English 225 Final Essay

The Future of Punalu'u

By Trisann Bambico

List of Illustrations

Figures

Tables

Abstract

Urbanization and development is spreading all over the world at an increasing rate, Hawai'i included. Punalu'u, located on the Island of Hawai'i, is a potential location for development of a resort, housing, and a golf course. The objective of this paper is to look at how urbanization could affect the environment, but more specifically the marine environment. Everything that happens on land will eventually affect the ocean and research has shown this to be true. This affect on the water quality will affect the marine animals, more specifically the green sea turtle and the algae. This location is also culturally significant for the Hawaiian community and this paper will show how the community feels about this development. Scientific papers, Hawaiian archives, newspaper articles, and the Environmental Impact Statement (EIS) were consulted, along with letters from Dr. Jason Turner, a professor at the University of Hawai'i at Hilo, and Group 70 International, the people who are conducting the EIS. Results show that increased nutrients can cause increased algal growth, algal blooms, and numerous deaths due to eutrophication. Bacteria in the water could also be the cause of tumors in green sea turtles. An increase in human traffic could discourage the turtles from feeding, basking, and nesting at this beach. Hawaiian history has shown how significant and sacred this coastline is and the majority of the Hawaiian community feels that development should not occur, although some do feel that development would help the economy and decrease the amount of homeless people in Ka'ū. A compromise was made and it was decided that 150 of the 433 acres will be purchased by the County of Hawai'i and will then be managed by the people of Ka'ū. The next question is: will 150 acres of coastline be enough to protect this pristine marine environment?

Introduction

Punalu'u beach is located along the Ka'ū coastline on the Island of Hawai'i. This culturally significant location is where Sea Mountain Five LLC, a development group, wants to expand the already existing golf course and build Sea Mountain Village. Within this 432-acre development plan, developers want to build a 200 to 300 room resort, about 1,500 to 2,000 residential units, and an 18-hole golf course with a pro shop and restaurant (Armstrong, 2006). The local community of Ka'ū feels that Punalu'u "should stay country" and they want to keep this area pristine (Armstrong, 2007)

Each person has a different perspective about the development and it is imperative to provide more in-depth information about this topic. The issue presented regards how development would affect the marine environment, more specifically the green sea turtles and algae, if the development occurred. There are also many different opinions about this specific topic, but it is necessary like to look at how the Hawaiian people feel about the development and how this might affect their community. This topic is very important to the Hawaiian and local community because this place holds a lot of cultural significance (Figure 2) and plays an important role in Hawaiian practices.

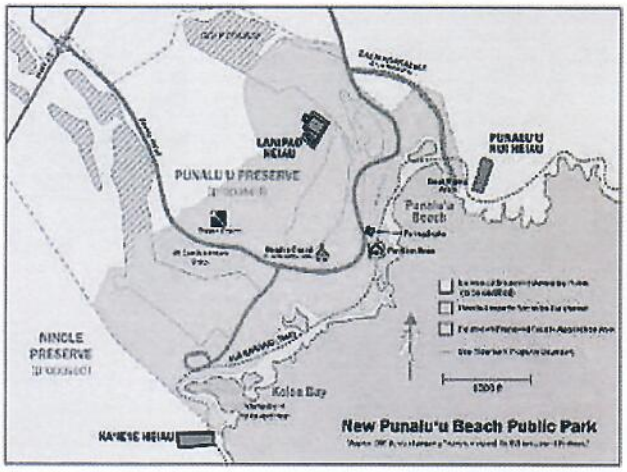

Figure 2- New Punalu'u Beach Public Park: This is an image of the Punalu'u coastline. This shows the different heiau in the area, along with the fishponds and the first Christian church.

The topics that will be covered are the Hawaiian history of Punalu'u, the Environmental Impact Statement (EIS), the affects on the marine animals, and the perspectives of the Hawaiian people on the development.

Hawaiian history of Punalu'u

Within the Ka'ū district, there are nine ahupua'a (land divisions), which run from the mountain to the sea. There is a lot of historical background that each land division holds, which consists of volcanic eruptions, the beaches, and the rainfall. These factors are all essential for the survival of the Hawaiian people in these areas. Settlers also had an influence in the Ka'ū area, which helped and hurt the Hawaiian people (Kelly, 1980). With the settlers, came religion and the first Christian church that was built at Punalu'u, which still stands till this day.

