Enculturating Student Anthropologists Through Fieldwork in Fiji

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Enculturating Student Anthropologists Through Fieldwork in Fiji

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Our paper describes year-one results of an interdisciplinary field school funded by the National Science Foundation Research Experiences for Undergraduates (NSF-REU) Program through the University of Alabama at Birmingham. This NSF-REU Fiji is a multidisciplinary collaboration among anthropologists (archaeology, ethnography, linguistics), historical ecologists, and educators (science education) focused on the understanding and conservation of cultural resources and marine biological variation. Our project established an international REU site in the Fiji Islands. During two summers (2009-2010), 18 undergraduate students (nine each summer) engage in this interdisciplinary problem-based research (field school) that is expected to generate a model of long-term dynamics in marine biological communities, emphasizing interactions between humans and the environment.

The philosophy of the NSF-REU program is two-fold. An underlying premise is that the potential for undergraduates to make meaningful contributions to science is often underestimated. If students are given the opportunity to engage in faculty research programs and if they are mentored in the scientific method and communication of research to professional audiences, they are fully capable, even at the undergraduate level, of making significant contributions to scientific inquiry. A secondary aim of the NSF-REU program is
to target highly qualified but underrepresented populations of students. The aims of this paper are threefold. First, we discuss the project aims and the pedagogy of the student-scholar model, whereby students are incorporated into faculty research, beginning at the undergraduate level. Second, we present the findings of independent student research associated with the field school. Third, we provide an evaluation of the field school and its plans for the future.

BACKGROUND

The NSF-REU program is designed to provide meaningful research experiences for undergraduates, who often do not have serious research opportunities until the graduate level. Numerous educational theories and pedagogies exist in the literature that call for enhancing the learning experiences of students in college and university settings (Chall 2000). Our NSF-REU program is modeled on MATRIX, an NSF-endorsed anthropology curriculum enhancement and evaluation program designed to make anthropological teaching relevant for the 21st century (MATRIX 2003). MATRIX employs seven principles that focus on knowledge, skills, and values that are applicable to teaching archaeology, and for our purposes, ethnography: (1) promoting stewardship of anthropological resources, (2) recognizing diverse interests in these records, (3) understanding the social relevance of anthropology, (4) making a commitment to professional ethics and values, (5) developing effectiveness in written and oral communication, (6) learning basic archaeological and ethnographic skills, and (7) developing real world problem-solving skills. One of the key advantages of using MATRIX is that it was developed specifically to address the educational needs of anthropology students and to make them more marketable to potential employers after they graduate. Eleven specialists in educational anthropology created
MATRIX, and currently, thirty anthropology programs have contributed teaching modules to the MATRIX interactive Web site.

The UAB NSF-REU also seeks to make the field experiences of undergraduate anthropology students more relevant to their educational programs and future careers. Many of our undergraduate (as well as graduate) students have participated in study-abroad programs, collaborated with faculty in research, or had independent experiences (e.g., Fulbright scholarships, Operation Cross-Roads Africa, and varied archaeological and ethnographic field schools). Currently, little opportunity exists for undergraduate students to meaningfully translate these experiences into productive products that can contribute to their educational goals and professional development, nor do such opportunities exist for our graduate students beyond the thesis. The problem was described aptly by the Boyer Commission on Educating Undergraduates in the Research University (1998, 6); they argue, “Many students graduate having accumulated whatever number of courses is required, but still lacking a coherent body of knowledge, or any inkling as to how one sort of information might relate to others.”

A priority of the UAB NSF-REU Fiji program is to provide continuity between the summer fieldwork experience and the rest of each student’s education. The faculty serve as “scholar-teachers,” where students are mentored and actively participate in the process of scientific inquiry and ultimately give presentations to both academic and public audiences; this model has benefited students in terms of achievement and retention, as well as making students more attractive to future employers (Boyer 1998; E. Boyer 1990; Hu et al. 2008; USDE 2008). An explicit focus on critical thinking is a fundamental part of the field school, which numerous studies have described as being inadequately fostered in university classrooms (e.g., Boyer 1998; E. Boyer 1990; Chaffee 1988, 2004; Facione et al. 1995; Hu et al. 2008; USDE 2006).
Specifically, our NSF-REU is designed to accomplish four objectives: (1) to introduce undergraduates to the ways in which ecological, historical, economic, and cultural phenomena are connected; (2) to train students in research strategies that will identify and explore those connections; (3) to facilitate the in-depth involvement of students in original research that will contribute to the scientific understanding of historical ecology, biodiversity through time, and characterize the causes and rates of marine ecological change; and (4) to effectively measure the success of the project in achieving its goals, implementing curriculum, and facilitating learning. Our fourth goal is aimed at creating a model of innovative strategies for teaching field-based sciences and for evaluating the educational effectiveness of our approach. Our research program should also stimulate and encourage the REU students to pursue a graduate education.

This interdisciplinary project will contribute to the understanding and conservation of marine biological variation through two perspectives. The field school involves documentation of economically important extant marine faunas through ethnographic observations of modern marine exploitation patterns by local inhabitants in the study area on four diverse islands in the Lau Group (Eastern Fiji: Aiwa Levu and Aiwa Lailai, Nayau, Lakeba). These islands were chosen through Jones’s previous research; their variability in size and physical structure is representative of the region’s island structure, fauna, and varying degrees of human impacts. Second, we will generate retrospective data on marine diversity and exploitation through archaeological work (the bulk of our work in 2009). Together these data will characterize and clarify the causes and rates of ecological change in a representative insular marine setting. Both long-term temporal data and insights gained from Fijian traditional ecological knowledge (TEK) will facilitate the development of programs for sustainable use of marine resources in the study area and beyond.
STUDENT RESEARCH

UAB undergraduate and graduate students worked on five projects related to this broader NSF-REU program. Their research included work on ethnoarchaeology (McCown), marine resource exploitation and the relationship between biodiversity and climate change (Delisle and Noojin), archaeological investigations (Messersmith), and historical place names (Aamodt). The projects by McCown, Messersmith, and Aamodt were initiated during our fieldwork on Nayau and were part of each student’s NSF-REU Fellowship research. Delisle and Noojin are both graduate students who began their laboratory-based projects using the material culture collected from excavations on Nayau.

McCown: Dumped, An Exploration of Material Culture of the Past and Present in Nayau, Fiji

McCown’s investigation involved comparison of the composition of contemporary and prehistoric garbage sites in order to (1) assess changes in the composition of garbage over time and (2) to gain insight from the contemporary dump site in interpreting site formation processes in the archaeological record. Nayau provides an ideal locale for comparing past and present garbage sites due to the relative continuity in types of subsistence practices over the last 2500-3000 years, its comparative isolation from more acculturated and Westernized Fijian islands, and its small population size (approximately 400 people) that makes such a project feasible.

