry and Lower Trophics (COBALT) model to simulate biochemistry. In this model, a 100MW OTEC plant was simulated through the release of 420 cubic meters per second of surface water and 320 cubic meters per second of water drawn from 1000m depth in a combined discharge at a depth of 40 meters. The discharge point was located offshore of Mokapu Point, Oahu. Results showed changes well within natural variability on average for nutrients and plankton within Kaneohe Bay.