DISPLAY ON

FRESHWATER USE CUSTOMS ON ROT

AN EXPLORATORY STUDY

Rebecca A. Stephenson
Darlene Moore

Water Resources Research Center

UNIVERSITY OF GUAM

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DEPARTMENT OF THE INTERIOR • OFFICE OF WATER RESEARCH AND TECHNOLOGY •

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By

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Editors

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for

SOCIOCULTURAL DETERMINANTS OF FRESHWATER USES IN GUAM

OWRT Project No. A-009-Guam, Grant Agreement Nos. 14-34-0001-8012,9012

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Abstract

The purpose of this study is to delineate cultural aspects of freshwater uses on the island of Rota, Commonwealth of the Northern Marianas. The overriding theme of the study is the significance of freshwater as a natural resource for the people of Rota. Rotanese people interviewed in the course of the research expressed the opinion that there is a sufficient amount of freshwater available on their island to meet their needs. The majority of freshwater that people use is disbursed by a piping system leading down from Matanhanom, the water cave. Rotanese people, however, also make use of rainwater.

Seventy-one Rotanese informants recounted in detail their customs, practices and beliefs concerning freshwater uses before and during World War II to the research team. A key purpose of the study was then met, that of gathering and recording the recollections of the Rotanese in regard to freshwater use customs prior to the "the present". Informants were interviewed on an individual basis; the field instrument was a questionaire.

An archaeological survey was also conducted to suggest possible locations of freshwater sources on Rota in prehistoric and historic times. Research on the ethnohistory of Rota serves to link the past to the present. Sections of the report on land tenure, place names and world view reinforce the continuum from past to present, and set forth the contemporary perspectives of the people of Rota regarding water as a natural resource on their island.

The results of the research suggest that consistency is shown on Rota from the past to the present in regard to the value of freshwater. Before and during the war, local people were resourceful in building catchments, wells, and the like in order to insure sufficient supplies of freshwater. In the present, Rotanese people express confidence that they will continue to have sufficient supplies of freshwater to meet their daily needs.

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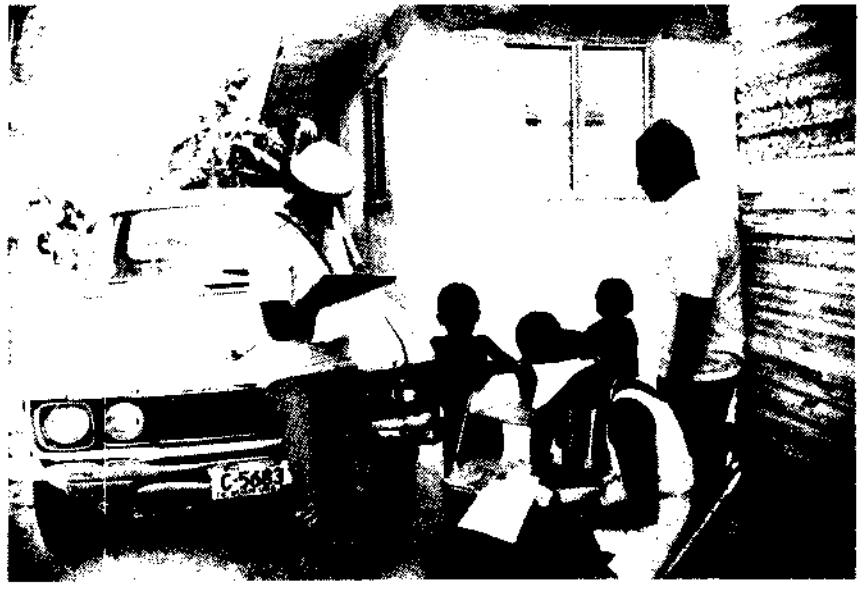
PROBLEM AND METHODOLOGY

The majority of research projects sponsored by Guam's Water Resources Research Center to date have addressed technical aspects of freshwater: water quality, analysis of groundwater, runoff and flow, and the like. This research report takes a different perspective, that of sociocultural determinants of freshwater uses by human subjects. The site of the field research for this project was the island of Rota, Guam's nearest neighbor in the Northern Mariana Islands chain.

This study compliments an earlier study of cultural aspects of freshwater uses as reported by human subjects on Guam in 1978. Also sponsored by WRRC, the earlier project was entitled Freshwater Use Customs on Guam: An Exploratory Study (Water Resources Research Center, University of Guam, Technical Report No. 8, April 1979). At the time of the Guam Water Project, local residents were asked to share customs and practices in regard to the use of fresh water with members of the research team. A questionnaire was administered to an availability sample of 265 Chamorro informants over the age of forty. Chamorros of this age bracket had recollections of freshwater use customs and practices prior to World War II, having experienced the pre-War lifeway, as well as a knowledge of freshwater as a natural resources of prime importance to human beings in the post-War era. The Guam Water Project also featured archaeological studies with reference to freshwater sources on Guam, ethnohistorical research, studies of Chamorro language terms for freshwater in its various forms, and place names where people reported collecting and utilizing fresh water.

In the Guam study, it seemed clear that traditional Chamorro freshwater use customs still exist, in the recollections of people if not in actual practice in contemporary times. Archaeological evidence suggested a close correspondence between prehistoric settlement patterns and freshwater sites. The perception of freshwater as a natural phenomenon within the context of the Chamorro language was shown to be in a state of change. The ethnohistory section of the Guam study documented that having a sufficient supply of freshwater in order to meet the daily needs of local people has been a continuing problem on Guam from contact times up to the present. Responses gleaned from the questionnaire, however, indicate that Chamorro people over the age of forty do not recall difficulties in obtaining a sufficient supply of freshwater in times past. In comparing and contrasting village of residence and water resources utilized in the natural environment, Chamorro informants of



Photos 1 & 2. Interviewing informants.

Photos 3 & 4.
Collecting data.

the Guam Water Project supplied locally derived names for both, names that are not consistently found on presentday maps of Guam. This suggests that our informants had a precise and personal knowledge of the environment in which they lived, and a continuing and regular interaction within the same.

As a follow-up to the Guam study, the Rota Water Project was initiated, with a similar focus and research design. Like the Guam study, the Rota project began with the assumption that freshwater is an extremely important natural resource in the daily lives of human beings. Like the Guam study, the purpose of the Rota Water Project was to collect and record customs and habits of local people in regard to fresh water uses, consumption practices, and the like. The time frame under particular consideration is "before the present", i.e., before piped water was commonplace in all of the homes. For Rota, "before the present" in this context focuses on pre-1945, life on Rota before the end of World War II.

For the most part, those personnel involved in the Guam Water Project also staffed the Rota Water Project. Similar field techniques were employed in both projects: eventually the data from the two projects can be compared and contrasted in greater detail. The current project report is preliminary in nature. Dr. Rebecca Stephenson served as Principal Investigator of the projects, aided by Anthropology and Geography students at University of Guam. The questionnaire utilized on Rota was prepared on Guam in January-February 1979, while project members also conducted library reference research about Rota, completed map work, and discussed field techniques. In early March 1979, Dr. Stephenson and Research Aide Darlene Moore traveled to Rota to lay the groundwork for the field project. The first field team, eight students in the company of Dr. Stephenson, conducted household interviews on Rota and completed preliminary aspects of the project during a five day stay on the island from March 22-26. The second field team of ten students conducted field research on Rota from April 19-23. Half of the students completed the remaining household interviews with selected Rotanese informants, directed by Dr. Stephenson. The other group of students, working in connection with Guam's Territorial Archaeology Laboratory under the direction of Marvin Montvel-Cohen, Guam's Territorial Archaeologist, surveyed key archaeological sites on Rota. This team sought evidence of the availability of fresh water in prehistoric times, water storage facilities located in association with traditional village sites, and the like.

For the remainder of Spring Semester 1979, the students coded and analyzed the data collected on Rota in the project's research headquarters at House Number 11, Deans' Circle, University of Guam. The students were required to prepare individual papers for Spring Semester course credit at the University of Guam, dealing with a particular aspect of the Rota Water Project. Their papers as edited appear in this volume.

Photo 5. Guam student and Rotanese research assistant.

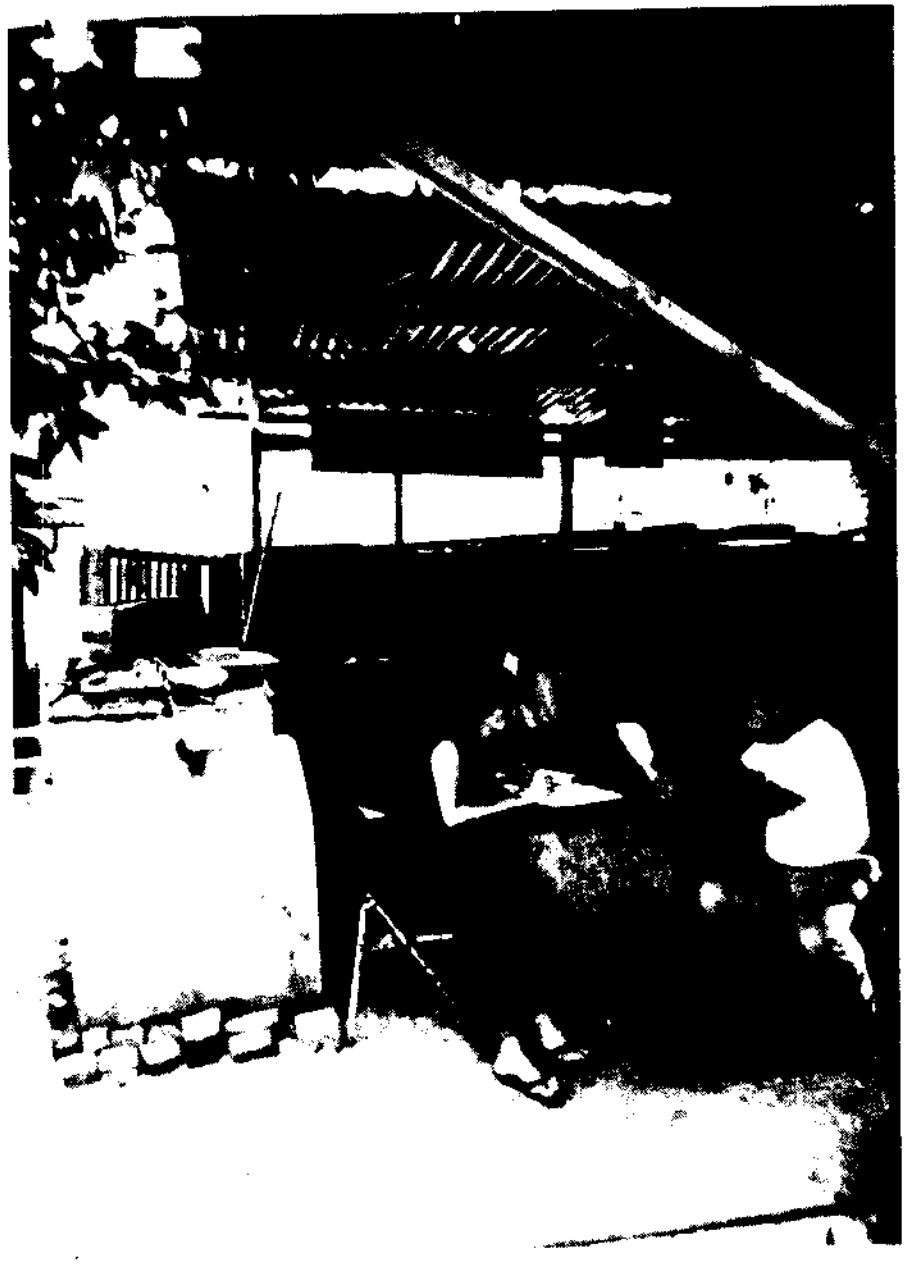


Photo 6. Typical interview situation.