While an extensive literature exists in archaeology on garbology (Rathje and Murphy 2001), very little has been done in this area in the Pacific. Most publications on contact and change in the Pacific focus on the exchange of religious ideas or prestige goods in the context of colonization (Worsley 1957; Schwartz 1976; Toren 1988; Thomas
1991; Kaplan 2004). Few studies (Leach 2003) examine change over time in the less exotic, but just as (if not more) informative everyday items that constitute most of the garbage produced by societies. Four key questions are relevant for this pilot project and future research in this area: (1) What types of information about the daily activities are ascertainable from an analysis of the byproducts of material culture (i.e., garbage)? (2) What types of changes in the byproducts of material culture are observable over time and space in Nayau? (3) Can analysis of garbage reveal evidence of changes in intensity of culture contact with the more Westernized main Fijian islands? (4) Can changes in the composition of garbage over time be used to predict trends in patterns of contact with Westernized islands and accumulation of Western material goods?

McCown and Aamodt collected data from an area of high trash concentration outside the village of Salia. McCown developed an artifact classification system that encompassed all material culture remnants recovered in both the contemporary site and the archaeological site. The key findings of the research are listed below.

First, items of Western material culture were present in the contemporary site that were not present in the archaeological site. While this suggests increased contact with Westernized groups and acquisition of items of their material culture, it is not inconsistent with Fijian culture to materially express wealth and prestige. In the past and present in Fiji, prestige is expressed through images of abundance (Jones 2009a, 34). Contemporary demonstrations of wealth on Nayau stem from these historical contexts, “to a lesser extent, [from] western ideas about wealth” (Jones 2009a, 32-33), as islanders value both indigenous and foreign material items. As islanders continue to value foreign goods, it is likely that their consumption of these items will increase over time as well.
Second, changes in the archaeological data analyzed suggest that the people of Nayau are experiencing recent changes in their diet as a result of access to Western products. Flour and other non-indigenous starches have become staples in the islanders’ diet. Jones (2009a, 107) estimates that 70 to 80 percent of food daily consumed by the islanders are starches referred to as ka kana dina, or “true foods.” She provides a list of these starches ordered by most frequent consumption and importance. Flour and rice, the only two non-indigenous items listed, appear fourth and sixth out of eight, respectively (Jones 2009a, 107). The incorporation of flour and rice into a once strictly indigenous category of food indicates a dietary change as a result of increased contact with Fiji’s main islands, and this does not include other nonindigenous foods that have been added to the islanders’ diet.

Third, changes in the islanders’ culture can also be seen through further observation of modern imported items in the dump, including a videocassette tape and a compact disc (CD). These items reflect the recent changes in villagers’ access to media. During Jones’ (personal communication) research on Nayau, there were no televisions or videotape recorders, although a few islanders had generators. Now, several households in Salia have televisions, VCRs, and DVD players. The grade school on the island is currently seeking a generator, and the village of Liku now has a community generator through which it distributes electricity to its inhabitants. This change in energy dependence has occurred very recently, within the last decade, and islanders continue to use more electricity with each passing year.

Rapid changes are taking place on Nayau and seem to suggest urgency in conducting fieldwork. Although different aspects of the islanders’ culture are changing as a result of increased contact, these changes are not necessarily damaging the islanders’ cultural integrity. Several researchers (Thomas 1991, 2; Toren 1988, 696, 712-715)
have suggested that increasing dependence on “modern” items will not result in the loss of the Lauans’ unique culture, but rather that these items “enhance existing social systems and are looked upon as a positive influence” (Jones 2009a, 30-31). It is expected that Nayau, like most of the more isolated cultures of the world, will continue to be increasingly drawn into the forces of globalization. However, the people of Nayau are not so much replicating Western models, but adopting novel items into their own cultural domain and altering their use and meaning to reflect Lauan lifeways.

A number of steps can be taken to continue future research in comparing past and present depositions of material culture on Nayau. First and foremost, a map should be created of the contemporary area of high trash concentration excavated in the summer of 2009. The map should also include spatial relationships between the garbage site and living spaces, working spaces, structures, and landscape features such as the bush and the ocean to make it relevant for comparison to archaeological sites (see Jones 2009a, 63; Schiffer 1972, 161-162; Toren 1988, 700-706). In addition, a map of the dump outside of the village of Salia could be used to provide a basis for comparison for other dump sites on the island of Nayau. Furthermore, mapping the dump outside of Salia would provide a basis for comparison for other dump sites on Nayau. Interestingly, neither of the other two villages on Nayau have a dump comparable in size to Salia’s. It is possible that the reason Salia has such a large dump site is that, for a number of years, the village has been without a chief, who would coordinate community activities such as garbage disposal.

Second, further research would help clarify differences between the ideal and real in terms of what islanders say they throw away and what they actually do throw away. Rathje (2001, 67) states, “What people claim in interviews to have bought and consumed, to have eaten and drunk, to have recycled and thrown away, almost never
corresponds directly or even very closely to the actual remnants of material culture in their [garbage].” By using matched studies that compare interview data with the cycle of contemporary material culture of the islanders from source to refuse, a more accurate picture of consumption of both indigenous and nonindigenous products would emerge. Jones (2009a, 110) notes that according to her interviews, frequency of store visits and sums of purchases made does not appear to be directly related to age or rank of the consumer, but rather to the amount of disposable cash available to the consumer. New interviews and descriptions of material culture could be matched one to one to demonstrate correlations between consumption patterns and age, gender, and social status. Jones and others accomplish this in relation to indigenous items; further research here would focus on the consumption and disposal of nonindigenous items according to social standing. Additional excavations of the dump have potential to provide quantitative data amenable to statistical analysis on the most prevalent nonindigenous items in the dump. This could be combined with studies on other methods of disposal on the island to determine the percentage of garbage that is dumped, burned, and reused in order to adequately assess the extent of the garbage problem on Nayau.

More broadly, Schiffer (1972, 163) argues that additional research should investigate the dumping patterns of both present and past cultural systems in order to further illuminate the types of information that can be gleaned from discarded material culture items, especially in regard to archaeological site formation. Following material culture from source to refuse in Nayau would provide a complete description of the use, meaning, cultural context, and ultimate deposit of material items in Nayau and would thus contribute to understanding how these different processes are expressed in prehistoric and historic sites. Further studies in the dump also have potential to
enhance understanding of demographic variables. Creating a culturally-specific formula to estimate population size from the quantity of garbage produced would have multiple applications for archaeological interpretation (Schiffer 1972, 163; Rathje and Murphy 2001, 138-150). Future garbage studies could examine environmental changes through time in relation to human activity and material culture on Nayau from initial settlement to present day in order to demonstrate the impact humans have on the environment.