Ceremonies and traditions were, and are, very important to the Hawaiian people. Heiau (places of worship), birthing stones, and kū'ula (fishing stones) are significant parts of the Hawaiian lifestyle and were used very frequently. The area of Ka'ū was

used to teach the future generations about native plants and fishing practices. The marine life was very plentiful and a majority of their food came from the ocean. Legends and several akua (gods), like Pele and Kū, live in Ka'ū and are worshipped on a daily basis. A majority of the Hawaiian people in Ka'ū have the shark, caterpillar, or turtle as their 'aumakua (family guardian), which all dwell in Ka'ū (Kelly, 1980). The people in Ka'ū have a respect for these gods and 'aumakua, which they relied on for nourishment and strength (Roelofs, 1994).

Several archaeological surveys were conducted in Punalu'u and its surrounding areas to find any artifacts reminiscent of the ancient Hawaiian people who once lived there. Crozier (1972) conducted one survey and several historical sites were located, including heiau and burial grounds, which dated back from 1520 to 1658. Artifacts like basaltic glass, a pebble scrapper, and adzes were recovered from this excavation. Another survey conducted by Crozier and Barrera (1974) found Lanipao Heiau and historic gravesites. Paths, walls, fireplaces, and heiau structures were located within the vicinity. Artifacts like adzes, 'ili'ili (small, water-worn stones), and a konane board, which is like a modern-day checkerboard, were recovered. Crozier's recommendation is to work with developers to preserve the area. Although not all locations can be preserved, there are some with a lot of cultural significance and should be protected, like Punalu'u.

Environmental Impact Statement (EIS)

An EIS is a document that must be filed with the federal government that takes priority because it is significantly affecting the quality of the environment. Group 70 International (2006) prepared an EIS document for the Sea Mountain Village development at Punalu'u. The research that Sea Mountain Village did on the environment was inaccurate and lacked a lot of scientific backing. To start, the entire EIS is filled with contradictions and false statements, all of which made it very hard to understand what the developers thought would happen to Punalu'u.

Overall, the EIS had no quantitative marine biological surveys conducted; only qualitative surveys were done due to the rough conditions on the days of surveying (Group 70 International, 2006). The authors made elaborate statements about the environment and what would happen to the area, but since they did no quantitative surveys, couldn't make such bold statements (Turner, 2006). The authors used little peer-reviewed scientific literature to support their idea and would either cite them wrong or make false statements. For example, the EIS stated "there is little potential for impact to these populations from changes in water chemistry" (Group 70 International, 2006). When the nitrate and chlorophyll a concentrations were compared to the state standards, Punalu'u already exceeds the Hawai'i Department of Health water quality standards and development would only increase this amount (Rappa, 2006). This would then lead to algal blooms and possible eutrophication.

It also seems that developers think that the development would be a good thing for the environment because there would be increased nutrient and bacteria (Figure 3) input into the marine environment. The turtles are decreasing in growth rate which could be due to the lack of food. With increased nutrients, the algae would grow and therefore, make more food for the turtles to eat (Group 70 International, 2006). This statement is only partially true, in that with increased nutrients there would be an increase in algae growth. What makes it false is that the statement assumes that the turtles will eat the algae. Turtles are selective eaters and might not feed on that species of algae (Turner, 2006).

Figure 3- Tumor Covered Turtle: The increased bacteria in coastal waters could be causing the increase in tumors on green sea turtles.

In response to the letters from Turner (2006) and Rappa (2006), the developers felt that they would increase the protection of the green sea turtles by providing education to the visitors and enforce the correct distance away from the turtles. Developers feel that the turtle situation will get worse if the development does not occur (Atta, 2007). There will be continued public access to the beach, which was a big concern for some. The statements that were made about the nutrients in the marine environment being wrong were disagreed with. The developers based their ideas on the energetic hydrodynamic environment of the coastline and decided that the

nutrients would not be a problem. Lastly, they felt that qualitative surveys were sufficient and that the statements that they made could be held true (Atta, 2007). Impacts on the environment are very important and should not be taken lightly. Scientific research and peer-reviewed journals should be used to support statements that are made, especially when it is a document for the federal government and concerns such a special place.