The final sample of questionnaires includes the responses of 71 Rotanese informants over the age of forty. An availablility sample, the sample was restricted to persons of this age category for they would have the most vivid recollections of social and cultural water use customs and practices on Rota prior to World War II.

For the most part, personal interviews were conducted directly between field research team members from Guam and Rotanese informants. A majority of the interviews were conducted in the Chamorro lanaguage, necessitating the presence of at least one Chamorro language speaker in each interviewing party, either a student from Guam or a Rotanese research aide. Two or three persons comprised each field party, for in each case an interviewer was needed, a scribe, and the Chamorro language speaker to translate the remarks of the informants.

Standard anthropological field techniques were employed for gathering, analyzing, and interpreting the data, including library reference research, map surveys, and formal and informal interviews. Participant-observation was a highlight of our field research on Rota. Field team members were regularly invited into homes, to fiestas, and to other social gatherings. Rapport was inhanced as field team members talked with new friends and acquaintances interested in the research project, and new ideas and insights were shared.

We stress that this project, like the Guam Water Project, is presented here as an exploratory study. The project is informant-oriented. Data gathered and presented in this report is as personal and as subjective as our Rotanese informants cared to make it. Further studies of sociocultural determinants of freshwater uses in the Western Pacific are recommended to compare and contrast data gathered on Guam and Rota in further detail, and to explore other issues and themes of a cultural nature in regard to freshwater as brought to light in the two above-mentioned projects.

ROTA: PLACE AND PEOPLE

Rota, one of several populated islands in the Mariana archipelago, is located between Guam, which lies some 32 nautical miles to the southwest and Aguijan, lying some 55 miles north-northeast. Its location is approximately 14°8' north latitude and 145°8' east longitude (Dela Cruz and Kapileo, 1972:1). The third largest of the islands constituting the Northern Marianas, Rota has a land area of approximately 21,124 acres of 32.9 square miles and is about 10.5 miles long and 3 miles wide at its widest point (Dela Cruz and Kapileo, 1972:1). Like most of the other islands in the Marianas, Rota is primarily composed of a volcanic core upon which limestone terraces have formed, thereby creating varied geography ranging from steep cliffs to plateaus and coastal lowlands.

Photo 7. Rota coastline.

Photo 8. View of Taipingot ("Wedding Cake") from across the bay.

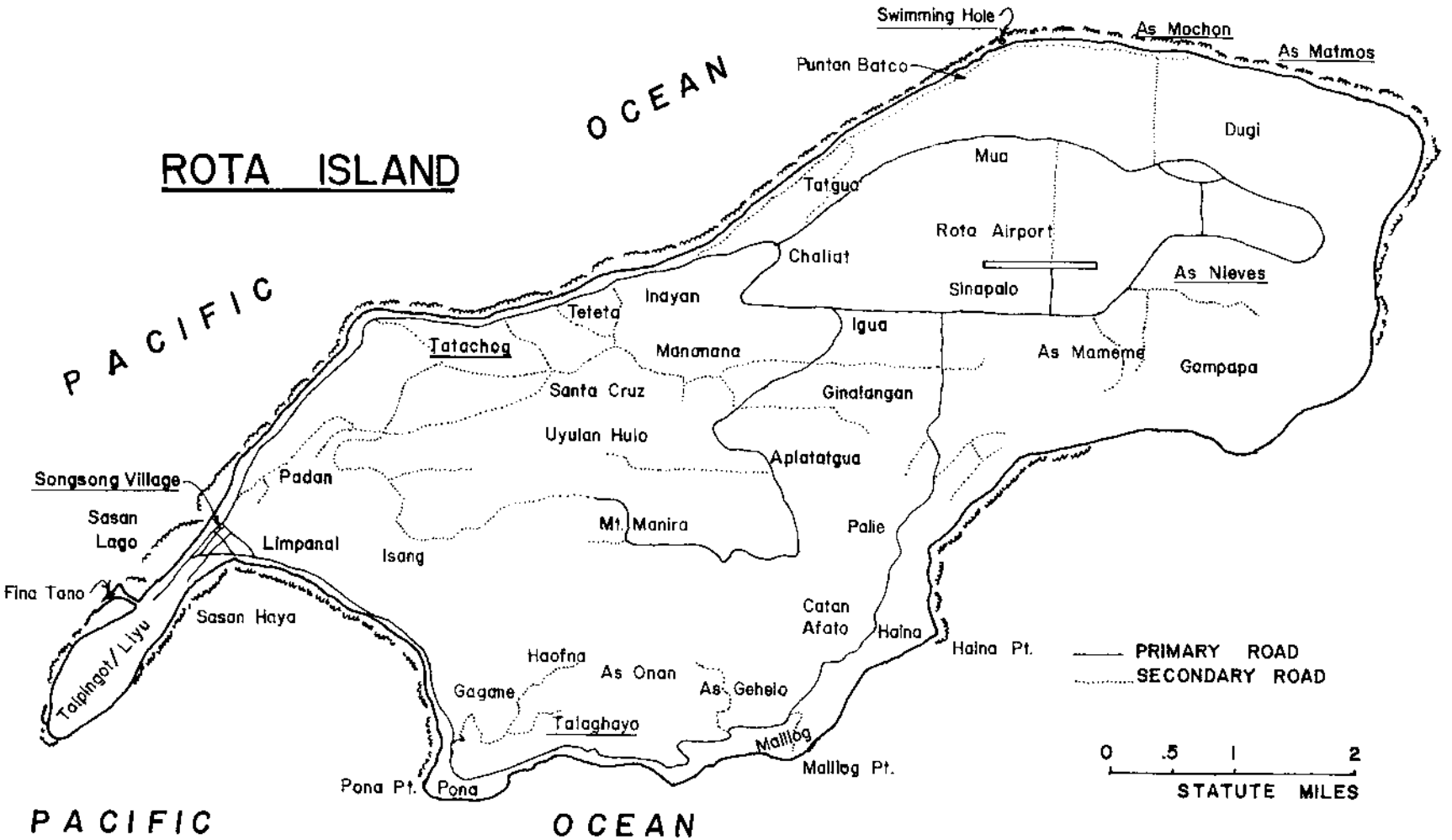


Illustration 1. Map of Rota

The island can best be described as a series of terraces rising to approximately 1,610 feet on the southern Sabana. Mt. Manira, the highest peak, is about 1,625 feet in elevation (Dela Cruz and Kapileo, 1972:12). The village of Songsong is located on the coastal lowland which is actually an isthmus linking Taipingot, a small 469-foot high terraced island, to the main island.

Fresh water percolation through limestone terraces on Rota provides ideal conditions for the formation of numerous caves. One of the largest caves is located near the village of Songsong and has served as a shelter for village residents during typhoons. According to Rotanese informants, the cave was also used during the Japanese period as a bomb shelter.

The coastline of Rota consists of narrow reefs, coral flats, beach strands and cliffs of uplifted coral. No natural deep water harbors exist along the coastline, although work is currently in process to complete a harbor which will allow small cargo ships to unload at dock-side.

The island terrain supports a varied plant community, described in detail by Fosberg (1960:49-51). Plants and animals are ecologically diversified. Rota is characterized by its pleasant tropical climate throughout the year. The rainy season is a time of shifting winds and typhoons. In the dry season, northeast trade winds blow continously. A mean maximum temperature of approximately 88° F and a mean minimum temperature of about 78°F have been reported (Dela Cruz and Kapileo, 1972:1).

Rota's rainfall averages from 85 to 90 inches per year, equivalent to four million gallons per square mile per day (Mink 1969:64). Heavy rainfall is experienced between July and September with frequent squalls occurring from July to October, the wet season. The dry season begins in December and continues until June. Relative humidity is high, averaging 78% to 84%.

Rota, like the nearby islands of Saipan and Tinian, has practically no surface water. Perennial stream systems are absent; there is very little surface water run-off. Rainfall quickly infiltrates the island's limestone surface to become ground water. The volcanic subsurface acts as a barrier to the vertical drainage of water from the limestone. This situation causes the formation of a very large subsurface water recharge. It is this ground water which serves as the major recoverable fresh water resource for Rota.

Springs or natural water caves occur where the limestone makes contact with the volcanic base. Along the western sector of the escarpment, between Haofna and As Onan in tht Talaghaya area, several caves are situated about 700 feet above sea level. The island's major

source of fresh water is supplied by these caves. Fresh water from the cave known as Matanhanum is gravity-fed through a pipeline system, designed and installed during Japanese times, to Songsong village, about six miles away. A Japanese six-cylinder engine was used to pump water from a concrete holding tank next to the large water cave through the pipes (Dela Cruz and Kapileo, 1972:3). This system is still operational in the present, and supplies all the freshwater needed in Songsong village. During the Japanese occupation, water from a small spring along the eastern sector of the escarpment was used to supply water to the airport region (Mink, 1969:65). This water supply system is apparently no longer in use.