In conclusion, although this pilot study was limited in scope, the comparison of an early occupation site and a contemporary garbage site revealed clear differences in the types of material culture remains at the two sites. While the contemporary site, paired with ethnographic evidence, demonstrates increasing acquisition of Western material goods, it does not necessarily mean that such goods are incorporated into the culture of Nayau in analogous ways, either materially, socially, or symbolically. Nonetheless, it is cause for concern that the accumulation of Western garbage seen on Nayau includes materials that are non-biodegradable or even toxic, such as old batteries and plastic that unless physically removed off the island may take thousands of years to degrade. Pursuing further research on the contemporary material culture of Nayau would aid in refining the classification system proposed here, make a complete assessment of the garbage problem on Nayau, and also provide unique contributions to the theoretical realms of contact, change, site formation, and globalization. It is hoped that the preliminary data described here will form the basis for future research investigating how relationships of culture contact and culture change are reflected in trash.
Delisle: What Invertebrates Can Tell Us About Climate and Culture Change

In recent years, detailed and accurate ecological data has become available for the islands located in Remote Oceania, as defined by genetic and linguistic studies (Pawley and Green 1973; Blust 2008). The relatively slow development in this field of inquiry is partially due to the fact that Pacific archaeology is largely a post-World War II area of research. Moreover, it takes a substantial amount of time and effort to negotiate funding, conduct surveys, select excavation sites on islands that are often remote and difficult to travel to, and to train individuals in proper excavation techniques. Post-excavation laboratory analysis includes the time-consuming tasks of sorting, analyzing, cataloging, debating, and eventually publishing (Kirch and Kahn 2007). Much of Pacific archaeological and other historical scientific research in the region has used a model of Late Holocene climate change in the Central Pacific, based fundamentally on interpretations of data from other regions of the world, specifically continental Europe. Now researchers have come to understand that this Late Holocene climate change model conflicts with a vastly increased body of information now available about climate conditions specific to Oceania over the course of human history (Allen 2006; Field 2004). As a result, now more research can be conducted to generate informed conclusions about human history. The work described in this section details archaeological remains from the site and cave referred to by the Lauans on Nayau as Waituruturu. The goal of this project is to use archaeological data from Waituruturu’s excavation unit J18 to explore the association between hypothesized climatic shifts and the abundance, size, and diversity of invertebrates through time.
Waituruturu (“falling water droplets” in Fijian, in reference to the moisture accumulating on the roof of the cave) is an archaeological site on the south side of Nayau. To get to the site, one must hike through the jungle for roughly one-and-a-half miles from the village of Salia, then uphill and over a number of prehistoric wall fortifications, to the entrance of a karst (calcified coral) cave covered in spongy green moss, ferns, and other vegetation. Evidence of former human and owl occupations is visible on the ground. Surface artifacts, including potsherds, shells, and bones are present on the bottom of the cave near the fern growth. Survey and excavations were conducted on this site in 2001 by Jones, and it was determined, through a combination of oral history and archaeological evidence, that the rock shelter was occupied during times of warfare and/or environmental changes that would have made it more difficult to survive on an island in the Central Pacific (Jones 2009a). Radiocarbon dating of archaeological remains indicates that the site was occupied briefly during the period of 680-520 BP (O’Day and Steadman 2003). The brief nature of the occupation during this interval, and the shifts in ceramic styles suggest that this may have been a time of social upheaval that was associated with ecological changes and cultural shifts that may involve contact from other groups of Pacific islanders (Jones 2009a). These movement patterns and cultural shifts might be related to the rapid cooling and sea-level fluctuations resulting from the transition from the Little Climatic Optimum to the Little Ice Age, which occurred between 730-525 BP, or around AD 1300 (Allen 2006; Jones 2009b).

With increasingly more detailed analysis, greater emphasis on data collection and preservation, and lively debate within academic spheres, the field of archaeology as a whole, and the archaeology of Remote Oceania specifically, has advanced a great deal in producing socially-relevant, question-raising, quality data (Kirch and Kahn
2007). In an attempt to continue this trend, Delisle conducted a zoo-
archaeological analysis of invertebrates, specifically mollusks, from
a unit excavated not far from Waituruturu’s entrance. Though there
were other fauna present in the unit, invertebrates were chosen as
a subject of study, in part because of their presence at many differ-
ent kinds of archaeological sites and the well-researched body of
literature that goes along with those sites and in part because the
information that fluctuations in shell size, population numbers, and
frequency of Mollusca species potentially can be used to clarify the
nature of human-environmental interactions both geographically
and temporally. In the published literature on Remote Oceania, in-
vertebrate faunal assemblages have generally been analyzed less than
vertebrate assemblages, although the recent past has seen in-depth
studies carried out for sites in multiple island groups (Jones 2009a;
Conte and Kirch 2004; Green and Weisler 2004; Amesbury 1999;
Morrison and Cochrane 2008).

Even minor climate changes may have impacted populations,
potentially driving collapses in humans and other species. Though
many people assume that in the past climate was similar to today’s
climate, the body of evidence from the past decade strongly suggests
that climate has been incredibly variable over the course of human
history. It is not a great stretch of the imagination to suppose that
ecological events have had a considerable hand in shaping the evol-
ution of entire genera of plants and animals, though there is also a
great deal of evidence that suggests that periods of intense ecological
hardship force interesting adaptations in species that maintain con-
tinuity and diversity into the present day. Environmental changes
can also usher in periods of great success for both humans and the
species they exploit, and more and more archaeological discussion is
focused on the bounty and stability found in some human-inhabited
environments before the present day (Baisre 2010; Jones 2010). More
recently, studies of anthropogenic climate change have made clear that there are unintended consequences to human use and manipulation of the environment that can be viewed in the archaeological record and across the world today, but development and implementation of creative management strategies has equipped humans across the planet with the ability to deal with unexpected natural disasters and has allowed us to responsibly exploit our environments (Molnar and Molnar 2000). Natural processes associated with sea-level change and climatic fluctuation, as well as cultural factors related to changes in settlement patterns and resource exploitation, should be taken into consideration, all the while keeping in mind that ecological changes can lead to negative effects on near-shore areas, with consequences for the people who rely on these environments for subsistence (Morrison and Cochrane 2008). This is true for both the past and the present.

Mollusks usually are the most abundant fauna in Fiji’s archaeological sites, and of the mollusks, taxa from four classes are usually the most common. Two of these common taxa were present in unit J18 at Waituruturu: bivalves and gastropods. In archaeological sites, shells are often found in middens, a class of archaeological deposit formed of refuse from food preparation and consumption. The term *midden* is also used to describe large mounds of shells (with associated cultural debris) found at archaeological sites. Unit J18 appears to be a lovo, or earth-oven, which contained fire-cracked rock and a substantial amount of charcoal, bone, and shell. The conditions at the site suggest that it was not occupied for long stretches of time, so the remains present provide a snapshot of the diet of the people of Nayau during a short period of settlement in a fortified site. The majority of the shells in unit J18 are relatively common bivalves, primarily *Atactodia striata* (surf clam) and *Codakia spp.* (Lucine clam).
The relationship between the shells found at Waituruturu and the people who consumed them could be coincidental and insignificant to the greater narrative of Lauan history, or they could be indicative of a creative survival technique utilized by the people of Nayau during a period of ecological marginality. We hypothesize that the women and children probably collected the shellfish, though who consumed these food items and under what conditions is up for debate. As with all sites, the exact conditions that led to the present state of archaeological remains extracted from unit J18 are still unknown, although it appears that ecological changes may have created conditions that facilitated movement and social change, but not necessarily a shortage of invertebrates. The rich biodiversity of the region appears to have padded the instability created by the weather shifts, with species ready to take advantages of increased storminess and fresh water from rain to initiate their spawning cycles. We know much more now than we did just a few decades ago about ecological conditions over time in Nayau, and this increased understanding can be supplemented further by looking at the people living on the island today.