Development and urbanization

There are numerous amounts of research being done on how urbanization impacts the environment. With urbanization comes an increase in nutrients and bacteria in coastal waters because of runoff. This can lead to several problems for the marine ecosystem, which could also be detrimental for the animals, as well as humans.

The fish and other marine life can be affected by the development because of the increased nutrients along the coastline. If eutrophication occurs, then the fish and other marine life could die because of the lack of oxygen. With the increased nutrients, there will be an increase in algae growth. This might cause certain species of algae to over-grow other species. If fish or turtles do not eat the increased algae species, that species could become invasive to the area and potentially hurt the entire ecosystem at Punalu'u. It would just cause another problem.

A study conducted in southern California examined how urbanization and runoff affected coastal waters (Beighley et.al, 2008, p.73). This study determined that there would be a 200% increase in runoff from 1929 to 2050 along the southern coastline of California, due to the shift of development from the upland to lowland areas. People want to develop closer to the ocean, since waterfront property has increased in popularity. The amount of runoff will increase the nitrate and phosphate concentrations in the water, thus leading to an excess in sediment, bacteria, or metals, which will give poor coastal water quality and could present human health dangers.

Development is also happening rapidly along the South Carolina coastline and this increase of development is affecting the 29 estuarine watersheds in a study conducted by Van Dolah et.al (2008). Each study area varied in the percentage of urban cover. There was a positive correlation between the developed areas and the degradation of sediment quality: as the development percentage increased, the degradation of sediment increased. The fecal concentrations were greater and more prevalent in watersheds with higher urbanization cover (Figure 4). This could be a possible outcome at Punalu'u if development does occur. There will be an increase in nutrients because of development and will therefore affect the physical conditions of the water which could become detrimental to humans.

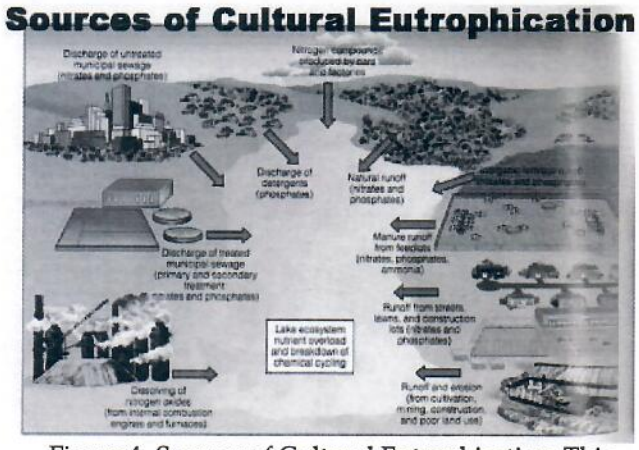

Figure 4- Sources of Cultural Eutrophication: This is a diagram showing sources of nutrient input into a marine system.

With increased nutrients in the water, algae will be affected, and could potentially cause plankton blooms. Bokn et.al (2003) conducted a study along the California coast on 14 coastal waterway outlets. Inorganic nitrogen and potassium concentrations (Figure 5) were added to a rocky community that was dominant in brown algae to see if any fast-growing opportunistic algae would grow in the area. Some green algae grew faster, but the red and larger brown algae were not affected by the increased nutrients. Herbivores, physical disturbance, heavy competition, and limited light made it difficult for the opportunistic algae to establish on the already dominated community. It may take longer than 2.5 years to have any change of dominant algae due to an increase in nutrients.

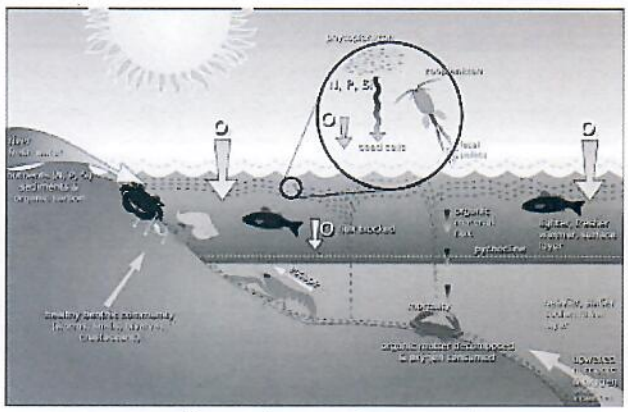

Figure 5- Affects of Eutrophication: This is a diagram showing how nutrients are added to the system and how the system reacts to this chemical change. It shows that it could lead to mortality of marine animals.

