INTERNSHIP PROJECT PROPOSAL TO THE UNIVERSITY OF HAWAII
AT HILO MARINE SCIENCE DEPARTMENT

MARE 480: Senior Internship Class

Project title
Conservation of coral reef and potential of Black-lip Pearl Oyster
(Pinctada margaritifera) in Pohnpei

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May 11, 2001
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The theme of my internship program was to produce a video, which shows the importance of coral reefs and the potential of black-lip pearl oyster culture in Pohnpei. At the beginning of the planning stages of the project, I hoped to shoot some underwater video by myself, but eventually all of the video scenes came from previous video footage of others. This project is a part of Dr. Maria Haws work. She is the Director of the Pearl Research and Training Program at the Pacific Aquaculture and Coastal Resources of the Center at University of Hawaii Hilo.
This program promotes black-lip pearl oyster culture as an opportunity to restore local pearl oyster populations, as a good vehicle for environmental education about coral reefs, and as a new income source for people in Pacific Islands including Hawaii. The purpose of my video is to increase awareness of the importance of conservation of coral reefs in Pohnpei and how introduction of the pearl oyster culture can play a role in coral reef conservation.

There were two main reasons for choosing this internship project. First, I could learn how to use a video editing deck. Learning video editing has been a big interest of mine since I started teaching scuba diving. I believe that the effect of visual images is very powerful. So, I have wanted to use my own videography as a teaching tool, and to introduce marine environment and organisms to people.

The second reason I chose this project is that I may be able to contribute to conservation of the marine environment and organisms and the economical situation in Pohnpei. It is always easy for people who live in developed countries to say “save the coral reefs”. But that is more difficult for developing countries that depend on the reef for their subsistence. However, pearl oyster farming may give people a realistic reason to protect the marine environment because the amount and quality of pearls that people can harvest increases as the condition of the reef environment improves. So, pearl farming may help promote the co-existence of marine and human lives.

I had several objectives that were established for this internship. A storyboard and a script, which are the outline and messages of video, had to be completed first. It made it easier to find what types of footage I needed to collect.

Second object was learning how to use editing equipment. I got help from John Coney for using VHS, Hi-8 video deck, and Adobe premier, which is computer software for editing videos.

Third object was to learn about pearl farming. I wanted to know the basic process of the culturing pearl oysters. All information was collected from Dr. Haws since she is a specialist of the pearl culture. Her research papers and video clips were main information sources for my knowledge.

Fourth object was to complete a video. This could be a main object for my internship. For my oral presentation, the video had to be finished by May 6, 2001.
Job Description
Learning how to write a storyboard, finding right footage for the video, adjusting length of footage and a narration, and how to use the basic video editing equipments were main jobs for my project. I also kept regular contact with the internship mentor, Dr. Haws, to gain valuable advice. Since she was often outside of the Island, we had to maintain contact by email. Meeting with Amy Phillips who helped me as a cultural consultant for Pohnpein culture was another important contact. She had many good ideas that improved my video.
Final Proposal
Video Making Project
Mare 480
Senior Internship
Tomoaki Yamada

An internship project in association with Dr. Maria Haws and
Pacific Aquaculture and Coastal Resource Center.
Coordinated in part by Sharon Ziegler – Chong

Spring 2001
Dr. Maria Haws, a member of Pacific Aquaculture and Coastal Resource Center and the Director of Pearl Research and Training Program of University of Hawaii at Hilo, has proposed farming of Black-lip Pearl Oyster (*Pinctada margaritifera*) in Pohnpei to conserve coral reefs and the pearl oysters around the island. Dr. Haws points out that pearl farming can restore pearl oyster populations, pearl oysters can be indicators of environmental condition since *environmental quality affects to the quality of pearls*, and the farm areas can be marine sanctuaries because the area will be highly guarded from theft. She also explains that the farm culture is not only a lucrative activity, but also a good vehicle for environmental education. The farmers understand that conserving populations of pearl oysters and coral reef environment has an impact on the value of the pearls they produce. So, pearl culture may help change people’s habits and it is good opportunity to bring their awareness to preserve marine resources.