As far as the ability of Fijians to exploit their environments to collect food is concerned, ecological extinction caused by overfishing precedes all other pervasive human disturbance to coastal ecosystems, including pollution, degradation of water quality, and anthropogenic climate change (Jackson et al. 2001). Evidence indicates that this is a cycle humans have been perpetuating for quite some time, and the negative impacts are abundant and visible, so much so that in some areas, species of marine invertebrates were once so abundant as to pose hazards to navigation and are witnessed now only by massive garbage heaps of empty shells (ibid.). Nayau appears to have maintained a high level of biodiversity and related stability in the variability of human diet, even during periods of intense ecological
change when human subsistence is considered in a long-term perspective (Jones 2009b). The archaeological remains, and our participant observations of living Fijians, show that the island produces everything needed for successful long-term human occupation. Unlike the people who left the remains excavated at Waituruturu, modern Lauans rely more heavily on imported foods, such as flour, sugar, and canned fish.

Several tropical Pacific Island cultures invented and employed marine resource management measures centuries before the West did, and for a variety of reasons, including to prevent the unsustainable harvesting of species that eventually leads to extinction. These strategies included limited entry, closed seasons, closed areas, size limits, and in some rare cases gear restrictions. Recently, some Fijian communities have experimented successfully with population management of certain bivalves, making progress toward littoral stability and sustainable exploitation (Dalzell 1998). Small-scale impacts from overfishing and pollution cannot necessarily be fully managed locally, as thermal stress and coral bleaching are already changing the structure of reefs. Impacts of climate change may depend critically on the extent to which a reef is already degraded. Restoring food webs and controlling nutrient runoff from agricultural lots to avoid bacterial blooms provides a first line of defense against the ecological impacts of climate change; however, slowing or reversing global warming trends is essential for the long-term health of all tropical coral reefs (Pandolfi et al. 2005). Post-Cyclone Thomas, and because of concerns raised by climate fluctuations and species extinction, management programs such as the one described above might become a reality in Nayau in the future.

By combining what we know about the ecology of today with information about the environmental landscapes of the past, we can approach the future with a more complete understanding of human
impacts, successful strategies of marine resource management, and conservation (Jones 2007). Though there is some comfort in the fact that policymakers are turning to science to answer questions of how communities should deal with climate challenges, scientific, quantified knowledge is only one step on the way to creating an effective risk-management process (Finucane 2009). The people of the Remote Oceania, like people in every area across the planet, hold diverse beliefs about climate change, its causes and affects, and their individual roles in a greater global community. Their dynamic social and ecological context effects the decisions they make regarding consumption and management practices, and to a large degree determines the extent to which people are aware of and able to respond effectively to climate fluctuations and other ecologically relevant processes. Researchers working in environments such as Nayau see the impacts that changes in the weather and reef health have on the humans living in that environment. Though it is difficult to effectively communicate the detail necessary for complete understanding, improved methods of communication, conservation, and collaboration must be explored in the future in order to help preserve an ecosystem and culture that have already survived so much.

Noojin: Changes in Marine Biodiversity at the Site of Na Masimasi?

The purpose of this research project was to investigate possible changes in marine biodiversity as a result of climate change during AD 1300 (around the transition from the Little Climatic Optimum to the Little Ice Age). Noojin included two lines of evidence as part of her investigation—marine fauna and secondary sources or published studies. The findings indicate that there were several different types of marine species in the archaeological excavation unit examined (unit P18, a 1x1 meter excavation pit) at the site of Na Masimasi, but the area is very small and specific and can only be one small piece of
the puzzle as far as showing any changes caused by climate shift. The site of Na Masimasi Yavu is a large earthen mound that was used as a structural foundation for a house or other building. It is located on the south coast of Nayau, about half a kilometer (or 0.3 miles) from the modern shoreline, and therefore the occupation has ready access to the sea. Radiocarbon dates indicate that the site was occupied perhaps as early as AD 0 and then continuously or at intervals through around AD 1520.

In a literature review associated with this project, a common theme was found in the discussion of natural versus human interference with the Fijian environment, and with Pacific environments in general. The literature has been helpful in discussing the various ways in which climate change can be traced, especially in regard to marine biodiversity, as discussed in the section by Delisle above.

The original plan for this project was to examine shell remains, or invertebrates in a midden context, excavated from the site of Na Masimasi Yavu in order to begin a database that would later allow for comparison of marine fauna from this region. This comparison is helpful in that it contributes to a broad perspective of marine life, sustainability of food systems over the duration of human occupation of Nayau, and potential changes that occurred over time. Specifically we aim to understand if shifts in the use of marine invertebrates are evidenced, especially during the hypothesized climatic shift around AD 1300 in the central Pacific. This study will thus address the issue of climatic changes and their potential relation to marine-oriented food systems.

While examining the shell midden from unit P18, several different types of information were collected in order to understand what invertebrates, and shellfish specifically, were available on Nayau, as well as to discover any changes in the use or exploitation of marine fauna over time. Information collected included
element identification (genus, species), length, width, weight, count (NISP), and modifications. Modifications include any obvious signs of change in the shells that were man-made in order to make tools, ornaments, jewelry, etc. Tool classification included certain bivalve shell species, such as clams, oysters, and mussels that are used for scraping, as evidenced by use-wear along the edge of the shell. Overall, the invertebrate count is around 700, the majority of which are gastropods and bivalves, along with a small number of crab.

Some challenges were encountered while examining the marine fauna. In particular, accurate identifications of the shells were difficult due to the fragmentary nature of most of the specimens. Moreover, while there are online databases and literature on the topic of marine invertebrate species in the Pacific, Fijian waters contain much biodiversity and many species that are not well-illustrated and described in accessible databases or books. The marine species that made up the majority of the shells in P18 are those from the Turbinidae family. The Turbinidae family consists of a range of small to relatively large gastropods, commonly referred to as turban snails. A large portion of the shell assemblage was unidentifiable, being too broken and fragmentary to accurately identify and catalog.

This research suggests that there were likely copious supplies of shellfish, which occurred in a wide variety and that were available to the people of Nayau throughout the occupation of Na Masimasi Yavu, including the time period around AD 1300. The data gathered does not show a change in preference for the Fijians, nor does it show any changes in size, odd modifications, or changes in majority of species found when compared with data from earlier research and published literature. The shell size of individual specimens does not appear to differ from data collected by other researchers; therefore, this study found drastic differences in shell species. It is difficult to tell a great deal about possible climate changes and their effects
on the marine subsistence economy based on this research project alone. The data show availability of shells, use of shells, and modifications resulting from use-wear on two bivalves. However, problems with gaps in our understanding based on this research can be filled by more exploration and excavation in Fiji. So far, several sites have been excavated and hundreds of different marine species have been cataloged from both archaeological sites and modern ethnographic research. The research presented in this section represents a small fraction of what can be known about marine biodiversity through time on the island of Nayau. This research is helpful in that it has added to a large database of known species found in Fiji and the Pacific so that, ultimately, we may be able to understand potential changes and effects caused by climate shifts.