Usually, eutrophication of these areas leads to plankton blooms and an increase in algae competition, but this study shows otherwise (Bokn et.al, 2003). Eutrophication is when all of the oxygen is used up in the water column due to the increased amount of phytoplankton, which will lead to the death of marine animals. This study emphasizes the importance of land management and that pollution should be monitored to see the change of nutrients in order to prevent problems in the ocean for the animals and even for humans.

Affects on marine animals

The green sea turtle is an indigenous species and is found throughout the Hawaiian Islands. This species is now protected under the U.S. Endangered Species Act in 1978, but prior to this, the green sea turtle was harvested for its shells and eggs while humans destroyed its habitat. Careful monitoring is conducted by nesting beach surveys, observation, and capture-mark-recapture (Balazs & Chaloupka, 2004). Due to this research, the green sea turtle is only on the threatened status and is on its way to recovery. The green sea turtle population is increasing in number, but the growth rate of the recaptured turtles is decreasing. This could be because the population is reaching the foraging habitat's carrying capacity which is due to the limited food resources; this means that the foraging habitat needs to be protected to allow for the increase in growth rate to help the survival of the green sea turtle.

Since the resort will be a large tourist destination, there will be a large influx of human impact on the beach, which could negatively affect the animals in this area. This beach is already known for the green sea turtles and there are dozens of turtles in the ocean at one time. If there was an increase of people swimming, this could affect the turtle's feeding habits and natural behavior in its environment. There would be an escalation of noise and limited beach space because of the increase of people, which might discourage the turtles from coming onto the beach to bask. Turtles thermo-regulate and they need to come onto shore to warm up. At night, the light will discourage green sea turtles and hawksbill turtles from nesting on the beach. Both of these animals are protected under federal law and the effects of development on them should be taken into consideration.

Perspectives of the Hawaiian people on development

The community has a variety of perspectives on this issue of development. The people that are for the development of Punalu'u feel that there will be an increase in jobs and the number of homes. They feel that the resort would be in the perfect spot because it is secluded from other locations and could contribute to the growth of tourism in this area, which will boost the economy of Hawai'i.

Below is a table of several comments from the public that are both for and opposed to development (Table 1). The following information is from the Hawai'i Tribune-Herald (Quirk, 2007; Armstrong, 2007; Sur, 2007).

Comments from the Community		
Name	**For or Against Development**	**Comment**
Keepitcountry	Against	"Losing open space at unprecedented rate throughout the state, purchase this land to preserve and protect the future generations to enjoy and so that public beach access will not be threatened or diminished. Let the keiki inherit the 'āina."
Jenniferpang808	For	"...encourages drawing more tourists to the area..."
Honu1818	Against	"...Most jobs created will not be worth the cost of the shoreline. Who do you think will run the resorts and live there? Not Hawaiian people..."
Eyedrop	For	"...Building homes will alleviate the housing shortage. Building a hotel will provide jobs and bring in tourist dollars. As long as there is public access to the beach, it could be like Hapuna."
Kenike	Against	"Keep developers out and maintain this beautiful beach in its natural state!"
Gladys	For	"...benefit the people of Ka'ū... and provide jobs for the residents of Ka'ū and the neighboring districts on this island..."

Table 1: Comments from the public about the development at Punalu'u that the resort would be in the perfect spot because it is secluded from other locations and could contribute to the growth of tourism in this area, which will boost the economy of Hawai'i.

A large majority of people that oppose development are Hawaiian. As mentioned in prior sections, the Hawaiian culture at Punalu'u is endless. It is true that there will be an increased number of jobs and homes, but at what cost? The jobs will probably be given to non-locals, and the homes will be too expensive for the average local person to afford. This development will be helping other people, not the local and Hawaiian families who need it the most. The Hawaiian people want to protect this coastline to continue their traditions in fishing and keep this beach a living classroom for future generations.