My project is a part of Dr. Haws work. Theme of my internship is to create a video that shows importance of protecting coral reef and the potential of pearl cultivation for people in Pohnpei.

There are two main reasons to choose this project.
1) To learn how to edit a video
2) To benefit the conservation of marine life and the economic situation in Pohnpei

Three main objects that I will establish in this semester are:
1) To complete a video
2) To make a video storyboard and oral script
3) To learn video editing techniques using Adobe Premiere

Just as people use visual effects such as TV commercials and posters to sell products and to inform people through news, this video should motivate people to participate the pearl farming or at least, it should help people to understand about the relationship between conservation of coral reefs and pearl oyster culture.
Learning Objectives & Methodologies

1) Objective
To complete the coral conservation and pearl oyster culture video.
Resources / Activities
1) Talk to Dr. Haws, Mr. Coney and Mr. Childers.
1) Obtain information from books, magazines, journals and web sites.
3) Interviews with other experts in the field.
Evaluation / Assessment
1) Include in video.
Time line
I will finish this until May 2nd.

2) Objective
To learn how to make a storyboard and script.
Resources / Activities
1) Talk to Dr. Haws, Mr. Coney and Mr. Childers.
1) Talk to UHH students who previously done video projects.
Evaluation / Assessment
2) Include in video.
Time line
I will finish this until February 17th.

3) Objective
1) To learn video editing skills.
Resources / Activities
1) Obtain information from books, magazines and web sites.
2) Talk to Dr. Haws, Mr. Coney and Mr. Childers.
3) Talk to UHH students who previously done video projects.
Evaluation / Assessment
3) Include in video.
Time line
I will finish this by the end of April.
4) **Objective**
1) To learn past and current techniques of black pearl culture in Pacific islands.

**Resources / Activities**
1) Obtain information from books, magazines and journals and web site.
2) Talk to Dr. Haws, professors of marine science department and co-workers.
3) Interviews with other experts in the field.

**Evaluation / Assessment**
1) Include in video.
2) Written summary.

**Time line**
I will finish this by the end of March.
Reflections
Storyboard

The storyboard is the outline and message of video. It includes an approximate time length, a brief description for each shot, and oral script that matches each video scene. Usually the storyboard is written before any footage is taken or collected so that the videographer or producer knows exactly what types of film they need to shoot or to search for.

Creating a storyboard is just like a writing paper for particular topic. There must be an effective introduction for making people be interested in the
video and to inform them of the theme of a video. The body part of a video includes the primary information that a video producer would like to introduce to audiences. At the end, audiences may be informed about the main theme of a video again.

I read some storyboards, which were previously written by Dr. Haws and Mr. David Lindschmidt who conducted a video project for his internship. Reading their storyboards gave me some idea of how it should be done. Since a storyboard is “the heart” of the video, I carefully determined the contents and selected the words that I used. For each revision I had valuable advice and suggestions from Dr. Haws, which I used to reconstruct the storyboard to make it better. Ms. Amy Phillip who is currently a student of the University of Hawaii at Hilo also helped me because she came from Pohnpei and knew about specific topics of the island. The first step of my project, writing a storyboard, was completed with assistance of Dr. Haws and Ms. Phillip in begging of March, which was a little behind from original schedule.

Creating a storyboard was important process for me, because this is always a key part of producing a video. If I would like to make a video, I would never eliminate this process. It was also a good practice to explain particular topic by short and simple sentences.