The only available data regarding fresh water production capability on Rota is that the larger western cave is capable of producing at least 700,000 gallons of fresh water per day, more than enough to support the needs of the present population, allowing for extra consumption (Dela Cruz and Kapileo, 1972:5).

Fresh water on Rota also occurs in the form of seeps along the northern beach areas. Rota's Swimming Hole is an example of this type of seep, where fresh water mixes with the salt water just below the waterline. Observations made by several individuals during the different seasons of the year over a 30 year period seems to indicate that the combined flow or discharge from springs and other seepages does not correspond to the probable recharge (Mink, 1970:65).

It has been suggested that to efficiently utilize the overflow of the western springs, large storage facilities would have to be constructed on Rota. Wells could be used to take advantage of the natural underground storage system, if aquifers exist. However, the possibility of development of Rota's water resources beyond the springs of the Sabana escarpment is dependent upon knowledge gained from exploratory techniques and programs. Such development, if successful, could assist in the establishment of widespread irrigation possibilities on Rota.

The indigenous people of the Mariana Islands are called Chamorros. In physical appearance and culturally, the Rotanese resemble the Chamorros of Guam and Saipan. Presently, there are approximately 1,500 people of Rotanese ethnicity living on the island. A single extended family on Rota is of Carolinian origin. A few expatriate Japanese, Koreans, Carolinians and Americans constitute a small percentage of the population. While the field project was taking place, one young temporary Rota resident was of Samoan ethnicity.

Rotanese are regarded as speaking the Chamorro language with a singsong quality or musical lilt and cadence. Chamorro people of Guam say that the Rotanese speak a more pristine form of the Chamorro language than do the Guamanians.

Life on Rota is primarily oriented toward the rural rather than the urban. Some Rotanese are employed by the government, some are farmers and fishermen, and others own or manage small businesses. An average family has about eight members. From our work with informants, we suggest that the Rotanese are family oriented and appear to have a cultural preference for large families. According to our informants, however, in the present time a family with ten or more children is quite rare on the island. Such a large family is viewed as an economic burden.

The majority of the population is located in the main village of Songsong. Churches, schools, government offices and commerical establishments are situated here or nearby. A few people live in outlying areas or in the new village of Teneto which was subdivided for homesteads in 1975. As the population pressures increase, areas in other parts of the island will be further developed for residential purposes. The most recent area being set aside for future village habitation is at Sinapalo, near the airport (Hawaii Architects & Engineers; 1973:18-19).

Almost every household in Songsong village has piped water outside, if not inside the home. Currently there is no water tax on Rota: an abundance of fresh water is equally available to all residents. People who leave their outdoor water faucets turned on and running are not charged a fee. Some of the people of Rota prefer rain water to piped water, and continue to use water catchments to meet their requirements. A number of homes in the village of Songsong at present have outdoor pit toilets. The majority of the homes also have outdoor kitchen or cooking areas, featuring a cement sink raised up off the ground, connected to a piped water outlet. The sinks are used for numerous purposes, including laundry. Photograph No. 9 shows a typical sink.

Regarding contemporary land use on Rota, a large percentage of the lands lie idle with the exception of areas used in village and agricultural homesteading, administrative or governmental uses, and those areas being used in milpa agricultural programs. Arable lands are abundant; some, under lease arrangements, are being used as grazing lands. Irrigation water is plentiful and is now dependable owing to the recent installation of the irrigation system which is near completion. This system supplies water to the areas around Sinapalo.

Almost every family maintains a lancho 'ranch' where enough produce is raised to provide the family with vegetables and fruits. Rain catchments are frequently utilized for watering the stock on the ranches. However, during the dry season, people were observed hauling water to their ranches in 50 gallon drums loaded onto the back of pickup trucks.

Photo 9. Outdoor kitchen with cement sink.

Photo 10. Peace Memorial.

In terms of Rota's attractions, long stretches of segmented coral sand beaches are found along the western coastal areas of the island, extending from Songsong village to As Matmos. Several other similar beaches are found on the island's southeastern side. Historic and scenic sites are numerous and are potentially valuable as tourist attractions when restored, renovated and properly preserved. As Nieves quarry, where huge latte stones were hewn out but never removed from the ground, is particularly impressive, along with the latte stones on the Mendiola family land. In more recent times, a beautiful Peace Memorial was constructed at the top of the Sabana (Photo No. 10).

ARCHAEOLOGY AND WATER RESOURCES ON ROTA

A cultural reconnaissance survey was undertaken on Rota between April 19 and 23, 1979. The purpose of the survey was to relate the extent latte sites to water sources, thereby developing data regarding any relationships between prehistoric freshwater distribution and Latte Period settlement patterns. Field work was limited to on-site observations. No excavations were attempted and no surface collections were made in this phase of the research effort. The survey was selective, concentrating on three areas owing to time constraints. The primary foci of the field investigations were the Mochon Latte complex, As Nieves Quarry area, and the water cave, Matanhanum.

The latte of Rota have not gone unnoticed by observers. Spoehr (1957) reflected that..."Rota abounds in coastal latte sites, with the greatest concentration along the north coast, particularly in the Muchon (sic)[1] point area". Twenty years later, Takayama and Egami (1971) affirmed that..."there are literally dozens of latte in the Muchon area". Earlier Yawata (1944) gave the designation of Muchon No. 1 (M-1) to one of the largest sets, a designation followed by Takayama in his report on its excavation.

Takayama suggests that the considerable number of extant, largely intact latte sets invite further study toward understanding settlement patterns. The extensive destruction of latte carried out in the course of commerical and residential development on Guam has not taken place on Rota. The Physical Development Master Plan for the Commonwealth of the Northern Marianas Islands (1978) emphasized the conservation of latte sites as part of public education and recreation. Recently, the Northern Marianas Commonwealth Historic Preservation Office has undertaken a program to assure the appropriate management of these cultural resources.

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[1] As no standard Chamorro orthography exists to date, the words Muchon and Mochon are used interchangeably, according to the preference of each individual author.

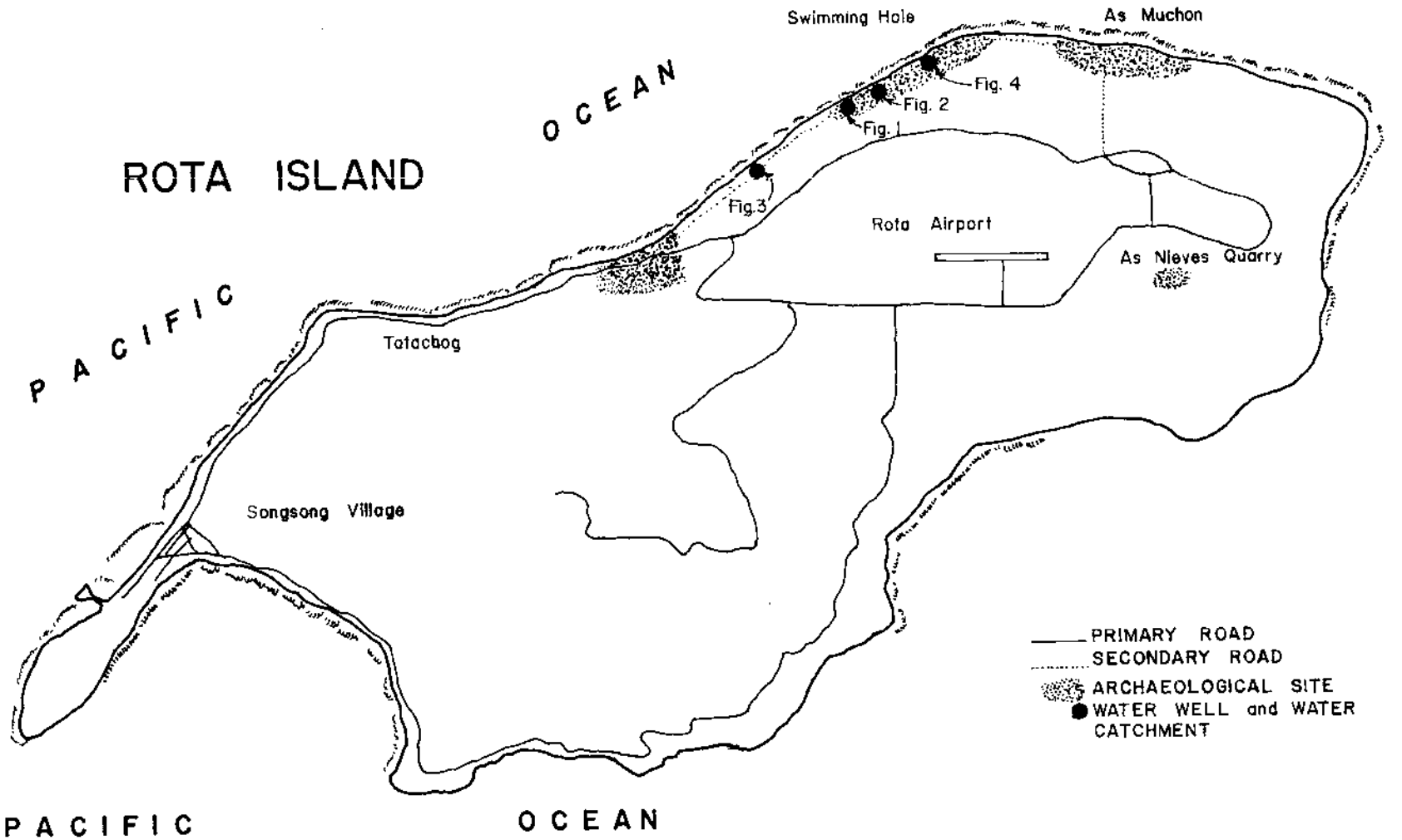


Illustration 2. Map of Rota showing roads, archaeological sites and water wells and catchments.

A count of latte sets on the coastal area between Guata and Muchon Point on Rota yielded an impressive total of sets. The Muchon complex of megalithic house supports is associated with a fresh water well which is still operable. More importantly, numerous freshets occur at the junction of the fresh water table and the beach strand: habitation sites along the coast must have thus been sufficiently supplied with fresh water. Rainfall available to the island supports an abundance of fresh vegetation. It is not unreasonable to speculate that these two sources were sufficient to supply water for the abundant population that the presence of the latte structures indicate.

Based on the work of Spoehr, Reinman, Osborne, Reed, Thompson and others, the prehistory of the Marianas is considered to be a sequence of two culture periods:

1) the pre-latte phase from 2000 (?) B.C. to 500-800 A.D. and the

2) Latte phase from 800 A.D. to the 17th century.

