

## **PACIFIC ISLANDS GROUNDWATER: LEARNING THE GAME**

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In the immensity of the central Pacific Ocean, island groups starting with the Hawaiian Archipelago on the east stretch westward to the Philippines on the rim of Asia. Hawaii has a teeming economy and in political and social behavior resembles its sister states, but the islands on its western horizon are relatively small and many are still emerging from subsistence economies. Others like Guam and Saipan have quickly evolved into modern societies because of their strategic importance.

The succession of islands in the north central Pacific Ocean in which the United States has played a guiding role since World War II starts with the low-lying atolls of the Marshall Islands. Farther west are the East and West Caroline Islands, which include rugged volcanic terrains as well as atolls, then the Mariana Islands of mixed volcanic and limestone composition. These islands were once governed under the U.S. Trust Territory Administration but in the last decade have become or are in the process of becoming sovereign entities associated with the U.S. The Marshall group is now called the Republic of the Marshall Islands; the Caroline Islands have divided into two nations, the Federated States of Micronesia and the Republic of Palau; and the Marianas consist of the Territory of Guam, which has existed since the turn of the century, and the Commonwealth of the Northern Mariana Islands, of which Saipan is the capital.

In many social and cultural aspects the islands have connecting similarities, but environmentally each may differ profoundly from the others. Everywhere, however, the fundamental concern is the availability of freshwater. Depending on local environments, water is obtained from rain catch, diverted from streams or ex

tracted from the ground.

Reliable water sources are vital if the expectations of the emerging island economies are to be met. Before the period of modern intervention in island affairs, freshwater was obtained as rain catch and from shallow-dug pits, streams, and springs. The sources were adequate, but once a water system is constructed to solve a specific problem, the old means of securing a supply suffer by comparison and are soon abandoned where possible. Turning a tap is more convenient than diverting a trickle from a stream. It is also more sanitary.

The most modern water system west of Hawaii serves Guam. It is based on groundwater in limestone aquifers covering the northern half of the island. The Water Resources Research Center at the University of Guam has played an important role in the success of the system. Saipan also has a central distribution network based on groundwater in limestone, but problems of salinity plague the delivered water supply. In Yap and Palau a core system exists, but only for the small urban areas serving the government centers. Small capacity wells, on the order of 10 to 20 gpm, have successfully exploited the low permeability volcanics of these arc islands, but surface water remains an essential component of supply where limestone aquifers are absent.

In the mid-ocean islands both surface and groundwaters serve urban centers, but efforts are being made to convert solely to groundwater wherever possible to eliminate sanitation problems. The Water Resources Research Center at the University of Hawaii and Guam has been engaged in performing research to assist the long-term goals of the island governments.

Water supply unreliability afflicts some islands of the central north Pacific, but sanitation is a worrisome concern in all. The problem of waste disposal is acute in those islands not yet far removed from their subsistence past. For some urban areas small sewage treatment plants have been constructed and sometimes work, while in rural and wild areas human and animal wastes are not treated and rarely collected. Carelessness threatens surface and shallow groundwater supplies.

The University of Hawaii Water Resources Research Center first sent a sanitation survey team to the islands more than 20 years ago. Its most recent effort was in 1988-89 when a census of waste

disposal practices was taken in Truk and Palau to assess contamination potential.

The conjunction of water supply and sanitation practices is inseparable in islands. Carelessness either in water development or disposal of wastes escalates quickly to disaster because the resource base is too small to allow for much error. The largest island in the American sphere of concern west of Hawaii is Guam, embracing 212 square miles. Most atoll islands are less than 1 square mile in area.

The problems of supply and disposal are bound to intensify. It is a new ball game, indeed, in the islands of the north central Pacific, and learning the game is the first order of priority.