Since I already had some information about coral reef issues and pearl oyster culture, only a little research about them was conducted before I started making storyboard. However I also think that I could have made better storyboard if I had researched more about specific problems for conservation of coral reefs in Pohnpei.
<table>
<thead>
<tr>
<th>Script &amp; Time</th>
<th>Shot Description</th>
</tr>
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| 1 Coral reefs are the “tropical rain forests” of the ocean. Reefs provide food and shelter for the many animals and plants that we depend on. (00:14-00:21) | 1 Show coral reefs  
Fishes hide in corals |
| 2 Just as the forest is made up of thousands of trees, a reef is made up of millions of tiny animals. Corals have soft bodies, called polyps, and make a hard, protective skeleton for themselves out of calcium carbonate. (~00:32) | 2 Show coral first, then camera close up coral polyps |
| 3 As these tiny animals live and die over hundreds of thousands of years, their skeletons slowly accumulate, building up the coral reefs into the islands we see today. These tiny animals are responsible for the very existence of tropical islands. The reefs they build are the key to survival of island peoples. (~00:49) | 3 Show live coral reefs and dead coral reefs  
Coral reef  
Sandy beach on the island  
Fringing reef |
| 4 First, coral reefs act as “natural breakwaters” that protect the shoreline from waves and storm surges (~00:57) | 4-5 Show waves that are breaking at outer reefs, then camera becomes wide angle and shows some ships in calm lagoon water |
| 5 Coral reefs form protected lagoons where the water is safe and calm so that people can use these areas for many important purposes. (~01:05) | |
6 For local residents, the reefs are good resources for fishes, and marine invertebrates such as sea cucumbers and crabs. (~01:13)

7 People also collect marine animals for making jewelry and other ornaments as a means of artist expression and to earn money. (~01:21)

8 Calm lagoon areas protected by reefs also create suitable conditions for aquaculture. Aquaculture is a way of farming marine plants and animals. This form of farming is becoming popular on many tropical islands because it offers an alternative way to earn money and produce food. (~01:38)

9 One example of aquaculture that is widespread is farming black lip pearl oysters to produce black pearls. Black pearls are beautiful and very valuable. (~01:48)

10 Pearl farming is attractive because small farms do not require a large investment and the farming methods are easy to learn. Pearl farming is also environmentally friendly and doesn't damage the environment. (~01:58)

11 Pearl farming is easy and simple enough that it can be done at any level, from a small family farm to a large company. (~02:06)

12 Pearl oysters are usually obtained by a method called “spat collection”. The free-swimming larval stage of the pearl oyster is attracted to settle on a substrate that is hung in the water and become a small pearl oyster, or spat. (~02:17)
Young pearl oysters are usually kept together in spat bags until they are about 10 cm in length. At this point, the pearl oysters are separated into pocket nets or strung on chaplets. Chaplets are lengths of rope onto which oysters are hung by a piece of wire that has been threaded through a hole drilled in the edge of the shell. (~02:40)

Pearl oysters are usually farmed on longlines, which are lengths of strong rope anchored to the bottom of the lagoon and suspended with floats at the desired depth. (~02:50)

After pearl oysters are 18 months old, a technician will start the process of producing a black pearl by performing the grafting operation. (~02:58)

During grafting, a bead, also called a nucleus, is inserted into the oyster to form a pearl. (~03:04)

Twelve to eighteen months after grafting, the pearls will be harvested. (~03:08)

Farming black pearls is an industry that can help Pacific Islands become economically independent and allow people to earn a good living. (~03:16)

Many islands suffer from population loss as people leave to look for jobs. Aquaculture such as pearl farming is rapidly becoming a way to provide jobs so that young people can avoid having to leave their home islands. (~03:30)

Family aquaculture farms are good ways to increase household income and maintain strong family bonds. (~03:36)

Show young pearl oysters, pocket nets, chaplets, and chaplets underwater. A man is making a hole on a shell by using a drill. Shell with marking point for hole.

Long line & floats from surface of the water. Long line, floats and anchor in the water.

Show large oyster and a technician.

A grafting technician is implanting a nucleus in a shell.

Technician is harvesting a pearl.

Show local people, pearl jewelry and variety of food on the table.

People in airport
   An airplane
   Show an aquaculture facility
   Young people are dancing traditional way.