This division into broad periods is based on the megalithic features, the latte. They are composed of uprights or pillars set into the ground and topped with separate hemispherical capstones. These usually appear as opposite pairs in two parallel rows. Sets containing varying numbers of pairs ranging from three to eight have been observed in the Marianas. Sets also range in height from less than three feet to sixteen feet tall. Cultural material associated with these features, such as mortars which are used for food processing, and stone and shell tools, as well as pottery, suggest they may have served as house supports. The means by which early Chamorros quarried latte stones and the way in which the latte were transported to their current locations are still being studied.

Pre-latte material recently excavated from Ypao Beach Park located on Guam's mid-northwest coast indicate a more advanced technology than previously recognized for this period. Pre-latte material has not been well represented in other excavations. The beads and other decorative objects seem to be carefully crafted, ranging in size from minute specimens measuring 2.66 milimeters in diameter to possible ear pendants and bracelets of assorted sizes as large as 3 inches or more in diameter (Guam Insular Arts Council 1978).

The pottery of the pre-latte phase seems to be characterized by small, thin-walled vessels. Two major types of pottery occurring in pre-latte material have been identified:

1) Marianas Redware, characterized by Spoehr to be a thin walled undecorated type with a curved rim and,

Photo 11. As Nieves Quarry.

2) Lime filled, impressed trade ware, characterized by Spoehr to be simple in design, delicate in execution and precisely decorated with geometric designs.

The decorative elements include circles, semi-circles, chevrons, diagonal lines, parellel lines, and diamond shaped forms. These were first incised into clay, which was then apparently fired and rubbed with lime. So far, the earliest carbon dates on pre-latte material are 1527 B.C. by Spoehr from material on Saipan, and 1320 B.C. by Reinman on material from Nomna Bay, Guam. The pottery associated with the latte phase is characterized by Spoehr as Marianas Plain. These sherds show no indication of slipping but some have been found to be decorated by combing, cordmarking, or mat impressing. Slingstones are also associated with the latte period. Other artifacts such as fish hooks, net sinkers, and stone and shell tools are found in both periods.

The As Nieves Latte Stone Quarry site, nominated to the National Register of Historic Places in 1974, is located on the eastern plateau of Rota, near the present airport. Although the area was no doubt known to the residents of the island previously, As Nieves was not given formal acknowledgement until the 1920's when it was documented by Hornbostel. He spent six weeks in 1925 collecting place names and conducting archaeological investigations on Rota under the auspices of the Bernice P. Bishop Museum of Honolulu, where the collection was subsequently stored. Laura Thompson, who had access to Hornbostel's collection and field notes, compiled some of his material in her study, Archaeology of the Marianas Islands (1932). Other archaeological research included work done by Japanese archaeologists:

1) Yawata investigated the rice fields in the Talakaya area in the 1930's, suggesting they had been used since ancient times. This conclusion was based on his observations of the terraces and the type of rice (1963: 91-92). He also visited the Muchon site in the early 1940's, noting the numerous latte sets situated there.

2) Takayama and Egami (1971) excavated twelve (12) separate two meter square test pits in Muchon in 1970-1971, producing the most extensive archaeological data for Rota thus far collected. Three potsherds were recovered which had imprints of rice husks on the surface. A carbon date from charcoal associated with these sherds yielded a date of A.D. 1335 $\pm$ 100. Evidence of the early practice of rice cultivation in the Marianas prior to European contact was thereby supported. The site also produced 11 metal artifacts. One fragment seemed to be of particular interest because of the possible adze-like shape and the proposed age of the metal. It was located 60 cm. from the surface. Material associated with the fragment yielded a carbon date

of 615 ± B.P., suggesting pre-European knowledge of metal in these islands. Other cultural material recovered during excavation consisted of pottery, stone and shell tools, beads and pendants, fish hooks, spear points and awls. Burials were also encountered.

Takayama and Egami concluded, based on carbon dates, that the Muchon Site was occupied until 1780 ± 80, well into the Spanish Period of administration of the Islands. Spoehr made a brief archaeological survey in 1950 as part of his research in the Marianas. He surveyed the northern coast to Muchon Point and the southern coast to Mariiru Point, locating concentrations of latte sites along the northern coast. He identified the Muchon Latte site as possibly containing the most latte sets of any site in the Marianas.

Field Research

In this particular field effort, the reconnaissance was conducted in four phases:

1) A survey of Muchon complex east of Mr. Mendiola's house to Muchon Point.

2) A survey of Muchon complex west of Mr. Mendiola's house to the intersection of the main road and the Muchon Dirt Road.

3) A survey of the water cave.

4) A survey of the As Nieves Quarry.

The first step of the survey was to record any water sources in the Muchon complex. The main well encountered was located approximately 20 meters west of the Mendiolas' residence. After the well was measured and plotted, the survey party proceeded east to determine how many latte sets were associated with the water source.

Twenty-seven sets were counted east of the Mendiolas' residence. Numerous sherds, stone and shell were apparent on the surface associated with the sets. Surveying of the eastern section consumed the entire day.

On the second day the western section of the Muchon complex was surveyed. The group was divided into two teams to cover the section west of Mr. Mendiola's house. Team #1 started from the intersection of the main road and the Muchon dirt road working east. Team #2 proceeded from Mr. Mendiola's house. West of Aguson Beach Park,

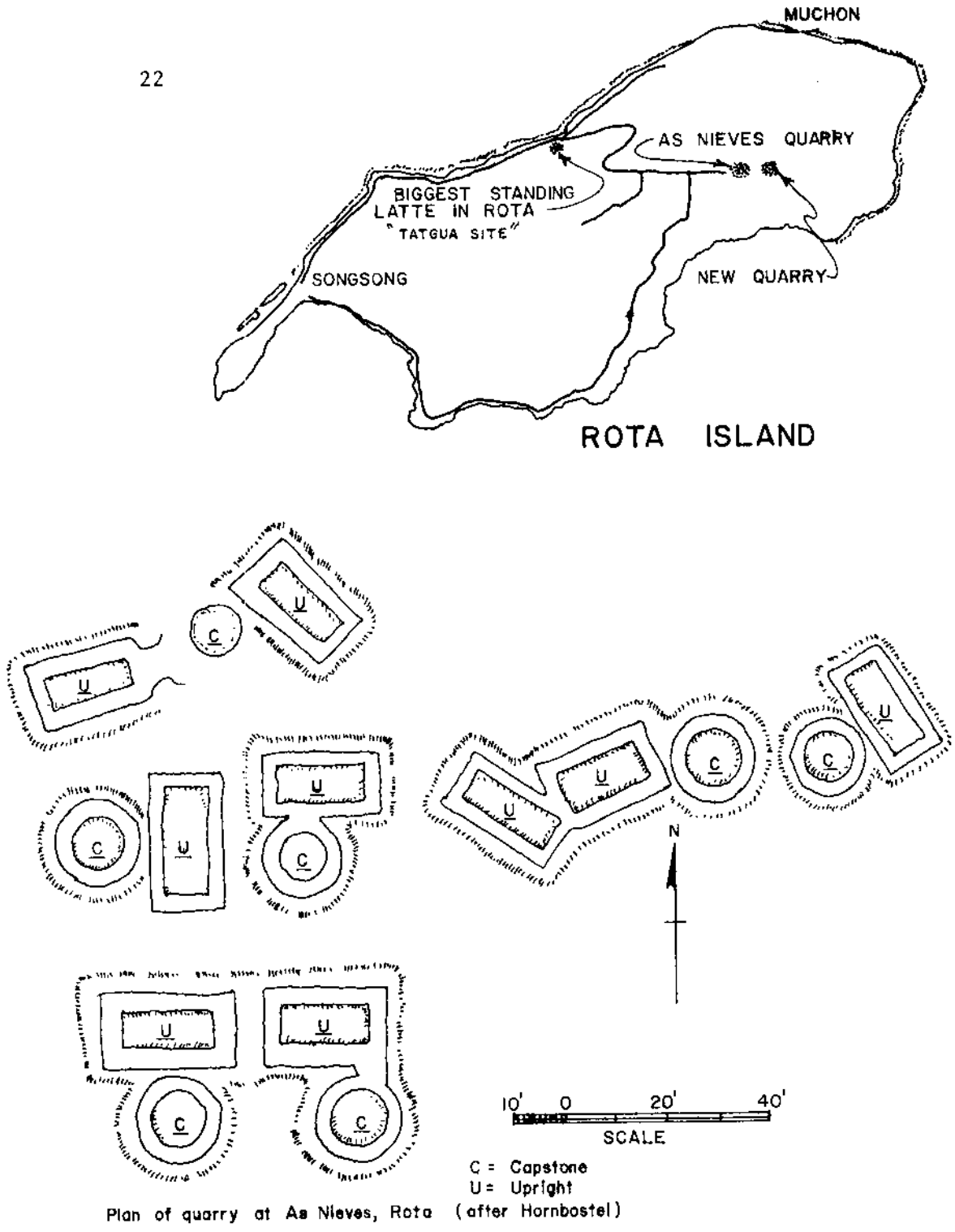
familiarly known as the Swimming Hole, Team #1 found a well associated with a five cave set used for the Japanese coastal trench system. Team #2 found a well and 13 latte sets. Numerous sherds and stone and shell tools were observed on the surface. A total of 56 latte sets were recorded during the survey.

The survey of the water cave, Matanhanum, was conducted by all members of the team. We noted a Japanese water pump, a 6-cylinder engine used by the Japanese to pump water from the concrete water tank connected to the reservior at the mouth of the water cave. Only two major springs that originate from these caves are presently being used for water.

On the final day of the survey, the archaeology team visited the As Nieves Quarry Site, exploring the surrounding wooded area on foot. After a thorough search of the land contiguous to the cleared Quarry site, no water sources were encountered in close proximity ot it. However, a densely thicketed area east of the quarry in what was formerly understood to be the complete quarry provided additional features. This area was apparently quarried previously as it revealed a surface containing many mounds and depressions. These were hypothesized to be related to the removal of stone to provide latte features.

