

**Shoreline Ocean Research in the Puna District**  
**Carol McKinney-Jarman, Science Teacher**  
**Hawaii Academy of Arts and Sciences Public Charter School, Paradise Hui Haumana**  
**Subsidiary, Big Island Hawaii**

My fifth and sixth grade students, at Paradise Hui Haumana, a subsidiary of the Hawaii Academy of Arts and Sciences Public Charter School, were involved in their first field research project. This project was funded by a GEMS grant which provided them with most of the equipment, including three, four objective microscopes. The Vernier Data Logger was used from the C-MORE Ocean Acidification Kit.

Our project involved visiting three shoreline sites on the Big Island of Hawaii, Maku'u Tide Pool, Ahalanui Hot Pond, and Pohoiki Beach (specifically the boat ramp bay). Students worked in pairs to collect and record three temperature readings, three salinity readings, and to collect three water samples from various locations at each site. The water samples were stored in buckets with continuous aeration, covered with adhesive saran wrap to allow light exposure, for a week, until their next Science class. The following week, students took a water sample from each site, prepared a slide of it, counted the microorganisms that they could see under the microscope, and tried to identify and classify the microorganisms based upon posters, and photos in their science book. During the next Science classes students collated their data, and computed the mean and range of temperature, salinity, and numbers of microorganisms from each location. A discussion of variables that may have affected their results then occurred. They then completed a lab report based upon their research (see example at the end of this report).

The preparation for this research involved four labs and prior study. The prior study topics were scientific method, ecosystems, zooplankton, phytoplankton, and the food chain. The sixth graders had studied protists (including diatoms), bacteria, viruses and algae the prior year, as well as, global warming. The preparatory labs were as follows: 1) using one objective microscopes (4X) (as the new ones had not yet been received) and slide preparation, 2) taking immersion temperature readings in both Fahrenheit and Celsius, 3) taking salinity readings with the Vernier probe, and 4) gathering information about an ecosystem within a 3 ft. X 3 ft. school ground area.

Since this project's completion, we are continuing our study of the food chain in relationship to marine and land ecosystems, and ecology. In retrospect, I would break this research project into two different field trips, as they were "pressed" for time to take all of the temperature and salinity readings, and gather all of the water samples, or I would plan to visit only two sites rather than three. The microscope work also took an inordinately long time due to having to share the microscopes. Should this project be broken into two field trips, I would plan to gather the water samples on the first one and allow the rest of that day, and a portion of the following, for the microscope work. I would allow time the following two weeks in our 1 ½ hr. science classes to collate, compute, and analyze the data, and complete a lab report. Then they would gather the temperature and salinity readings on the following field trip to ascertain conditions (temperature and salinity) that might have affected the number and types of microorganisms seen from their prior field trip.

This research project has provided my students with education in the areas of reading, math and science. They had to read, comprehend, develop new vocabulary, and apply scientific reading material. In the area of math, they used computational skills (adding, dividing, computing mean and range), use of the metric system, problem solving, and analysis. Scientifically, they developed skills using technology, applied understanding of the food chain, ecosystems, and ecology, analysis and the scientific method. They also utilized logical and deductive reasoning in the process of their data analysis. Additionally, they developed social skills as they learned to work in pairs as a team, during the process of their data collection, and as a class during their data collation.

My students have been excited throughout this entire process. Prior to their field research trip, they were informed that they would be doing “real” research that had not been done before, and that their results were going to be sent to real scientists. This helped them to be serious and more exacting regarding their data collection. They have also competed to achieve the best Data Computation Handout and Lab. Report, knowing that I was going to submit the best of them with this project report.

Even community members that we encountered at the Ahalanui Hot Pond and Pohoiki Beach were interested and excited about our project. At the Ahalanui Hot Pond, a man requested that one of our students come and measure the temperature at the location where he was floating. Another man, at Pohoiki Beach, asked us for a report on the microorganisms that we found there. Even one of our Safety Team members stated that he wished that he had been able to study Science this way, and offered his help with any further marine science research that we might do in the future.

Students remain excited about seeing their pictures on a professional science research website. Last, but not least, my students have had an experience that will remain in their memories for a lifetime, and these memories are associated with the excitement of doing scientific marine research!