Messersmith: The Fijian Lovo

Food, cooking, and eating all play prominent and integral roles in modern Fijian society, especially in the more traditional Lau Island Group of Eastern Fiji. Toren (2007) notes that Fijian household meals define and reinforce notions of hierarchical kinship relations. One’s place at the table reflects that person’s status in the household and/or community. In regard to food preparation, Jones (2009a) observes that a significant portion of daily activities in Lau is focused on obtaining and preparing food. Special occasions, such as weddings and funerals require feasts. Jones (ibid.) also notes that places and activities dealing with cooking are both social and highly gendered. Given the pervasive connections between foodways and important aspects of society, such as social hierarchy and gender, the study of Lauan history and archaeology is incomplete without analyses of social spaces and the material culture associated with cooking and eating.

Lauans utilize two primary techniques for cooking: boiling on a hearth and cooking in an earth oven (or *lovo*). This paper examines
a combustion feature that was partially uncovered during excavation in 2009 at the site of Na Masimasi Yavu. Although we suspected that the feature comprised a *lovo*, there were certain anomalies in comparison with previous examples of excavated earth ovens on the island. In order to answer questions about the nature and use of this particular feature, this research project examines common criteria that constitute a *lovo* in Pacific archaeology and analyzes this particular feature in regard to the criteria. After the basic analysis, Messersmith examines evidence for possible uses of the feature, including ethnographic and archaeological data that may point to a ritualistic or ceremonial purpose.

In order to determine if the combustion feature in question was in fact a *lovo*, Messersmith first determined a set of criteria common to earth ovens in the region that could be used for diagnostic purposes. While no such standardized list exists in the literature, she found several features that are commonly mentioned in both archaeological and ethnographic sources. These criteria include scoop and roughly circular shape, ash and charcoal in the sediment (sometimes layered), abundance of fire-cracked rock (FCR), and copious amounts of bone, shell, and pottery fragments (Carson 2002; Jones 2009a, 2007; Pietrusewsky et al. 2007; Steadman, Anton, and Kirch 2000). It should be noted, however, that these are general and very broad criteria that may differ on a case-by-case basis. For example, certain attributes, such as size, contents, and use of individual ovens, varied greatly among the reports reviewed.

In addition to archaeological data, researchers in Oceania have the advantage of the availability of ethnographic data about earth oven construction and contents. Although some practices have evolved (such as placing modern rice sacks on top of the food before covering it with dirt), Lauans today likely construct earth ovens much as their ancestors did thousands of years ago. By observing modern practices
regarding earth ovens, we can draw parallels between the past and present. This may allow us to form a clearer picture of the construction and use of earth ovens in Oceania’s distant past.

The unit excavated and analyzed at Na Masimasi Yavu is unit N18. It is located in the center of a house mound (yavu) in the broad area of sand dunes along the south coast of Nayau referred to as Na Masimasi (described in more detail in the section by Aamodt). The unit is located directly south of a large coconut tree. Root intrusion from the tree, and to a lesser extent from a smaller tree just south of the unit, made excavation difficult. Two radiocarbon dates were obtained from shells recovered from different levels of the unit. A *Turbo setosus* (turban snail) shell from approximately 40 centimeters below the surface (cmbs) gave a date of AD 1210-1320. At approximately 70 cmbs, a *Turbo argyrostromus* shell yielded a date of AD 660-790. A human bone from 120 cmbs of another unit at the site was dated to approximately AD 0. Taken together, these dates illustrate continuous site use and/or occupation from AD 0, the time of construction, to around AD 1320 or later. These dates place the site in the late or post-Lapita phase at Na Masimasi, according to dates from previous excavations (Jones 2009a).

After reviewing the stratigraphy of the unit, we determined that there are two main layers: Layer I (the combustion feature) and Layer II (non-combustion feature). The combustion feature extends down to approximately 80 cmbs. In general, artifact counts show a distinct difference between Layer I and Layer II. Pottery and lithic fragments appear only in Layer I. Also, shell and fire-cracked rock are significantly more common in Layer I. However, there is relatively little difference in the number of animal bones recovered from each layer, in fact very few animal bones were recovered overall.

Layer I consists of four sediment layers with poorly defined borders. The topmost layer (IA), was composed of dark (Munsell color
10YR 1/1) medium coarse organic sandy silt. Copious rootlets were present, and the layer showed evidence of having been recently churned up, probably due to a combination of agriculture and modern livestock, such as pigs, roaming the area. Layer IB, the dominant soil type within the combustion feature, appeared virtually the same as IA but was not disturbed by modern farming practices. There was also extensive root intrusion in this layer. Layer IC was found around the greatest concentration of FCR in the profile walls. It consisted of the same medium coarse organic sandy silt as the previous two layers; however, it was mixed with ash and charcoal, which resulted in a lighter color (10YR 3/1). Layer ID reflected mixing between Layers I and II (10YR 4/2).

The shape of the combustion feature corresponds with the common scoop shape of Fijian earth ovens found in both modern villages and previously excavated sites in the region (Carson 2002; Jones and Quinn 2009; Jones, Steadman, and O’Day 2007). Although the entire feature was not excavated, it is likely that the stratigraphy reveals approximately half the diameter of the scoop shape. Therefore, the estimated diameter of the feature would be about 2 meters. While most modern earth ovens on Nayau are between 0.5 and 1 meter in diameter, larger ovens are common in contemporary villages for cooking cows or large amounts of bread for feasts associated with special occasions (Jones 2009a).

Pottery sherds were found solely within Layer I, the combustion feature. A total of 37 sherds were collected, with a combined weight of 95.8g. Table 2 shows the different attributes present on the recovered sherds. Of these, 23 sherds were decorated with a thin red clay slip that is characteristic of Lapita and post-Lapita ceramics (Kirch 1997, 120). The slip on some sherds was virtually intact, while others had deteriorated to show only a hint of the red color they once displayed. Two sherds displayed a tan color different from the red slip.
Ten sherds showed evidence of mat impressions. These impressions could be deliberate, as a form of decoration. However, it is possible the impressions were unintended results of the pots having been laid on woven mats prior to firing. Also present were brush strokes from application of the red slip to the fired pottery. Finally, eight of the recovered sherds showed evidence of darkened areas or smudging, a result of the pot being used for cooking directly on a fire.