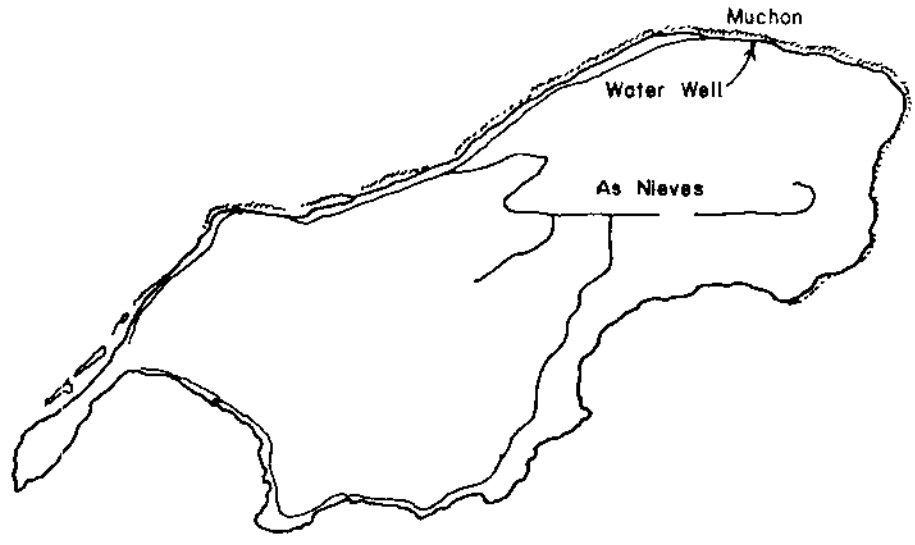
In summary, a small-scale reconnaissance of the north shore of Rota from Guata to Muchon point yielded the figure of 56 latte sets recognized to be in recordable condition. The still operable well in the Mendiola's residence property may have served to provide for the households in the immediate area during prehistoric times as it has done in recent history. The preponderant proportion of the latte are situated at such a distance from this source that hauling water would have been arduous as well as inconvenient. Rota's abundant rainfall would have provided sufficiently for supporting gardens and for daily needs. Rainfall would have been collected by traditional methods such as tree catchments with ceramic containers (tinajan hanum), coconut tree catchments (Tok-no), man-made well catchments (topo) and bamboo vessels (bongbung). Traditional Chamorro methods of rainwater collection are discussed in Stephenson, (1979).

We concluded that, if fresh water is sought in close proximity to ancient household sites, it will be most commonly found in the form of one of the numerous freshets that trickle out close to the reef. As at the edge of the northern aquifer of Guam, freshwater emerges at the juncture of the water lens and the level of the ocean. The intrinsic techno-potential of this process is made apparent by digging around rocks close to the sea shore. There, freshwater, albeit with a slightly saline flavor, is provided. It can be reasonably assumed that such sources of fresh water as described above were exploited by the population of Rota, thus supporting a prehistoric population of some 8,000 persons (Thompson, 1932).



Plan of quarry at As Nieves, Rota (after Hornbostel)

Illustration 3. Map of As Nieves Quarry.



MAP OF ROTA

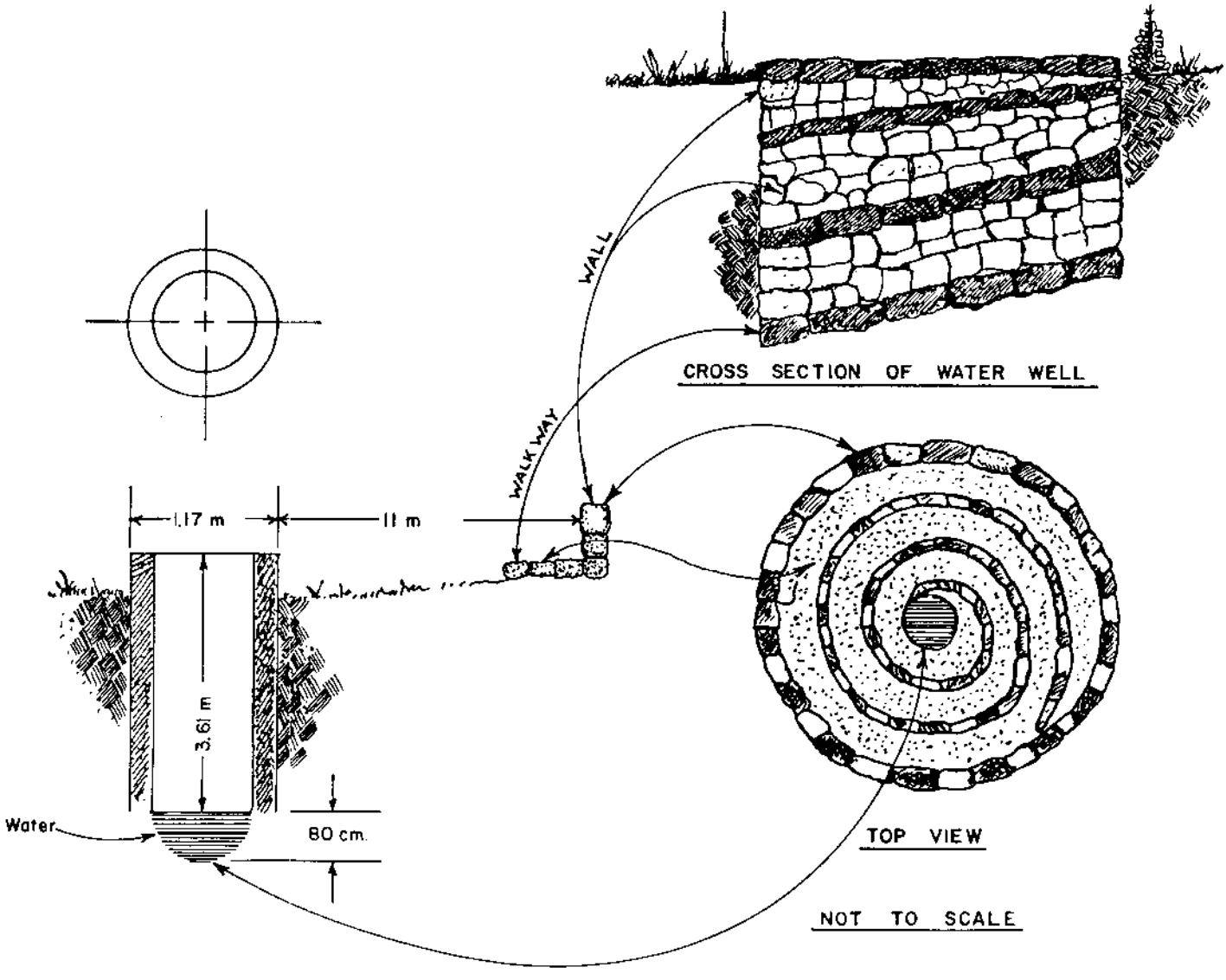


Illustration 4. Water well at Muchon.

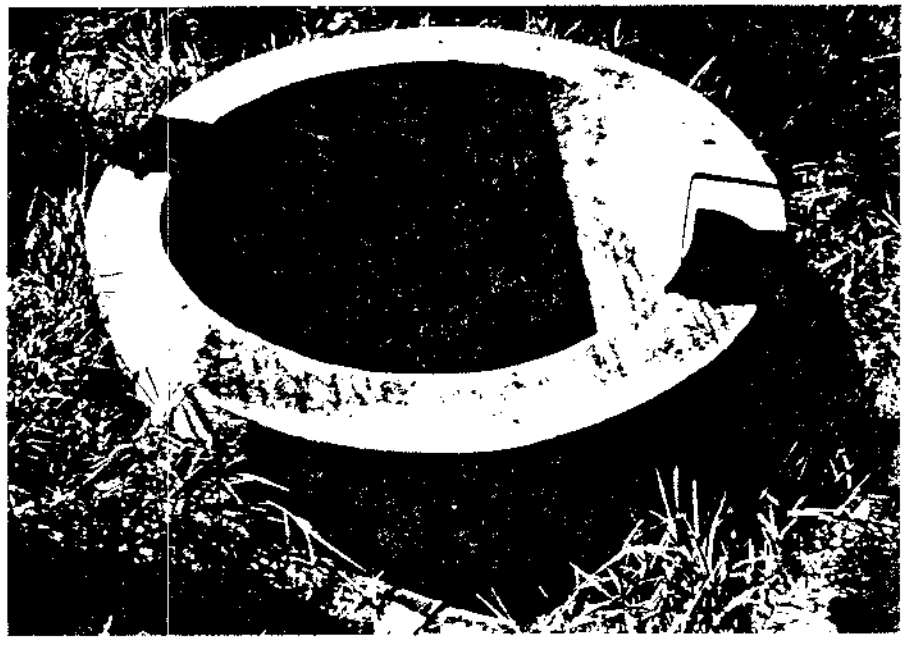


Photo 12. Water well.

Photo 13. Basaltic mortar

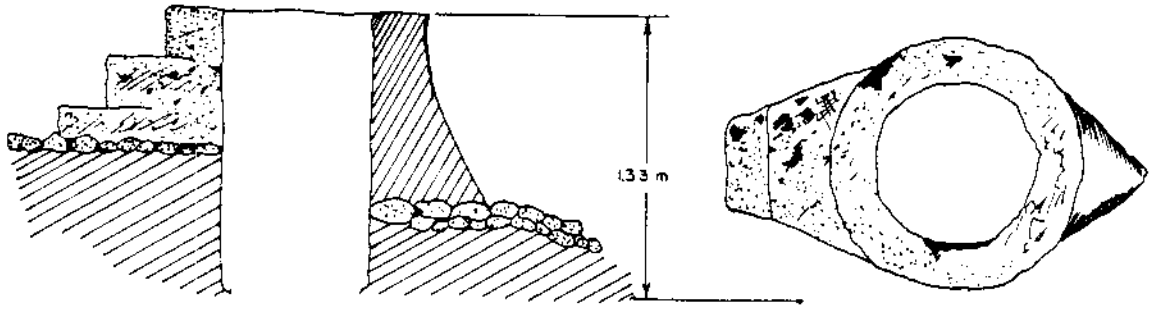


Illustration 5. Freshwater well near the beach.

Photo 14. Freshwater well near the beach.

ETHNOHISTORY

The Ethnohistory section of the Rota Water Project report consists of a concentrated literature review of various historical documents pertaining to the traditional lifestyle of the Chamorros prior to European contact. It also includes a look at the Spanish, German and Japanese periods of administration of the Mariana Islands. Finally, documents concerning the contemporary period extending from World War II to the present are reviewed. The ethnohistory section focuses upon the development of freshwater resources on the island of Rota.