Conclusion

Resolution 169-07 was introduced by Hawai'i County Councilman Bob Jacobson on May 1, 2007 stating that the County of Hawai'i will be purchasing 150 acres of shoreline to prevent development in this area (Ka'ū Preservation). The county's money will be matched with federal funds to purchase the shoreline. U.S. Congresswoman Mazie Hirono has requested $3 million dollars to assist in the purchase. Punalu'u will be managed by the "people of Ka'ū who rely on the area for fishing, recreation and cultural practices" once the property is purchased (Ka'ū Preservation).

Now that the shoreline is protected from initial impact, is that really enough? Hawaiian people know that whatever happens on land will eventually affect the ocean. The study done by Van Dolah et al. (2008) states that, with the research they conducted, it can be concluded that "estuarine habitat quality reflects upland development patterns at large spatial scales, and upland urbanization can result in increased risk of biological degradation and reduced safe human use of...coastal resources," which could occur at Punalu'u. Protection of the surrounding land is necessary to protect Punalu'u's shoreline. There is no compromise to this issue; once development occurs, the ocean will be affected whether people like it or not. Once the marine habitat at Punalu'u is gone, it is gone forever.

Punalu'u has much cultural significance to the Hawaiian community and it holds a lot of history. The ocean is a living classroom for students and is one of the few pristine beaches that Hawai'i has left. The animals and the Hawaiian people depend on this coastline for everyday living. Development should not occur in this area. We should keep country, "country."

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HOHONU

2009

A JOURNAL OF ACADEMIC WRITING

VOLUME 7

HOHONU 2009

VOLUME 7

UNIVERSITY OF HAWAI'I HILO

UNIVERSITY of HAWAI'I HAWAI'I COMMUNITY COLLEGE

HOHONU

2009

Academic Journal

University of Hawai'i at Hilo • Hawai'i Community College

Hohonu is a publication funded by
University of Hawai'i at Hilo and Hawai'i Community College student fees.

All production and printing costs are administered by:

University of Hawai'i at Hilo/Hawai'i Community College
Board of Student Publications
200 W. Kawili Street
Hilo, Hawai'i 96720-4091

Phone: (808) 933-8823
Web: www.uhh.hawaii.edu/campuscenter/bosp

Table of Contents

HOHONU

Aloha!

Welcome to the seventh volume of Hohonu, the academic journal of the University of Hawai'i at Hilo and Hawai'i Community College. We are pleased to present this issue to the community and are proud of the excellent academic writing it contains.

Hohonu, which means "deep" or "profound" in Hawaiian, has undoubtedly lived up to its name in this volume. Featuring non-fiction academic writing in any format and on any subject, each journal produced allows us to more fully share our mission with the community. It is the aim of Hohonu to facilitate in the sharing of quality academic writing and to exist as a reference for individuals looking to learn something about writing, a new subject, an attitude, or perhaps even themselves.

Hohonu would like to express much gratitude to our staff 'ohana in making this journal a reality for yet another year. Jenna Antilla, Jacqueline Barr, Chantelle Yandow, and Chaun Ballard – it has been my privilege to work with such an enthusiastic and committed group, thank you.

The staff and I wish to thank Professor Luke Bailey, our faculty advisor, for all of his advice and dedication. It is because of his encouragement that Hohonu has been able to stay on the right track. We appreciate all that he has done for the publication.

Mahalo to everyone who has helped make this issue possible. A gracious thank you is extended to the student authors for their contribution and their love for the written word. We are honored to have had the opportunity to work with such talented writers. We thankfully acknowledge the assistance of the Board of Student Publications and the staff at Campus Center for all of their help; their words of wisdom and patience have been a great source of support. We also want to thank Susan Yugawa, the whole of the UH Graphics Department, and James Rubio, our IT Specialist.

Hohonu is truly an asset to UH Hilo and HawCC, as the journal allows for one to catch a glimpse of what the students have learned and, in turn, what the students have to teach the world. The authors of Hohonu represent the future of Hilo, Hawai'i, and the nation. It is through their voices that change and progress is made possible.

We hope you enjoy this edition of Hohonu. Happy reading!

Mahalo nui loa,

Tara Vandiver
Editor-In-Chief