Of the 15 lithic artifacts collected during excavation, eight were later determined to be FCR. The remaining artifacts are composed of chert and fine-grain basalt. Fine-grain basalt was often used for tools throughout the Pacific, and such tools were considered more prestigious than those made of coarser-grained basalt. There are four basalt fragments, which all appear to be fire-cracked debitage fragments. Three of the lithic fragments are chert. Probably local, the fragments range in color. One is pink, another yellow, and the largest contains bands of both colors. The largest fragment retains the roughness from the original outer surface of the rock. It also shows signs of use-wear at the sharper end.

A total of 71 bone fragments, with a combined weight of 3.4 g, were recovered from unit N18. Of these, 40 were found within the combustion feature (Layer I). The remaining 31 fragments were located in Layer II, the area directly surrounding the feature. The majority of the fragments were found at depths of 20-30 cmbs (15 fragments), 70-80 cmbs (10 fragments), 80-90 cmbs (13 fragments), and 90-100 cmbs (13 fragments). The range of 20-30 cmbs comprises the top of layer IB, while the lower three areas contain the bottom of the fire feature and the levels directly below it. Of the bone fragments recovered from Layer I, 24 showed evidence of burning. These fragments were located in the mid to upper ranges of the combustion feature.
Fifty-four of the bones from the unit, a vast majority of the fragments, were positively identified as fish representing seven unique taxonomic categories. Forty-one of the fish bone fragments could not be identified, due to lack of diagnostic features. Seven of the bone fragments from unit N18 were identified as *Rattus exulans* (the Polynesia rat, which was introduced at the time the island was originally colonized by humans). Another seven fragments were echinoid (sea urchin). Other fragments were identified as snake, frog, and lizard. One fragment was an unidentified reptile, and another could not be identified to any specific taxonomic category. (Dr. Jones made the bone identifications.)

A total of 1194 shells were recovered from the unit. They have a combined weight of 1278.1 g. Of these shells, 953 were located in Layer I, and 191 were located in Layer II. One hundred twenty-seven of the shells from Layer I were identified, counted, and weighed in the field. Due to travel constraints, these shells were left in Fiji. However, the information collected was added to the total counts for unit N18. Of the shells processed in the lab, 54 were undiagnostic fragments of gastropods, 17 were unidentifiable bivalve fragments, and 329 could not be identified at all. Overall, 21 taxonomic families of shell were represented in the sample. While *Turbo* fragments were the most common in number, *Strombidae* (small conch) shells were also copious and yielded the highest minimum number of individuals (MNI) for the unit. Several of the shells were water worn, and at least one, a fragment of *Tridacnidae* (Giant clam), appeared to have been heat-affected, possibly the result of the shell being modified for use as a tool. Using both total fragment count and MNI, *Mytilidae* (mussel), *Cypraea* (cowry), *Tellinidae* (clam), and *Neritidae* (nerite snail) were common.

Fire-cracked rock is copious throughout Layer I. The first 10 cm of excavation yielded 79 individual rocks of cobble and pebble size.
However, it should be noted that heat from the fire feature might have caused some rocks to split completely, altering the actual rock count. FCR is abundant in higher levels and decreases in number in lower levels; the last 10 cm of Layer I contained only 12 rocks. This is most likely due to the scoop shape of the feature, which resulted in narrower sections of the combustion feature in lower levels. FCR was common in all three of the feature’s levels.

In comparison with the other four units excavated at Na Masimasi during the 2009 field season, unit N18 yielded significantly more FCR. Units L12 and I22 had the next highest concentrations of FCR, with total weights of 23.2kg and 22.2kg respectively. Unit N18 contained about twice as much FCR, with a total weight of 42.9kg. Our research team excavated a probable earth oven feature in unit J18 at the rockshelter site of Waituruturu (described above). This feature contained considerably more FCR than unit N18, with a total weight of 232.6kg. Also present in J18 were layers of ash and charcoal as well as copious amounts of animal bone, much of it burned.

Overall shape, stratigraphy, FCR count, and the presence of bone and pottery support classification of the feature in unit N18 as a *lovo*. However, this combustion feature is somewhat unique among earth ovens excavated in Nayau and the Lau Group in general. Comparatively, there are significantly fewer fragments of bone and pottery in or around the feature. While charcoal flecking was observed, it was not present in the amounts that would typically be indicative of repeated *lovo* use. Ashy sediment was also present, but there were no distinct layers of ash. In addition, borders of the feature were clearly defined. Everyday ovens were repeatedly dug out and refilled, which would lead to a less distinct transition from oven fill to surrounding sediment. Taken together, these signs point to an interpretation of occasional, rather than everyday, use.
During fieldwork in 2009, the chief of Narocivo (one of the three villages on Nayau) visited the site at Na Masimasi. Upon seeing the combustion feature in N18, the Tui Naro told Jones that it was an earth oven used for cooking humans. He said this was obvious due to its large size, central location on a *yavu*, and copious amounts of FCR. When we inquired about why no human bone was found in the unit, if this was an oven for cooking humans, the chief explained that there were no bones because the bodies would have been removed from the oven after cooking and taken elsewhere, where they would be dismembered and distributed to the community’s warriors.

Although the combustion feature excavated at Na Masimasi contained some anomalies compared to earth oven features in the region, we believe the basic structure of the feature classifies it as a *lovo*. However, relatively small amounts of charcoal, ash, bone, and artifacts point to a purpose other than everyday use as a cooking feature. While none of the previously published accounts of sacred spaces and rituals directly fit the ethnographic and archaeological evidence from Na Masimasi, the broad trends and variations within those trends do not discount the possibility of a ritual, perhaps even cannibalistic, purpose for the *lovo* in unit N18.

Further investigation into ritual and ceremony, both contemporary and prehistoric, could add an ethnographic perspective to the archaeological record for this and similar features. More extensive research of known ritual sites in Oceania could also contribute to our understanding of this feature’s use and purpose. Ideally, further work would include a field survey of other nearby islands, incorporating ethnographic accounts and oral histories of modern inhabitants, to locate any similar features. The unique nature of this feature makes it an important area of analysis, not only for the archaeology of Nayau, but also for the entire region.
Aamodt: Place Names in Fijian Culture

Aamodt investigated place-naming trends on Nayau. Place names can be a rich source of information for understanding symbolic meaning, history, and social identities, values, and norms for a culture. As Edward Sapir wrote in 1921, the relationship between language and environment is negotiated by human cognition and social life. Given that the people of Nayau have continually inhabited the same geographic area using a similar subsistence technology for approximately 3000 years, the place names have potential to give insight into long-standing cultural traditions in terms of ecological adaptation, social relations, and ideologies.

Twelve place names were analyzed by Aamodt during the 2009 field season. They included names of villages, rock shelters, sites of historical significance, and some places that were associated with local mythology and oral history. The method for interpretation of place names included interviews with Fijian informants, personal communications from the project P.I. (Jones), and ethnohistorical and language reference sources (Calvert and Williams 1858; Capell 1984; Geraghty 1983). Broadly, the place names fell into two main categories: geographical names and cultural names. However, geographical place names often went beyond simply describing the landscape feature and also included cultural information. Below is a description of the twelve place names and an evaluation of the validity of the meanings obtained, based on the strength of the sources. Each are ranked on a scale from 1 to 5, with 1 representing a low level of validity and 5 representing a high level of validity.

