WATER RESOURCES RESEARCH GRANT PROPOSAL

Project ID: 2004GU30B

Title: Hydrology of the Sabana Watershed and Water Cave, Rota, CNM

Project Type: Research

Focus Categories: Groundwater, Hydrology, Climatological Processes

Keywords: Groundwater, Island Karst, Water Supply

Start Date: 03/01/2004

End Date: 02/28/2005

Federal Funds: $37,475

Non-Federal Matching Funds: $0

Congressional District:

Principal Investigator:
John Jenson

Abstract

Rota, about 40 miles (64 km) north of Guam, supports a population of about 2500. The island obtains nearly all of its potable water from a karst spring estimated to produce from 0.5 to 1.5 mgd (0.02 to 0.06 m3/sec). Although the spring has historically produced more than enough during wet years, it can slow to very low flow during dry years, nearly ceasing entirely during the 1998 El Nino event. Reliable management of the water production over the long term requires a better understanding of the hydrology of the Water Cave and the catchment that feeds it. In a previous study of Rota led by the author of this proposal, several sink points in the Mount Sabana area are suspected to feed the spring. The Sabana area is undergoing active use, including the cultivation of crops in the watershed that feeds the sink points, and hence ultimately the spring. For the island to effectively manage this preeminent water source, it is crucial that engineers and planners have a better understanding of the properties of the Sabana Watershed and the hydrologic connection between the watershed and spring. The proposed study would produce a set of maps of the Sabana Watershed boundaries, geologic contacts, vegetation, and land use. The maps would also include field relationships of the important hydrogeological features, particularly the locations of the sink points and the inferred and observed flow paths to them. This work would be concurrent with parallel work by the US Geological Survey Field Office in the CNMI in collaboration with the Army Corps of Engineers

(Capital Improvement Program) to reinstall a rain gauge in the Sabana Watershed, along with new stage gauging instruments in the spring, both of which were destroyed by the typhoon in July of 2002. The proposed project would use rainfall and spring hydrograph data obtained by the USGS Field Office from Spring of 2001 through July of 2002, along with new data. These data would be used to prepare a water budget for the watershed-spring system and to elucidate the relationship between rainfall, watershed characteristics, storm water runoff and ponding at the sink points, transport time to the spring, and stage response of the spring. They will also provide a basis for predicting the response of the spring to rainfall and to develop a hypothesis for pathways and flow rates in the aquifer. For resource managers and planners on Rota, the results of the proposed work will provide a basis for assessing the risk to water quality posed by human activities in the Sabana Watershed, along with appropriate strategies for aquifer protection and remediation.