Impacts of Land Cover Change on Groundwater Quality in Saipan

Funded by:
US Geological Survey, Water Institute Program

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Saipan is the largest island in the Commonwealth of the Northern Mariana Islands (CNMI), and the second largest island in the Mariana Islands archipelago. It is located about 120 miles north of Guam, the largest and southernmost island in the Mariana Islands. The drinking water for the people of Saipan and increasing population of tourists in Saipan is mainly supplied by ground water resources. Saturated limestones form the principal aquifers on the island. Rainwater infiltrates the high-permeability limestones and maintains a freshwater body within the island. Fresh ground water in Saipan is underlain by saltwater. The fresh ground water can be withdrawn by wells, but freshwater quality and availability can be affected by over pumping or sustained periods of dry weather (Carruth, 2003). The porous nature of limestones in Saipan can result in constant and high potential for groundwater contamination if the environment in Saipan could not be protected well. The contributing factors may include run off caused by rain falls, particularly tropical storms and typhoons, human induced activities, and droughts.

As the quality of drinking water is critical to the health and quality of life of the residents and visitors in Saipan, water quality, particularly groundwater quality, becomes a major concern for the people and visitors there. Impact of historical and recent land use activities on ground and surface water quality and production was identified as one of the highest research needs for Saipan on the CNMI/University of Guam Water and Environmental Research Institute (WERI) Research Advisory Council Meeting of October 9, 2014. This proposed research project will focus on impacts of land cover change and human induced activities on ground water quality in Saipan to address the critical water need in Saipan, CNMI.

The main objectives of this project are listed as follows:

1. Processing of groundwater quality data (historical and recently collected) to geographic information systems (GIS) formats so that they can be utilized for analysis with land cover and land cover change information,
2. Collecting recently acquired satellite images for classification of land cover information, which can be used with the results from the recently completed project focusing on land cover change detection in Saipan (Wen and Chambers, 2014), and
3. Evaluation of impacts of land covers change and human induced activities on groundwater quality.