Old man and woman are smiling & holding pearls.
21 Since pearl culture is relatively easy and simple, people who have never worked in aquaculture can start with a little help from the government or universities who offer help. (~03:45)

22 Aquaculture can be a way for people to improve their lives both materially and culturally. (~03:52)

23 Since pearl oysters and other aquaculture species are coral reef organisms, pearl quality is closely related to environmental conditions on the reef. To produce beautiful pearls or other aquaculture products such Giant clams, the health of coral reefs must be preserved. Economic success means avoiding practices that damage the reef. (~04:12)

24 Pollution such as garbage dumps, chemical or oil spills, can damage coral reefs and kill pearl oysters. (~04:21)

25 Coral reefs are also damaged when anchors from fishing and dive operation boats break the reef. This breakage can destroy large areas of reef if it occurs frequently and continues for a long time. Moorings for day-use should be placed at popular fishing and diving spots to help avoid breaking coral. (~04:40)

26 Walking on reefs also damages the coral, although many people are not aware of this. Educational programs are helping spread awareness of the importance of not walking on the reef. (~04:51)

27 What happens on the land can affect reefs, too. Reefs can also be damaged when cutting trees for...
sakau. This farming practice leads to erosion. The soil that is washed from the hills is discharged into the ocean and covers the coral reef, suffocating the small coral polyps. Using good farm practices helps protect coral reefs and marine farms. (~05:14)

28 If inhabitants of Pacific Islands are to live well, protecting coral reefs is the key to success. Saving the coral reef is not only a means of preserving natural beauty, but it allows us to earn a good living today and hand down the coral reef to our children for their continued use and happiness. (~05:30)

the ocean. (Aerial picture)
Small particles are falling on the coral.
Women are working at farm

28 Local people
Healthy coral reefs
Cultural dancing of children
A boy is holding a fish.
Video Editing
Video editing was conducted at Marine Option Program (MOP). I used a personal computer, which had Adobe Premiere installed which is a computer software for video editing.

Learning how to use Adobe Premiere was perhaps the biggest challenge of this internship for me, because I had never used this software before, and I am not "computer person". Fortunately Mr. John Coney who is a MOP stuff coordinator taught me the basic use of Adobe Premiere. My first step of editing video was transferring footage from VHS tapes to the computer. I was allowed to transfer only the desired sequence of shots, which is called "capturing". Each shot was saved as a file in the computer and named for convenience. Because of the function of Adobe Premiere, I could see a series of shots with time length when I opened the file. The sequence of the video was cut into desired time length and pasted in screen bar. Every time I opened a file and added new footage to the screen, I was creating a video little by little.

At the beginning it was overwhelming to use Adobe Premiere, but thank to Mr. Coney, I was gradually begun to improve my ease of using Adobe Premiere and editing video after a couple days.

Even though what I learn from Mr. Coney was very limited, it was a good start to understanding video editing. It was definitely not easy thing to do. However, I believe that by gaining experience and knowledge about equipment, any video that I make will be improved. During the editing process, I suffered for trying to get better result, but it was maybe a good part, which can never be eliminated from a creative work. Because of this part, I had great feeling when I watched whole video.
Pearl Culture

Research
As a Marine science student, I was interested in learning process of Black - Lip pearl oyster culture. Two information papers (Listed below) that were written by Dr. Haws and Mr. Simon Ellis who works for College of Micronesia, Land Grant College Program, Pohnpei, Federal State of Micronesia were my main information sources.

After I read these papers, I summarized six objects of pearl culture that are listed below.

1) Site selection
2) Obtaining pearl oysters
3) How to take care of spat
4) Farm construction and layout
5) Grafting and Seeding
6) Harvest pearl

References


In the Indo-Pacific region, the black-lip pearl oyster, which possesses a beautiful shiny shell, is important species for economical reason. The shell is used to make jewelry and decorations. Since international trade has become more popular, demand for the shell rapidly increased. As the result of over fishing, populations of the black-lip pearl oyster have been decreased.

