Report for 2005GU60B: Geologic Study, Map Development, and Water Resources Analysis of Fais Island, Yap State, FSM.

Publications

- Dissertations:
    - MacCracken, R.S. 2006. Water Resources Analysis of Fais Island, Yap State, FSM: MS Dissertation. University of Guam. 67 p.

Report Follows

PROJECT SYNOPSIS REPORT

Project Title: Geologic Study, Map Development, and Water Resources Analysis of Fais Island, Yap State, FSM

Problem and Research Objectives

Fais Island is a very small (2.6 km^2) uplifted carbonate island, with about 320 people who rely almost exclusively on coconuts and rainwater catchments for potable water. On average, about once in ten years the coconut crop and rain catchments are destroyed by a typhoon. El Nino-related droughts, which often follow the typhoons in the western Pacific, render rain even the surviving rain catchments ineffective as well, and either eliminate or prevent the recovery of the coconuts. Although the island possesses a couple of dug wells that can be made serviceable in emergencies, neither is convenient to the three villages, and water must be drawn and carried by hand. A previous attempt to installed drilled wells in the mid-1990s was only marginally successful. Residents reported that most of the wells installed drew only brackish water. Moreover, since the island has no electrical power, pumping required maintenance of a portable solar panel power supply for each one. Today, only two wells remain serviceable, from which water must also be carried by hand to the villages.

On small, remote islands such as Fais, successful development of emergency water supply requires making optimal use of all the potential sources of water. Since there is no way to preserve the coconut crop through storms and droughts, emergency needs must be met by ensuring some combination of sufficient rain catchment and storage capacity and groundwater production capacity. Technical recommendations for development and protection of water resources must also be compatible with the island's social traditions, cultural values, and indigenous authority.

The central objective of this study was therefore to make a comprehensive survey of the island's rain catchment system and groundwater resource potential, from which appropriate recommendations could be made to prepare residents for worst-case emergencies, such a prolonged drought following a major storm. The project thus had three components: (1) assessment of the current and needed capacities for rain catchment and storage, (2) identification of the cultural and social practices relevant to water production, storage, and emergency provision, and (3) assessment of the potential for future groundwater development.

Methodology

Fieldwork in August 2004 focused on the first and second objectives. Specific activities included measuring the rainwater catchment and storage capacity of each household and conducting a comprehensive water use survey through personal visits and interviews with over one-third of the island's households. A preliminary survey of wells and water quality was also made. Follow-on work in May and June 2005 focused on the third objective, along with completion of the work begun on the first two. Specific activities during the second field season included mapping the groundwater-related features, specifically, coastal caves, springs and seeps, and the serviceable wells. Specific objectives of the socio-economic portion of the project included describing the

existing patterns of water usage, distribution, and water resource sharing, and quantifying current water production versus estimated demand for different uses of water.

The data gathered on rainwater catchment, storage, and household usage patterns were applied to a model that also accounts for local average monthly rainfall to predict the capability of alternative solutions to meet water requirements for the residents of Fais under normal as well as emergency conditions. Field survey and mapping of the caves, coastal discharge, and wells provided the basis for recommendations for development of existing wells, and identification of geologic factors to consider for successful future well installation.

Principal Findings and Significance

Results from this project include specific recommendations for upgrades of household and communal catchment and storage capacity, secure provision and maintenance of emergency equipment, tools, and supplies to ensure that minimum water needs can be met even under worst-case conditions. Specific recommendations are also made for development of pumping and transmission of water from the two serviceable drilled wells to existing nearby storage facilities, as well as for cadastral survey and testing of existing wells, requisite to installation and design of future wells. The hydrogeologic survey produced maps of caves and coastal discharge features, which provide a basis for determining most likely sites from which good quality might be obtained from future wells.