1. Salia (geographical): “small reef passage” (Geraghty 1983, 153). Salia, the main site of the fieldwork, is a village on the southeastern side of Nayau. This name was given in 1979 after Hurricane Meli destroyed the original village. True to its name, the reef passage is
treacherously small. When the students in the field school first arrived, the captain of the ship initially refused to enter the reef because of the dangerous passage. Because this toponym is corroborated by the geographical feature, the validity is ranked at 5.

2. Devo (geographical): the former name of Salia; literally, “a variety of soft stone, soapstone” (Capell 1984, 50). Because the specific stone could not be identified on Nayau, the validity is ranked at 2.

3. Waituruturu (geographical): “water drops” (Jones 2009a); the name derives from wai, meaning “water, liquid of any kind” (Capell 1984, 277) and turu “to drip, drop, of liquids” (Capell 1984, 243). The site is a fortified rock shelter. Often the word wai in a place name refers to water as a resource, either drinking water or fishing waters (ocean or river). However, this designation does not apply to Waituruturu, where the water supply is not currently enough to drink. There is some fern growth in the center of the cave that suggests that there may have been a garden once, but there is no conclusive data yet. It is possible that it serves simply as a poetic description and identifying feature of the place. The validity is ranked at 5.

4. Korovatu (geographical): koro “an eminence” or “a village” (Capell 1984, 101), and vatu “stone, rock” (Capell 1984, 257). Korovatu is a rock shelter, so the name translates almost directly to what the place is. The validity is ranked at 5.

5. Narocivo (geographical): civo “a sudden gust of wind from the mountains” (Capell 1984, 34) or “down” (Geraghty 1983, 135). There is only one mountain on Nayau, a collapsed volcanic cone in the center of the island. While it is possible that the name Narocivo refers to a geological phenomenon, this also may not be the true meaning of the name. In 1858 (Thomas and Calvert), missionaries in Lau wrote that the word vakacivo refers to the tradition of saying a kind of toast
or a wish after swallowing kava. These words may be commonplace, humorous, or sentimental. Wishes might include joking references to cannibal practices (“a human ham!”), or trade-specific needs, such as a report from the reef for a fisherman. Most commonly, people called out for wealth by naming specific items, including materials such as whale’s teeth or food items. Often the wishes were encoded in enigmatic phrasing (Calvert and Williams 1858, 114-115). *Vaka* is a prefix added to words to make them causatives (Capell 1984, 251). So loosely, *civo* may refer to a wish voiced around a kava bowl. This older word may hold clues to the true interpretation of *Narocivo*. The validity is ranked at 1; further investigation of both wind patterns on Nayau and the significance of *naro* are needed to construct a working hypothesis.

6. *Nukutuba* (geographical): The name of a rock shelter, *nuku* “sand” (Capell 1984, 156), *tuba* “outside, but limited in use” (Capell 1984, 240). As might be expected, sand is copious along the shores of Nayau, and it is not surprising that there might be a reference to it in a geographical name. The second part, however, rings untrue. A more likely alternative definition for the second part of the name might come from the word *katuba*, which is the Lauan word for “door.” The validity is ranked at 2.

7. *Raviravi* (geographical): The name for a fishing spot, *ravi* “to lean” (Capell 1984, 171). The name of this place describes how the fish appear to lean close to the rocks (personal communication, Jones 2009). As such, the fish behavior encoded in the term *Raviravi* may assist fishers in strategies for catching them. It is worth noting that *Raviravi* may be unusual in being formed from a reduplicated verb. Few other reduplicated place names were identified from either informant interviews or a review of the literature. The validity is ranked at 5.
8. *Nayau* (cultural): possibly *na* (an article, “the”), and *yau* “goods, wealth, riches, possession” or “to go in great numbers” (Capell 1984, 289). While it is not uncommon to see the association of land with wealth; it is unclear at this point whether these translations are correct, and further research is needed. The level of validity is ranked at 2.

9. *Liku* (cultural): translates directly to “native Fijian female dress, consisting of a band of braided *vau* or *wā loa*, with a fringe up to ten inches long” (Capell 1984, 121). In pre-European Fiji, the *liku* was everyday wear for women. It seems unlikely that Lauans would name a place after a female-associated item of material culture, when every other place name referring to ancestor gods identified thus far has a male-associated name. We suspect that there is an alternative, perhaps archaic, meaning of this word. The level of validity is ranked at 1.

10. *Na Masimasi* (cultural): “Sir barkcloth” (Jones 2009a). This site is a coastal dune and the place where the first founding ancestors lived, according to local oral traditions; now the site is plated as a coconut grove. It is the same site that Jones details in her 2009 book, *Food and Gender in Fiji: Ethnoarchaeological Explorations*. According to Jones (2009a), radiocarbon dates demonstrate that it is the oldest site occupied by humans on the island of Nayau, at 2800-3000 BP. Reports from the highest-ranking people on the island relate that it is the place where the gods of origin (*kalou vu*) lived when they first settled the island. *Masi* means “barkcloth,” and the word is also used in the title *Ramasi*, which translates to “Sir Cloth.” Here, it refers to the founding ancestors. It is common throughout the Pacific for legends to deify the first inhabitants of an island. The name *NaMasimasi* makes this area of the land a “place of the gods,” as is traditional in Lauan culture and myth (Jones 2009a, 41-42). The validity is ranked at 5.
11. Dali wawa (cultural): Means “twisted intestines” (Jones, personal communication). Dali means “rope” (Geraghty 1983, 86) and wāwā means “intestines” (Geraghty 1983, 375), hill fort. According to Jones’ informants, this name was created during a time when there was warring between the villages, and the purpose was to inspire fear in their enemies by evoking imagery of viscerally brutal war tactics. The level of validity is rated at 5.

12. Qara ni timoni (cultural): interpreted by a local informant as “the devil’s cave”; qara “a hole or cave” may be a play on words, as another meaning for qara is “to serve, minister, attend” (Capell 1984, 162). The meaning of timoni is “demon” or “devil” (Capell 1984, 321-322). In Fiji, the people believe that the old ancestor gods, commonly referred to as “devils,” or timoni, are still present but less effective than they once were, due to the fact that the people on Nayau now only serve the Christian God. This place name refers to a cave site where some people still practice rituals of the old religion honoring the old gods. Therefore, this name is a more recently conferred, post-Christianization. Qara may have a double meaning then, both “cave” and “to minister or serve.” According to Calvert and Williams, Fijians do indeed enjoy punning, or vakaribamalamala. The example provided is a story of how the people of Mbau ordered the people of Tailevu to come to ulaula. Ulaula means both “to thatch a house” and “to throw ulas” (short war clubs). The people of Tailevu came expecting to help thatch a house but, upon arrival, were comically pelted with clubs. (Calvert and Williams 1858, 130). It is conceivable that the practice of vakaribamalamala, or a similar practice of play on words, is extended to the naming of places. The level of validity for the interpretation of this name as “the devil’s cave” is a 5. The certainty of it having a double meaning is ranked at 5.
The examples above clearly show that place names serve several important functions in Lauan culture. Geographical place names that describe the features of the landscape have a practical function as orientation points in the landscape. They also encode information about the environment. For example, the term *Salia* provides valuable ecological information so that anyone coming to the village will know that the passage through the reef is very small. In a subsistence-based community, intimate knowledge of the environment is essential for survival. The Fijians have many epistemological practices to transmit this information, place names being one practical means of doing so.