Precontact Rota

The greatest amount of information regarding the traditional lifestyle of the Chamorros prior to European Contact is gleaned from accounts of European missionaries and explorers of the sixteenth and seventeenth centuries. Several researchers have attempted to reconstruct Chamorro history and culture based upon these early records; e.g., Thompson 1945, 1947; Spoehr 1957; Garcia 1683; et al. Alkire makes a summary statement in the opening pages of An Introduction to the Peoples and Cultures of Micronesia (1977):

> The villages of the Marianas ranged in size from 50 to 600 individuals and were found scattered along the coasts of the major islands. Only on the three largest islands--Guam, Tinian, and Saipan--did population density result in the establishment of permanent interior settlements. The Chamorro subsistence economy was based on agriculture, fishing, and a small amount of supplementary hunting (birds, bats, and crabs) and gathering of wild vegetable products.
>
> The agricultural technology was simple and depended on digging sticks and stone-bladed spades. Most agricultural work, from clearing of land and planting through harvesting, was done by men. Women, on the other hand, fished the fringing reefs that surrounded most islands, using small hand nets; occasionally they "stored" part of their catch in fish ponds built of stones along the shore. Women prepared the food for day-to-day consumption by boiling in locally manufactured earthenware pots.
>
> Chamorro households were probably made up on an extended family based on a descent line or lineage that was part of a large matrilineal clan. Within the clan, seniority of descent was emphasized and measured through eldest daughters in the matri-lines.

> There were three distinct classes---nobles (matua), an elite of high-ranking commoners (atchaot), and low-ranking commoners (mangatchang). The precise definitions of these classes are not clear, but it is quite likely that rank and class were determined by clan affiliation and land ownership---the nobles and elite were landholders, and the commoners lived and worked on land controlled by one of the other classes.
>
> The major islands of the Marianas were traditionally divided into a number of relatively autonomous districts each under the control of the highest-ranking chief (maga or maga-lahe) in the district (who was most likely the highest-ranking man of the senior class of the district). Rank seems clearly related to landholding...

The research team was interested in trying to obtain information regarding the possible correlation between traditional settlement pattern distribution and fresh water resources. Accordingly, data describing the size and distribution of Rota's population at contact was given special attention. The names of several villages appeared in the literature for that period. Father Peter Coomens, who was stationed on Rota, wrote in 1683 that a church had been built on the northern end of the island in a village called Agusan. Coomens indicated that . . . "natives dwelling in difficult and trackless places were summoned to assist in building the church" (Repetti, 1940:319-320). The villages of Muchon and Fuuna were also mentioned in the literature (Garcia 1937:57-58, 78). None of these places are contemporary village sites. Current maps of Rota show these places as being located along the northern and northeastern coastal beach areas of the island.

It was determined that traditional villages on Rota were not always found close to fresh water springs or streams. Although there are springs and streams in the southern part of Rota, there is no mention in the available literature of villages associated with these water sources. However, the literature does indicate that the area was utilized for rice cultivation prior to contact.

The discovery of potsherds containing imprints of rice husks indicate that rice was cultivated on Rota as early as 1335 A.D. (Shutler, 1975:92). Yawata, who has conducted some archaeological work in the southern portion of the island known to have produced rice in the 1800's, has noted that:

> The terraced rice fields at Taragaja were irrigated by river water. This system exists among the Bontok, Ifugao, Kankani, Navaloj, and Tinguian mountain tribes of northern Luzon, and

> therefore it is plausible to consider the Chamorros as having been connected with the mountain tribes of Luzon (1963:91-92).

Fresh water seeps occur along the northern beaches even today and they may have provided fresh water to villages located in that area in traditional times. It seems apparent that other factors, either ecological or social, were more important in determining where villages would be situated than the availability of fresh water from springs and streams.

Information in regard to pre-contact population size is limited. Various sources suggest that as many as 8,000 people may have lived on Rota prior to contact (Thompson, 1932; Underwood, 1973:15). Apparently these people were living in the several villages mentioned in the literature. It seems that there must have been many more villages not mentioned in the literature to accommodate such a sizeable population. Perhaps Underwood assessed the situation more correctly, in taking the position that:

> Estimates of native population size during this period could only have been based on unfounded speculation, prior to the arrival of the Sanvitores mission in 1668, while by this later date, the results of over a century and a half of contact experience may have influenced the size and distribution of the native population, as well as its composition (1973:14).

The first recorded census on Rota occurred in 1710. Perhaps archaeological evidence will suggest more correct figures regarding Rota's population size and distribution prior to contact. Whatever the correct population figures and distribution are, it can be assumed that the people of Rota had developed adaptation techniques to provide sufficient fresh water resources to meet their consumption and utilization requirements.

SPANISH PERIOD

The Spanish administration of the Marianas began with Magellan's discovery of these islands during his voyage around the world in 1521. Although actual Spanish administration occurred much later, Magellan's first contact paved the way for the formal administration which was to follow. Magellan first anchored in the Bay of Umatac, Guam, to obtain water and provisions for his three remaining ships. Records kept during that voyage provided the first data about Chamorro people and their culture to the outside world.

Although Rota was not directly affected by Magellan's visit, the events set in motion by his "discovery" soon affected Rota, as well. One of Magellan's ships, La Trinidad, attempted to sail a return passage from the Molluccas to New Spain in 1522 instead of completing the voyage around the world. The ship encountered difficulties. One of the sailors, Gonzalo de Vigo, and several of his shipmates deserted when the ship reached the northern islands of the Marianas' chain (Burney, 1967: Vol. 1:115-117). Some of the deserters were killed by the local islanders, but apparently de Vigo was able to find safety on Rota. The course of his adventure was recorded in an account of Loyosa's 1526 voyage (Safford, 1901:5). According to Safford, the ship was anchored at Guam to replenish provisions and water when ... "to the great surprise of the Spaniards, there came to them from an island named Borta (Rota) one of their own countrymen who had sailed with Magellan".

Perhaps one of the first European ships to actually land on Rota was the Spanish ship, the Santa Margarita, which is reported to have gone aground on Rota in 1600. Twenty-one survivors were picked up by the ship, Jesus Maria, two years later when it approached the island (Burney, 1967, Vol. 2:235, Correy 1968, 22:23). It is reported that the Rota Chamorros confiscated the cargo of the Santa Margarita and divided it among themselves. This bounty may be the origin of the metal artifacts discovered and reported by the Japanese archaeologist, Jun Takayama (1971:25).

Other than the scant information contained in these accounts, specific mention of Rota in the 16th century chronicles was rare. Based on the existing material, it is impossible to determine what cultural changes regarding fresh water use customs may have occurred as a result of these early contacts between Rota Chamorros and Europeans. Unfortunately, if these marooned sailors wrote of their stay in Rota, the documents have not been recognized or translated.

It was not until 1565 that Legaspi actually claimed the Mariana Islands for Spain, but even then the Spanish did not actively seek to colonize Rota. The original Chamorro name of Rota was Luta. The Spanish called Rota Zarpana for an interim period (le Gobien, 1949:35). Perhaps because "Rota" (the name of a city in Spain) is close to the Chamorro pronunciation of Luta, Rota is the name by which the island became known. Local residents in contemporary times continue to refer to the island as "Luta".

Actual Spanish influence was not significant on Rota until Father Sanvitores and a group of Jesuits arrived on Guam in 1668. Father Casanova of the Jesuits was assigned to Rota in 1669. Garcia, a Spanish historian, wrote in 1683 that Casanova was well received when

he arrived in Rota and that 300 children were baptized during the first few days (Garcia, 1937:40).

The first Spanish census was not conducted until 1710 which was after the decimation of the local population as a results of the Spanish-Chamorro wars. At that time 3,359 people were reported to be living in the Marianas (Smith, 1972:22).

The apparent disparity between pre-contact population estimates of 8,000 and the several hundred reported in the 1700's can be attributed to several factors:

1) death from diseases brought in by foreigners
2) decimation at the hand of the Spanish militia, and
3) relocation of all Chamorros to Guam.

These three factors can be further elaborated upon. The Chamorros of Guam did not easily give up their traditional customs and beliefs to embrace Catholicism. This resistance caused intermittent struggles known as the Spanish-Chamorro wars which continued for almost 30 years and left countless numbers of natives dead. Resistance spread from Guam to the other islands in the Marianas chain.

In fact, Matapang, the Chamorro of Guam responsible for the Jesuit Missionary Sanvitores' death on Guam in 1672, fled to Rota to escape the Spanish militia (le Gobien, 1949:118). A few years later, during a disturbance in 1675, people of the northern Guam village of Tarrague burned a neighboring village, Ritidian. Those responsible for setting the fires also escaped to Rota, which led Spanish historians de la Corte and Calderon to comment that: "all the criminals from Guam gathered in Rota" (1970:49). Subsequently in 1681, Don Joseph de Quiroga arrived in Rota accompanied by his troops to punish the natives. Historian le Gobien indicated that the "trouble makers" were brought in, and a trial and execution conducted (1949:118). But no mention is made of the numbers of natives, Rotanese or Guamanians, who perished during de Quiroga's ten day stay on Rota.

Battles between the Spanish and the Chamorros of Rota continued for several more years. In 1684 Father Boranga who had been stationed on Rota was killed by the native ("Some Historic Figures", 1690:46). Previously Father Antonio San Basilio of Guam was killed during a visit to Rota.

Historians related that the Spanish-Chamorro peace was reached by 1689 and about this time the Chamorros were resettled in population centers on Guam. The resettlement process included removal of Chamorros from their homelands on Rota, Tinian and Saipan. However, Bowers (1951: 224) indicated that a few families on Rota escaped capture by hiding in

caves. Thus, Rota and Guam are the only islands in the Marianas that have had a history of continuous Chamorro occupancy. According to Anttila (1965:92), Chamorros relocated to Guam during this period slowly began moving back to their abandoned islands in about 1816.

Nearly one hundred years elapsed between the resettlement process and the 1790 census at which time 300 people were reported to be living on Rota. Underwood (1973:29) has compiled the following population figures for the Spanish Period on Rota:

ROTA CENSUS IN SPANISH TIMES
After Underwood

Year	Population
1790	300
1832	438
1855	349
1864	335
1872	326
1896	504

Underwood indicated (1973:117) that probably epidemics such as flu, smallpox, and measles accounted for more native deaths than the Spanish-Chamorro battles.

