DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

CARIBBEAN ISLANDS
REGIONAL AQUIFER SYSTEM ANALYSIS

GEOLOGICAL SURVEY WATER RESOURCES DIVISION
WATER RESOURCES INVESTIGATIONS REPORT 89-4116

POTENTIOMETRIC SURFACE OF THE ALLUVIAL AQUIFER AND HYDROLOGIC CONDITIONS IN THE SANTA ISABEL-JUANA DIAZ AREA, PUERTO RICO, MARCH TO APRIL, 1987

U.S. Geological Survey
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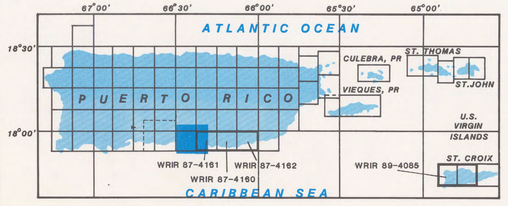

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POTENTIOMETRIC SURFACE OF THE ALLUVIAL AQUIFER AND HYDROLOGIC CONDITIONS IN THE SANTA ISABEL-JUANA DIAZ AREA, PUERTO RICO , MARCH TO APRIL, 1987

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A ground-water-level survey and reconnaissance of the hydrologic conditions in the coastal alluvial plain in the Santa Isabel-Juana Díaz area was conducted during March and April 1987. This synoptic survey was accomplished as part of the Caribbean Islands - Regional Aquifers System Analysis program (Gómez-Gómez, 1987). The aquifer within this area is contained within alluvial and associated clastic deposits which are as much as 3,700 feet thick at the coast.These deposits thin-out along the foothills. Most water supply wells penetrate less than 200 feet. Generally below 250 feet the unconsolidated deposits become finer grained and yields to wells are not increased significantly.

The altitude of the potentiometric surface was based on water-level measurements at wells and several piezometers. The altitude of the water surface was referenced to mean sea level datum from 1:20,000 scale topographic maps.

Discharge at operating wells was measured on-site only at areas under furrow irrigation. Such areas virtually coincide with all lands planted in sugarcane with the exception of approximately 250 acres at Jauca 1 sector of Santa Isabel. Discharge data for other wells was obtained from in-line flow meters or from owners. Total daily discharge values shown on this map for irrigation and public water-supply wells are the product of the instantaneous discharge rate and the reported number of hours the well was being used during the survey.

Crop types are of hydrologic signifícance and are delineated on this map because most crops are irrigated. All vegetable crops are watered by drip irrigation systems. At the time of this survey most sugarcane crops were watered by furrow irrigation, but large tracts of land to the west of Río Descalabrado and east of Río Cañas, found fallow during this survey, were being modified for drip irrigation of sugarcane. Areas having saline soils have been delineated on this map because they may represent natural discharge areas under predevelopment conditions in the aquifer.

Throughout the area, the potentiometric surface generally slopes southward from the northern part of the coastal plain toward the coast. In the northern part of the coastal plain, the potentiometric contours indicate that seepage from streams such as Río Cañas and Río Descalabrado recharges the alluvial aquifer.

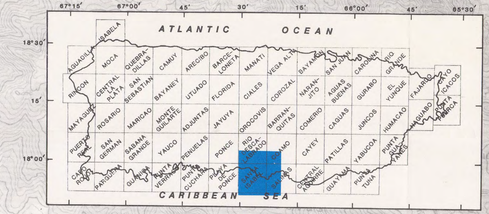
In other areas, irregularities in the contour line generally reflect the effect of pumping or the application of surface water for irrigation of crops. The displacement of the 10-foot contour line northeast of Santa Isabel is probably the result of large ground-water withdrawals and may be due in part to reduced transmissivity of the aquifer in the area. The potentiometric levels and hydrologic conditions presented in this map represent conditions during a period when ground-water levels and streamflow were seasonally low and irrigation withdrawals were at or near maximum rates. At the time of the survey the total consumptive ground-water withdrawal rate was approximately 25 million gallons per day (Mgal/d). This is approximately twice the estimated mean annual consumptive withdrawal rate which is estimated at 13 Mgal/d or 15,000 acre-feet per year. The consumptive ground-water withdrawal was estimated at 23,000 acre-feet in 1967 during one of the most severe droughts in this area (Guisti, 1971).

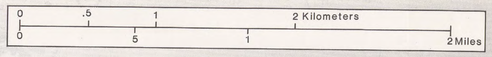
Additional information is available at the U.S. Geological Survey, Water Resources Division, G.P.O. Box 4424, San Juan, Puerto Rico, 00936 Tel. (809) 749-4346.

References

Guisti, E.V., 1971, Water Resources of the Coamo area, Puerto Rico: Commonwealth of Puerto Rico Water-Resources Bulletin 9, 31 p.

Gómez-Gómez, Fernando, 1987, Planning report for the Caribbean islands regional aquifer-system analysis project: U.S. Geological Survey Water-Resources Investigations Report 86-4074, 50 p.





- APPROXIMATE AREAS PLANTED IN VEGETABLES (Drip irrigation)
- APPROXIMATE AREAS PLANTED IN SUGARCANE (Furrow irrigation)
- APPROXIMATE AREAS PLANTED IN VEGETABLES BUT LEFT FALLOW AT TIME OF SURVEY
- APPROXIMATE AREAS AFFECTED BY SALINE SOILS (Never cultivated)

- PUBLIC SUPPLY WELL
- IRRIGATION WELL
- DOMESTIC SUPPLY WELL
- OBSERVATION WELL
- CONCRETE -LINED IRRIGATION CANAL
- SATURATED SEGMENTS OF STREAMBED AND IRRIGATION CANAL-Concrete-lined parts of the Juana Diaz canal which runs along the northern part of the coastal plain not indicated.

20(6.1) POTENTIOMETRIC CONTOUR -- Shows altitude at which water level would have stood in tightly cased well. Dashed where approximately located. Contour interval, in feet (metric equivalent within parenthesis), is variable . Datum is mean sea level.

5R(750/1.05).QW WATER-LEVEL AND PUMPAGE DATA -- Number preceding parenthesis is altitude of water level in feet above mean sea level. Letter preceding parenthesis indicates water-level measurement was made while well was pumping (P) or while the water level was recovering (R) from pumping. Numbers in parenthesis are instantaneous well discharge in gallons per minute (upper number) and total daily pumpage in million gallons per day (lower number). Estimated values are identified with an "e". The letters QW indicate that a water sample was collected for analysis.

5.4(5/7) STREAM OR IRRIGATION CANAL FLOW MEASUREMENT SITE--Number preceding parenthesis is the instantaneous discharge in cubic feet per second. Number in parenthesis is date of measurement (month/day). Arrow indicates direction of flow. Arrows perpendicular to canals indicate withdrawals for irrigation.

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Base from the U.S. Geological Survey Topographic Quadrangles of Coamo(1972), Salinas(1982), Río Descalabrado (1982) and Santa Isabel (1982). Scale: 1:20,000

CARIBBEAN DISTRICT,
SAN JUAN, PUERTO RICO