Cultural names are a bit more abstract, but they also serve specific purposes within Lauan culture. One important purpose is to encode the history of the people of the island, such as with *Na Masimasi*. Retelling the history or mythology of places such as *Na Masimasi* also transmits values from generation to generation and recreates social and cultural identities associated with place. In more recent times, a similar function is seen in encoding information about current practices, such as with *Qara ni timoni*. Here the name may serve as a warning that the ancestor spirits present in the land have been recently attended to and may be more powerful than they usually are.

In sum, place names hold fascinating keys to understanding both present-day and past culture in Fiji. Many of the names in the study have definitive interpretations and associated meanings that provide ethnographic clues to the worldview and lifeways of the people of Lau. Other names require further investigation to truly understand what information is encoded in them. Plans for further study include reading more texts written by missionaries to find records of older traditions and words no longer in current use. In the field, additional research plans include having suggested interpretations evaluated by local informants, acquiring more place names and meanings,
mapping all names with GPS points and from there, using the map to discern toponymic density, as well as utilizing records of indigenous oral history available in the archives of the Fiji Museum.

SUMMARY AND CONCLUSIONS

As the summaries of student research projects illustrate, our interdisciplinary program produced data that will contribute to a range of important anthropological and biological issues. First, our archaeological data derived from the identification of animal bones and shells is useful for understanding the potential impacts of hypothesized climatic shifts in the Central Pacific Islands at AD 1300 on marine resources used for food. This long-term data on marine diversity and exploitation at the archaeological sites excavated in 2009 will be compared and contrasted to ethnographic data on important modern marine faunas and contemporary exploitation patterns by local inhabitants on Nayau (in particular, fishing and collecting on the reef). Together these data will assist in characterizing and clarifying the causes and rates of ecological change in a marine setting. Both long-term data (archaeological and ethnographic) and insights gained from Fijian traditional ecological knowledge (TEK) will facilitate the development of programs for sustainable use of marine resources in the study area and elsewhere. All of the NSF Fellows were instructed in archaeological, ethnographic, and basic ecological techniques and gained skills and experience applying skill sets, including mapping, excavation, sieving, documenting excavations and drawing stratigraphy, interview techniques, note taking, journaling, fish and shellfish identifications, and time allocation studies.

Second, the exploration of material culture and refuse patterns from an ethnoarchaeological perspective, the trash project, was designed to examine culture change and its material expressions. That
is, we aim to better understand material goods, their everyday use, value, and how they are disposed of. This work lends insights into long-term patterns of consumption and culture change.

Third, archaeological data from the site of Na Masimasi Yavu in particular provides information on ritual, ceremonial structures, and subsurface features (especially earth ovens or *lovo*). The oral histories and the material remains at this site suggest that this mound may have been used as a foundation for a temple or priest’s house. The curious combustion feature in unit N18 and spatial, architectural, and artifactual analysis from the site as a whole promises to lend insights into the material correlates of ritual in Fiji, and in the Pacific Islands in general, a subject that has not been investigated in detail from an archaeological perspective in the region.

Fourth and finally, research on the place names of Nayau is informative and illuminates multiple dimensions of ideology in terms of symbolic meaning, social identities, history, values, and norms. The study of place names in Fiji is exciting, challenging, and rewarding, offering tangible connections to the larger understanding of worldview and indigenous traditional lifeways. It is hoped that in doing so, greater insight can be gained in seeing the land through the eyes of the Fijian people.

Some of the many accomplishments of our NSF-REU Fiji program have been described in the highlights above. In summary:

- Our 2009 team excavated two archaeological sites that will lend insights into long-term marine resource exploitation and ritual practices in the past.
- Students and program faculty collected ethnographic data (video, film, interviews) on traditional lifeways, eating behaviors, fishing, traditional ecological knowledge,
changes in marine resource availability, body image, and ritual activities.

- Fiji Fellows designed and presented their findings and experiences to the general public and to local K-12 students in the Birmingham area (currently, a total of five days of presentations and 10 posters).

- The Fellows created an interactive website with the following address: http://hulamo.com/2009_NSF_REU_Fieldschool_in_Fiji.

- This NSF-REU Fiji program proved to be a challenging and beneficial learning experience. Most students described themselves as having a learning experience that will undoubtedly positively impact the course of their careers. Moreover, the changes in responses from the pre- to the post-experience educational evaluation tests clearly indicate large gains in both academic and cultural learning.

- Eleven professional papers were presented at regional and national professional conferences within the following year, based on data from this program.

- The Project faculty and students contributed to and/or authored both news items and lectures for students and the public in the Birmingham area and beyond.

In conclusion, relatively few opportunities are available for students to engage in meaningful research at the undergraduate level. While many anthropology field schools exist around the world where students and volunteers can gain hands-on experience doing archaeology or other forms of anthropology, a chance to engage in
in-depth anthropological research in a remote setting with long-term cultural continuity is rare in our discipline. Our NSF-REU Fiji program trained students in participant observation and in conducting archaeological work and provided a setting where these skills were utilized in the field every day. For example, students learned to document fishing techniques, to identify common fishes, and to collect data from fishing expeditions, such as the species of fishes collected, their sizes and weights, the use of these fishes and how the members of the fishing party divide the catch. Upon their return from the fieldwork in Fiji, undergraduate and graduate students were trained in laboratory methods, and they gained experiences in a variety of outreach settings and media. Students worked to process, catalog, and analyze the artifacts and fauna. Students also created an interactive website that has background on the research project, a history of Fiji, information on our outreach program, podcasts with the fellows, a downloadable application to the field school, and contact information.

Student researchers gained experience presenting their findings and projects to the general public and to local K-12 students in the Birmingham area. While the presentations were educational experiences for the students, they were also educational for the general public and for K-12 school students. At the McWane Science Center in Birmingham, REU Fiji Fellows prepared four presentations and hands-on-science booths where people of all ages could learn about our Fiji research. Presentations and activities focused on the scientific method, archaeology, foodways in Fiji, and marine resource exploitation and management.

Our preliminary data analysis suggests that the field school was successful in meeting the educational goals set out for the students. Moreover, students learned and grew in ways that they had not expected. Most of them developed a sense of confidence and pride in
completing the field school. The field school was undoubtedly transformative to all the REU Fellows and has stimulated positive associations with science for both undergraduates and students at the graduate level.

REFERENCES


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