The black-lip pearl oyster creates a pearl when a small rock or a grain of sand stays in its body. Nacre is the iridescent coating which covers a particle to form the pearl. However the natural pearl is extremely rare and usually small and irregular in shape. In 1900, researchers found a technique (grafting) to produce pearls, which is done through implanting artificially made nucleus into pearl oysters. People are keeping oysters alive to produce pearls rather than killing them to obtain shells. Pearl culture was established, and the industry emphasizes raising pearls, but not collecting wild oysters.

The black-lip pearl oysters, bivalve mollusks, have two shells that protect their body parts. They usually live in shallow reef areas, and attach to hard substrates. They born as male, and change into females after 2-3 years. Females release eggs into the water, and sperm from males externally fertilize them. Eggs hatch and larvae freely swim in the water during the first few weeks. After 25 to 35 days, the larvae start to crawl on the bottom and finally become juvenile pearl oysters. Black-lip pearl oysters are filter feeders. They filter water across their gills to catch plankton and other digestible materials.

To start and successfully run pearl farming, there are several points that farmers must consider.

1) Site selection

Farmers must select a good farm site first. An ideal site should have clean and pollution-free water. Farmers need to avoid potential pollution sources such as garbage dumps, chemical or oil depots, large areas of human population and fresh water run-off.

It is recommended that the site have slight water movement to bring in clean water and new food for the oysters.

Because pearls are very valuable, security is important. The farm should be located in an area where the farmer can watch their farm.
The site should not be affected by heavy boat traffic and fishing activity because this will minimize damage to the farm from propellers and fishing lines and hooks.

2) Obtaining pearl oysters

There are three ways to obtain pearl oysters for cultures: collection of wild juveniles and adults; spat collection; and hatchery-reared animals. However, collecting wild animals is not sustainable because it exhausts local oyster populations. Hatchery rearing oysters is not commonly used since there was only one Black-lip pearl oyster hatchery in the U.S. Affiliated Pacific Islands in Majuro, RMI. Thus, spat collection method is the most common way to be chosen by farmers.

Spat collection is attracting free-swimming larvae of the oysters to settle on artificially made substrates that are called spat collectors. The spat collector can be made by black polyethylene shade cloth (Fig. 1), oyster shells, coconuts husks, and onion bags. The larvae can hide between materials to avoid predator while they grow. The collectors need to be hung on longline about 1-2m below the water surface (Fig. 2). Lines are anchored at a depth of 20-30m of water and at least 30m from reef edge to avoid fish predation.

Regular inspection of lines and floats is important. Small plants and animals colonize on them and cause to sink spat collectors to the depth where no larvae will be collected. Thus, farmers must remove other organisms from lines and readjust the line.

For successful spat collection, it is necessary to have enough adult oysters to produce large number of spat in the water. The farm area should not have
extremely high water exchange such as in very open lagoons or near shore areas that are not enclosed because larvae may not have enough time to settle on the collectors.

3) How to take care of spats
There are two ways to take care of spats after they are found on the collectors.

If the larvae in the areas are abundant, the spat will be left on the collectors for one year. Farmers expect that many will lost to natural mortality and predation, but enough larvae will survive for the farm. After about 18 month from first settling on the collectors, the pearl oysters are cut off the collectors and transported to the areas where farmers culture them until time for grafting.

The second option in case where larvae are not abundant is that the larvae may be removed from the collectors when they are small (2-3cm) The larvae should be kept in protected containers such as lantern nets, box nets, and circle nets (Fig.3) until ready for grafting.

4) Farm construction and layout
The structure of the farm needs to allow oysters to be suspended in the water at a depth of 3-7m. The oysters are kept in protected containers or hung by a piece of wire that has been threaded through a hole drilled in hinge of the shells (chaplets). Oysters can be protected from wave action at this depth and they are still accessible to farmers. There are three methods for constructing farm: longline (Fig. 2), rafts (Fig. 4), and underwater trestles (Fig.5).
5) Grafting of seeding

Grafting or seeding is the process where a bead or nucleus is implanted into the oysters to form the pearls. A highly skilled technician who must be paid by farmers accomplishes this.

