Island Groundwater Resources Research

Federated States of Micronesia

Principal Investigators

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Ulithi Atoll, Yap State

Student opportunity

Atoll Water Resource Study

Ulithi Atoll, January 5-15, 2006

Field team departing Yap Island, January 6, 2006 via Pacific Missionary Aviation

WERI Graduate student Paulina Welch and PMA pilot consult to calibrate navigation devices

Ulithi Atoll over Asor Island

Approach to Falalop Island

[Water resources]
[Fieldwork]
[Social and cultural aspects]

Background

- Ulithi Atoll, located about 100 kilometers northeast of Yap, in the Caroline Islands, is the fourth largest atoll in world. The lagoon covers about 550 square kilometers, and is surrounded by 40 low lying islands, of which four are inhabited: Falalop, Asor, Mogmog, and Fatherai. The current population is about 1000. Ulithi is believed to have been continuously inhabited since perhaps 300 A.D. The first westerner to arrive was the Portuguese navigator, Diego da Rocha, in 1526. During World War II, Ulithi Atoll was the US Navy's main forward staging base in the western Pacific Theater. In early 1945, the lagoon held some 617 ships manned by nearly 1.5 million service members deployed to support the Okinawa operation.
- Ulithi is now one of the "outer islands" of Yap State, one of the four states of the Federated States of Micronesia. In November 2003 Typhoon Lupit passed over Ulithi, severely damaging the island's infrastructure, and destroying nearly all of the rooftop rainwater catchments. During such emergencies, residents rely on the very limited groundwater available in the shallow and thin fresh water lenses of atoll islands. The research activities described here are in support of ongoing WERI research to obtain current data on rainwater and groundwater resources, develop better management tools, and recommend appropriate management strategies for development, storage, and use, especially following damaging storms or during heavy droughts.

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Ulithi Island Water Resources

Rainwater catchments are the main source of drinking water on Mogmog and other islands. Household storage is an important component for emergency preparedness.

Hand dug wells allow access to the fresh water lens, only a meter or two below the surface. Water from wells must be boiled or chemically treated before drinking.

Most hand dug wells are lined and well maintained. Ground water is used mainly for washing and bathing, except when rain water and coconuts are unavailable.

Fresh coconuts remain and important hydration source, but can be destroyed in heavy storms and become unfit for drinking during droughts.

In spite of the lack of soil, many islands support dense vegetation, including large trees adapted for extracting water from the shallow lens

Because of the small size and low elevations of the islands, inhabitants live close to the sea and are thus well exposed to wind and storm surge.

A diesel-powered electrical generator on Falalop supplies power for residents, ground water production, and pressurized water delivery system.

An infiltration tunnel well installed along Falalop's runway to extract ground water recharged by runoff from the runway.

Atoll Water Resource Study

Ulithi Field Features

Fossil reef, Fatherai Island, ocean side, probably remnant of the Mid-Holocene highstand. Fatherai is one of the four inhabited islands of Ulithi.

Fossil beach, Yew Island, leeward side. Yew is one of the two uninhabited Turtle Islands about 10 kilometers southeast of Falalop.

Exhumed beach, Fatherai Island, lagoon side. Recent storms and ongoing sea level rise combine to erode beaches and undercut vegetation at many sites around the islands.

Storm debris and undercut vegetation on the lagoon side of Mangyang Island.

Storm deposits, Yew Island, windward side.

Excavated storm deposits on Falalop Island, ocean side.

Sea turtle tracks to nesting ground, Losiep Island, leeward side.

Field team consulting with host, Mogmog resident and Ulithi High School science teacher Peter Manglor, regarding installation of evapotranspiration gage.

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Ulithi Social and Cultural Events

Ulithians and guests gather on Mogmog, January 12, 2006 in commemoration of the 30th anniversary of the funeral of Father Walter, first resident Catholic missionary and a beloved contributor to the community.

Elaborate traditional dances depict oral histories and legends from each island. Each of the participating islands sent a delegation of dancers for the three-day commemoration.

Men's dance, Mogmog. The men's dances typically recount legends about island history and dramatic events.

Women's dance, Mogmog. The women's dances tell stories of emotional experiences such as poignant departures and reunions.

Each generation learns the traditional arts from their elders. The youngest members of the dance line are seated at the end.

Island feast, featuring fresh seafood, pork , chicken, taro, sweet potato, and coconut.

Field team members enjoying famous island hospitality. The table is graced with piles of fresh-caught fish, crab, and lobster.

Field team at dinner at the Ulithi Divers Resort, Falalop, which treats its guests to authentic island cuisine along with some of the comforts of home.

Student Opportunity

Hydrology/Environmental Science

Field team member, Dr. Rubinstein and graduate research assistant Paulina Welch with field guide, Patrick Mangsemal.

The uninhabited Turtle Islands, Yew and Losiep, about 10 kilometers southeast of Falalop.

The University of Guam offers a Master of Science Degree in Environmental Science. Competitive awards for graduate assistantships are available from WERI to support graduate tuition and provide living expenses.

Field team with boat operator, Randy Yurus on final day in Ulithi, January 2006.

Atoll Island Modeling

The Water and Environmental Research Institute of the Western Pacific (WERI) at the University of Guam invites applicants for a graduate research assistantship in hydrogeologic modeling of atoll island aquifers. WERI is ranked in the top 10% of the state and territorial water resources research institutes at the nation's Land Grant Universities. The University of Guam is an accredited US Land Grant University serving Guam, the Commonwealth of the Northern Mariana Islands (CNMI), the Federated States of Micronesia (FSM), and the rest of the Western Pacific Region. The project will provide a basis for a Master of Science thesis in Environmental Science in the University of Guam's Environmental Science Program. Ideal candidates will have a BS degree in geology, geophysics, civil engineering/hydrology, or a related field, coursework in hydrogeology, groundwater modeling, or other numerical methods applications, and be ready to begin fieldwork by midsummer, 2006. Fieldwork will include visits to remote atoll islands in the FSM, most likely Ulithi Atoll and/or Pingelap Atoll, in Yap and Pohnpei States, respectively. A fundamental objective of the project is construction of a groundwater model for atoll islands using the USGS's SUTRA code as part of a team of modelers at WERI working in collaboration with the USGS Pacific Islands Water Science Center in Honolulu, Hawaii. The completed model will provide a tool for assessing the impact of sea level rise, land use, and economic development on atoll islands worldwide. Applications should include a letter of interest, contact information for three professional references, resume, and current transcript (unofficial copy is acceptable), mailed in hard copy by April 30, 2006 to Dr. John Jenson, WERI, University of Guam, Mangilao, Guam 96923. Inquiries and/or advance copies of application materials may be emailed to jjenson@uog.edu. The University of Guam is an Equal Opportunity Employer.