Olive y Garcia also commented on the size of the population of Rota (1887:49):

> Rota has 487 inhabitants. Of these, seventy-five are Carolinians. This gives hope that the population may exceed 500 this year, a total which has never been reached as far as is known for certain.

And he commented on the residential distribution of the population (1887:49-50):

> All of the inhabitants live in a single village located on the isthmus and bearing the same name as the island. It has eighty-nine houses (some of mamposteria, the others of cana and paja) situated along four streets running parallel to both beaches and along two cross streets. The casa real (pompously called the Palacio) where the alcalde 'mayor' lives is very small and shabby, built of mamposteria and covered with palm fronds. The church, back to back with the casa parroquial, is constructed of the same materials as the case real.

He also described the people of Rota on the same page:

> The character of these people seems to be the same as that of the other Chamorros, although they are reputed to be very unassuming.

On the next page, he comments:

> Other writers discussing the island of Rota conjecture that its inhabitants are more indolent and lazy than those of Guajan (i.e., Guam).

Olive y Garcia makes the following summary statement (1887:50-51):

> In view of the island's characteristics, its rocks producing an abundance of wild edibles (especialy the root called piga -- their principal food -- along with equally abundant fish from the sea) and keeping in mind that great difficulties the Rotanese have making their plantings on those sharp cliffs, it has occurred to us, and we have reported, that "after all, it would be advisable to increase the population in order to enlarge that of the archipelago, but in Rota we believe that even twice the present population of 487 would not find enough food to be well nourished and that, truthfully, an isthmus of sand joining two huge rocks does not hold many attractions, neither does a place where one struggles with great toil to make a living. All of which speaks eloquently for the inhabitants of the island who fulfill so well the divine precept of earning a living by the sweat of one's brow."

Actual reference to fresh water on Rota does not appear in the literature until Arago, draftsman to Captain Freycinet's voyage around the world reported that (1971:277-278):

> The inhabitants (of Rota) drink nothing but the water of a natural well a dozen paces from the sea shore on the north-east and about a league and a half from the city. It is two feet and a half in diameter and four feet and a half deep. I thought it a little brackish, though it was deemed good by my comrades.

He also noted:

> The Rotanians adopt a very ingenious method of collecting rain water. They fix one of the leaves of the cocoa-tree (coconut palm) to the summit of the trunk, so that the stoutest part of the spine is uppermost; another leaf is fastened to the first, a third to the second, and so on, to within a foot or two of

> the ground; all having their leaflets fixed to their stalks. The rain water runs along the leaves as in a channel, and is received into a jar, into which the last leaf enters. An apparatus of this kind is seen on almost every cocoa-tree.

He elaborated on the availability of water on Rota:

> The 25th we made an excursion to a river. The road is very difficult...the water of this torrent appeared to us delicious... It flows along a gully shaded on both sides by majestic trees...

Observations made by the Freycinet expedition during their stay on Rota are further elaborated upon by Captain Sanchez y Zavas (Searles, 1931:216-217):

> Three wells furnish water to the people of the villages; two of them are artificial, and the water detestable: the third, which is natural, affords better, though it is brackish. On the east coast at five miles from the villages, there is a rivulet of very good water... Water (in general) is scarce, bad and difficult to embark.

Sanchez y Zayas also makes the following summary statements on village life on Rota:

> The two villages are more properly two streets which, collectively, are called Rota. They consist of seventy-nine huts of leaves and bamboos, a small hermitage called a church, a house for the padre, and a sort of hovel which they call the Rota house. The priest is the only European, and there were three hundred and thirty-five inhabitants. There is anchorage opposite to either village. The streets are built on the sandy isthmus, which is so low that the sea threatens to break over it in bad weather, when the people take refuge in a cavern near Sosanjaya. This cavern is exceedingly curious, abounding in crystals, and of unknown but great extent.

Although published sources indicate that rice was growing on Rota prior to European contact (Yawata, 1963:91-92), no references to irrigation practices were known in the literature until a translation of Felipe de la Corte's 1875 historical report of the Mariana Islands was located:

> The lack of running water is also reason for certain discomfort in Rota, because there is only one stream on the south side which gushes from the top of the slope.
>
> This water is used to water rice fields cultivated on the slope worked in terraces or steps. Apart from this living water,

> there are only a few wells at the foot of the hills near the isthmus, where the population lives. They drink this water (1970:155).

De la Corte elaborated that the natural well in the south cove was located so near the sea that, a little further, and it would have filled with salt water. It was indicated that although salt water enters the well during storms or disturbance, the water remains fresh or becomes fresh quickly.

Olive y Garcia (1887:49) also described the fresh water resources of Rota:

> There is only one stream which is high up the slope in the southern part of Ugulan. It is used to irrigate some terraced rice fields as well as for drinking water by some of the people. However, most of the population use water from wells. One of these, either natural or artificial, is in a place which at high tide is covered by the sea but which as soon as the tide goes out, is free of any salty taste. We have verified this the three times we have been on the island. This is the well that the natives use most.

It would appear that fresh water from wells as described above and rain catchments were sufficient to meet the requirements of freshwater for Rota's population. A final reference to wells on Rota will be noted here. Mr. Ed Gould[2] recently called our attention to a particular well from Spanish times on Rota. The well was described in notes dated August 7, 1974, written by Msgr. Oscar L. Calvo, who was at that time assigned to the parish on Rota. In the course of compiling some data on the history of Rota, he described the well as follows:

> At the back of the Palasyo near the steps is the legendary well called <u>itipo i manego</u> 'old Chamorro well' with hewn rock steps leading down and the water very sweet, even though very near the seashore.

The ruins of the Palasyo are visable at the present time on Rota. They are located across the street from the Catholic church in Songsong village, near to the beach, and date from the early 1800's. Msgr. Calvo elaborated that, although many elderly people knew the location of the well, they had not seen it. Nor is this well observable in the present day. It must have been filled in and covered with earth at some time in the past. People interviewed on Rota in 1979 for the current project did not mention this particular well in their discussions with us. Perhaps they had forgotten about it.

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[2]Research conducted in 1977 for an Insular Arts Council funded project, "A Preliminary Survey of Historical and Archaeological sites on Rota", Ed Gould and Marvin Montvel-Cohen, principal investigators.

It is not possible to tell at this time what influences the Spanish administration may have had on the development of fresh water resources on the island of Rota during the period 1521-1898. Something of the general administration policies of Spain as a colonizing agent can be reconstructed, however. Spain generally administered her colonies through establishment of population centers associated with missions (Solenberger, 1953-4:132). In fact, the Roman Catholic church exerted much influence regarded the establishment and maintenance of the colonies as well as determining the location of population centers and establishment of missions. The Catholic church was also responsbile for administering the educational programs of the colonies. Mission schools were established on Guam as early as 1674 (Anttila, 1965:92). Many of the improvements accredited to the Spanish period relate directly to the church, as it was the priests who encouraged agricultural activities, built schools, and provided the staffs to run them.

The administrative policies applied to the Mariana Island seem to be typical of the general practices carried out in other colonies. Economic interests in the Marianas centered on Guam which served as a Western Pacific provisioning port of Spanish galleons which sailed annually from Mexico on a round trip voyage to the Philippines. These voyages continued for nearly 150 years.

In order to maintain Guam as a colony, a governor was appointed in 1676. Prior to this period, the missionaries were supported by a military garrison (Carano & Sanchez, 1964:75). The Spanish divided Guam into municipalities in order to govern the island effectively. Each municipality consisted of several villages or hamlets under the direction of a native magistrate called the gobunadorcillo (Carano & Sanchez, 1964: 58). This native official had complete executive powers within his district and was responsible for the collection of taxes and assignment of work on public projects, such as construction of churches, roads or public buildings.

Very little information is available concerning the specific administrative policies put into effect on Rota. Thompson (1947:60) indicated that Rota and Saipan were provided alcaldes, appointed as direct representatives of the governor. These administrators were in charge of municipal affairs for a two year period. Harvey (1920:45) mentioned that a Spanish officer was assigned to Rota. But it is uncertain when this occurred. The setttlement of the people into the village of Songsong was probably a result of Spanish influence: it was a practice to concentrate the population near missions. On Rota, however, it is not clear if this resettlement occurred in the early 1700's or much later. At the time Arago (1819:277-8) visited Rota, the population was living in one village called Songsong located on the southwestern tip of the island. This village is either near or on the same location of Rota's contemporary village of Songsong.

Harvey noted that when the Agustinian order arrived on Guam in 1769 to replace the Jesuits, there were only two parishes in the Marianas, one in Agana, Guam and one on Rota. Priests for both parishes resided on Guam (Harvey, 1920:45). Apparently Father Stengel was in Rota where he had gone to hear confessions and administer the annual communion when the Agustinians arrived; he had to be recalled to Guam (Carano and Sanchez, 1964:103). The mission on Rota was reestablished in 1855 according to Hornbostel (1935:60).

Perhaps the Spanish had less economic interest and therefore less influence on Rota. Since there was not a port of sufficient capacity to provide anchorage for the large sailing vessels of the period, it is likely that less European contact occurred. In fact, Solenberger (1935:132) noted that Chamorros in Rota use a slightly lower percentage of words with a Spanish origin than Chamorros in Agana, which would support the fact that there was less Spanish influence on Rota.

The digging of additional wells on Rota and the use of streams for irrigation purposes may have been introduced by the Spanish. However, as was pointed out earlier, irrigation practices and the terraced rice fields at Taragaja could have been introduced as a result of association with the Philippines. Solenberger (1953-4:101) indicated that no dams or reservoirs were apparent in the Marianas at the end of the Spanish period.

We suggest that, because of the relative isolation of Rota, it is likely that the Chamorros continued traditionally established practices of fresh water acquisition and consumption during the Spanish period, other than for the few possible exceptions already mentioned. We also suggest that rain water catchments and the juice of the coconut were major substitutions for fresh ground water. Apparently the few streams of running fresh water were not considered as important factors in establishing the placement of village sites, as not traditional or historic villages were mentioned in close association with these streams. However, further archaeological research may provide evidence to the contrary.

Perhaps the difference in taste between brackish well water and good 'living' water was not recognized as important because of consumption practices. For example, well water may have been used for washing or cleaning and, by contrast, rain water and coconuts utilized for drinking. However, this conjecture needs to be further substantiated and perhaps will be by our research.