The technician chooses a donor oyster first to provide the mantle tissue graft. He or she then removes the mantle tissue, which is trimmed into small pieces. This small piece of tissue (2mm) produces the nacre for the pearl. A piece of mantle is inserted into the gonad of the pearl oyster, through a small incision made by the technician. A round nucleus is also inserted following to the mantle tissue so that they can touch. If these processes are done properly by the technician, the mantle tissue will grow around and form the pearl. Formation of pearl takes 18-24 months from grafting. Mortality rate after grafting is approximately 10% of the oyster and rate of rejecting the nucleus is about 20%. This may be caused by a poor technician or disease.

6) Harvest

A grafting technician makes an incision in the pearl sac and removes the pearl. If the pearl is a good quality, the technician re-implants a new, larger nucleus into the pearl sac and returns the oyster to the farm. Re-implantation can be conducted up to two times. The size of nucleus for re-implantation is same as the size of the initially harvested pearls.
Video
Dr. Haws requested to make a short video. From her experience, a general education video becomes more effective when it is relatively short. It is difficult to maintain people's attention for long time even if video includes a lot of interesting information. Instead of making detailed film, I tried to create a concise video. My first plan was producing three to four minutes video, however the video eventually became about six minutes long. It was not quite possible to include two topics such as conservation of coral reefs and pearl oyster farming in three to four minutes.

Completing video was the significant because it was the main object and it should represent all my effort for this internship. It was also important for the oral presentation, which was conducted in May 6th. Although the video was a “first cut” or a rough draft at least I could show to the audience my work in this semester. Producing a first cut of a video such as this one normally takes about this amount of time. Producing a final cut normally takes 2-3 months long. So producing a rough cut was a realistic result of a semester long project.

I had to use some footage with time records. These shots were donated from Dr. Bruce Carlson who works for Waikiki Aquarium. Unfortunately I could not make contact with him again to send me the same shots without time records. A time record in a copy tape is not eliminated if they are included in an original film. So, for next time, I must make sure that footages do not contain any time records.

I did not shoot any video for my project, because the video I made was about coral reefs in Pohnpei. So I preferred to use other films that were taken in Pohnpei and asked a friend of Dr. Haws who lives in Pohnpei to shoot some particular shots for me. These footages were almost same as my images and they were used in my video. Next time if I have the techniques and chance to shoot good footage, I would like to use my own films. I am sure that it makes me feel more satisfied with the video.
Closing

Statements
At beginning of semester, I was excited about participating this internship project, because learning how to make a video was one of my biggest interests. However, since it required some equipment to begin, I have never had any opportunity to try this creative work. Even though I was excited about this project, it was also overwhelming to take on a part of Dr. Haws' work. I felt that there was pressure on myself during the semester, and every time I asked people to help my work, I felt more pressure. However this pressures affected my work positively. I enjoyed my work and aimed to finish this project in a good way. While I was editing a video, I kept my enthusiasm for creating a better quality of the video, and I was always looking for expressing my video images in different way. Because of these thoughts, I could watch same video footage over and over again.

Even though I had positive attitude for this project, I would not have been able to create a video without people who assisted me in many areas. Those people were always willing to help and encouraged me to have good work. While I was contacting these people, I realized that they have also many connections to people who supported their jobs without benefit. Eventually these people also indirecory assisted my project. I believe that a good relationship and building a professional network with everyone must be important for all types of jobs and this must be something I should consider and gain for my future.

This internship program was worthy of my last semester in University of Hawaii at Hilo. Some of the learning experiences in this semester such as taking multi - responsibilities, improving self-reliance and creativity, having good relationship with everyone, will be very helpful for my next steps toward my career. I also remember that I should enjoy any job in order for it to be done well, and whether I can enjoy the work or not is always dependent on my attitude.