German Rule

The literature review revealed little information regarding the German occupation of Rota. Frequently documents describing the German

administration of the islands dealt with the Micronesian islands as a whole or with individual districts. Generally, data regarding the Marianas made particular reference to Saipan, which served as the administrative center. It is assumed that the majority of the policies and programs described for the Marianas applied to the Rotanese population as well.

Although German traders were engaged in business in parts of Micronesia as early as 1869, it was not until 1898 that actual German rule occurred in the Northern Marianas. At that time, Germany paid the equivalent of four million dollars to the Spanish Government for the purchase of the Caroline and Mariana Islands (Gale, 1979:30). Guam was excluded from this arrangement, as it came under the protection of the United States Government (McKinney, 1947:15). This situation continued until 1915 when, at the onset of World War I, the Japanese assumed domination.

Germany administered the Micronesian colonies from German New Guinea, establishing administrative offices in each of the Island Districts. Headquarters were established in Palau, Yap, Saipan, Truk, Ponape, and Jaluit in the Marshall Islands (Cockrum, 1970:66). Germany administered the island with a relatively small German staff assigned to each of these Island Districts.

The purpose of the German Government in acquiring the islands of Micronesia was to achieve an industrially self contained imperial state (Oliver, 1951:350). The colonies were to provide raw materials, primarily copra, to German industry and in turn furnish a market for German products. Fletcher (1920:74) was of the opinion that. . ."The Germans' trade and labor ideal has been to make as much profit as possible without reference to law or gospel."

Schnee, writing in 1920, stated German administration objectives in terms of economic goals:

> The most important problem of administration in these colonies is the exploitation of land, for most of it is still virgin soil. To accomplish this, the most essential requirements are the subjugation of the natives, inclusion of them in our administrative system, extermination of disease, creation of financial resourses, increase of schools and spread of the German language (in Hughes and Lingenfelter, 1974:129).

Apparently the Germans did not see the Northern Marianas islands as strategic for military purposes: no records of the establisment of military bases could be found. Neither did the Germans initially conquer the islands by violence.

When Germany acquired the Micronesia colonies, she tried to discourage other countries from engaging in trade with the islands. However, the Japanese had already established significant trade routes in the Pacific and were not easily discouraged (Cockrum, 1970:68-69). Trade figures for 1905 support the fact that Germany was unable to prohibit Japanese trade with the Marianas. In that year 89% of the Marianas' exports went to Japan and 85% of the imports came from Japan (Cockrum, 1970:79). Apparently the Germans encountered difficulty realizing their economic goals with respect to the Marianas Islands.

Local administration and judicial affairs in the Marianas were conducted in Saipan through a German Station Director. District Officer George Fritz resided on Saipan for three and one-half years and was reported being on island for events taking place during the years 1900-1903. During his tenure Fritz initiated an experimental farm on Saipan. The crops he attempted to grow included coffee, cacao, oranges and mango trees (McKinney, 1947:87).

Oliver indicated that the German official assigned to Saipan became disgusted because the area lapsed into unimportance and moved to Yap, rarely visiting his area of responsibility (in Cockrum, 1970:70). At what point in time this situation occurred is not clear. However, it seems possible that the District Officer left Saipan after the disastrous typhoons which are recorded to have occurred in 1904 and 1905. As a result of the typhoons, copra exports were severely diminished for several years. As copra was the chief export product, lack of it would drastically reduce the economic importance of the islands. The German official mentioned above may very well have seized this opportunity to relocate.

For the most part, the Germans maintained the Spanish system of local administration. Local mayors and district officers were responsible for carrying out instructions and supervising work assignments for public projects. It was reported that the Germans considered the preference of the community when establishing local appointments, thereby gaining approval and subsequent cooperation of the people. The duties of the local officials included the maintenance of an accurate registry of the residents in their respective communities, villages or districts; the raising of taxes in accordance with orders decreed by the German Administrator; deciding upon the number of local workers to be supplied each day for the public work projects; keeping an accurate record of such workers; and the like.

There are no references to German difficulties in asserting or maintaining control of the Chamorros of the Marianas. The Germans origianlly brought in a police force of twelve Malayans to Saipan, but discovered that they were not needed for maintaining civil control (McKinney, 1947:85). Subsequently, a local police force was established in the context of an educational program.

After receiving training, a few participants who showed special promise commonly left the police force to become plantation overseers and community officials. The literature does not indicate whether or not this program was instituted on Rota. One account described a one-year military training program for the men of Saipan "but not those of Rota" (Costenoble, 1905:56). It is not clear if this reference to military training was the same police training program mentioned above or an entirely different program.

Population figures for Saipan, Tinian and Rota appear in the literature for 1899, shortly after Germany acquired the Northern Mariana Islands (reported by McKinney, 1947:89). These three islands were the only inhabited islands of the Marianas chain at that time, with the exception of Guam. The population distribution was as follows:

1,253	Chamorros
650	Carolinians
23	Japanese
3	Spanish
3	Germans
6	Malays and Tagalogs
Total 1,938	

It should be pointed out that this ethnic breakdown of the population should be somewhat suspect, as intermarriage between Chamorros and Spanish or Filipinos had been occurring for many years. However, the figures reported for German nationals are, no doubt, correct. It is interesting to reflect upon the fact that only three individuals of German descent were responsible for administering a colony of approximately 2,000 individuals scattered over three islands.

Apparently Germany was not actively encouraging her own people to settle in the Marianas. McKinney (1947:87) reported that the only German colonists to settle in the Marianas arrived as a group of three in Saipan in 1904. However, population figures indicated that the European population had increased to 23 by 1906. This group was composed of six government officials, three missionaries, three planters and traders and their family members (McKinney, 1947:90). It is not known how many of these twenty-three persons, if any, lived on Rota.

Although some Micronesian islands such as Yap experienced diminishing birth rates, and the total population of Micronesia decreased during the German administration, the population of the Marianas increased (Cockrum, 1970:73-74). Population figures of 1907 show a total of 2,640 people: 1,704 Chamorros and 936 Carolinians in the Northern Marianas (McKinney, 1947:90). This is an increase of 702 people over the 1899 figure.

One reason for this population increase was a direct result of a new administrative policy initiated by the Germans. They relocated the natives among the islands of the Northern Marianas. Among reasons given for this policy was the belief that the introduction of new blood through intermarriage would result in healthier and stronger islanders (McKinney, 1947:107). As can be seen from the 1899 population figures, 650 Carolinians were living in the Marianas at that time. It should be pointed out that populations were migrating as early as 1815, however and the size of the Carolinian population not entirely the result of the German relocation policy.

McKinney (1947:107) indicates that natives living on islands south of Palau were relocated to Saipan during the German Period. Rota may also have received new residents at this time. Such enforced migrations were later set aside: it seemed that people were having difficulties in adjusting to and being accepted in their new locations.

To be sure, commerce was Germany's primary concern in developing and administering the Pacific colonies. Oliver (1951:350) takes the position that tolerant respect was demonstrated toward native institutions which did not interfere with that goal. Education was one institution that seems to have been neglected, however, by the Germans. Aside from giving nominal support to a public school in Saipan, other schools in the Northern Marianas were simply left in charge of the Catholic priests (Anttila, 1965:82). Children were required to attend school from the age of seven through the age of 13. The German school in Saipan included a secondary level of instruction, and the courses taught included mathematics and drafting. Notebooks of a student at that school during the same time period, one Joachim Kwiditchay, are in the collection of the Linden Museum, Stuttgart, Germany (Marvin Montvel-Cohen, personal communication).

Fritz (1904:26) reported visiting the Catholic School in Rota which had 49 pupils. These students met for three hours per day to study the history of Christianity (Report to the League of Nations 1924). Juan Taitano (as reported in Horbostel, 1935:130) served as the school master of the island of Rota during the German period and could speak the German language.

According to Anttila (1956:136), the German Capuchins replaced Spanish priests in the churches of the Marianas. However, Costenoble (1905:36) stated that in 1906 a priest of the Spanish Order of the Agustinian Recollect was assigned to Rota. It may have some time later that the German priest actually arrived on Rota. However, German influence did indeed arrive, as Hornbostel (1935:130) reported seeing a blond, blue-eyed statue of the Virgin Mary during his visit to Rota in 1925. Of this visit he wrote, "All that was left of the German influence on this island was Juan's dog (part dachshund) and a picture of Kaiser Wilhelm, former German Emperor."

Currently, a small chapel built during German times, known as Our Lady of Lourdes, serves as a visual marker of the German period on Rota. It stands on a hillside above the ruins of Tatachog village. Although no written information concerning construction of the chapel has been located, conversations with local people provided the information that the chapel was constructed with a water cistern adjacent to it. Rain water collected in cistern was blessed by the priest. People on Rota told us they used to go to the chapel to pray and they used the water to cure illnesses. The small chapel has recently been restored; it now serves as a shrine and an historical monument.

It has been suggested that the primary concern of the Germans in administering the Pacific colonies was economic in orientation. Accordingly, maintaining a labor force to produce copra was a prime objective. Cockrum (1970:73) takes the position that this was the reason why public health took priority over public education. Substantial public health programs may have been initiated in other parts of Micronesia, but such programs do not seem to have been of great significance in the Northern Marianas. McKinney (1947:112) provided the information that the doctor assigned to Ponape paid annual visits to the Marianas. Medical services also included public or mass vaccinations administered in 1901 and 1905 (McKinney, 1947:90). Many years after Germany acquired the Marianas, a doctor was assigned to Saipan. It is not documented how often that doctor visited Rota. Other researchers, however, take the position that Germany's concern for instituting public health programs along with economic development in the Colonies were simply policies aimed at the improvement of "native life" for the direct benefit of the islanders.

McKinney (1947:84) stated that . . . "The Germans worked assiduously for the improvement of native life." Yet it seems that widespread practices throughout the German colonial empire included the use of forced labor, enforced with widespread indiscriminate floggings of natives (Fletcher, 1920:84). However, in the literature there is no mention made of Germans flogging people in the Northern Marianas. In fact, Anttila (1956:136) reported that the islanders used as laborers were well treated. This observation may have been based on the laws the Germans established for governing the employment of natives. Laws concerning maintenance of health and the restricting of hours of work were formulated, but as McKinney (1947:109) observed, it is not known how effectively these laws were enforced.

In terms of forced labor, Fritz (1904:100) described a system of compulsory labor enforced by the district office in Saipan with the assistance of local officials. Such compulsory labor was utilized for public work projects. Married men were expected to contribute 12 days of work per year and bachelors 20 days per year. Fathers of more than five children were exempted from this practice.