A Hydrologist In Brazil

Sol D. Resnick

". . . a large section of Ceará must rely directly upon the unfortunately erratic rainfall regime. Under the tyrrany of the rains, nothing can be more crucial to the farmer than the coming 'winter'. He seeks to discover in nature—in the animals and plants, in the stars, in all that surrounds him—signs of life-giving rains or of droughts which may leave him a homeless wanderer.

"Small wonder, this constant worry with the outlook for rainfall, for, from the year 1603 to our day, more than 30 severe droughts have been recorded in the Northeast (Brazil); that of 1877-79 alone is said to have caused the death of 500,000 inhabitants of Ceará and adjacent areas, that is to say, about 50 percent of the population;"[1]

Statements like the one above, applied to the vast area twice the size of Texas in northeast Brazil known as the "sertao", probably create mental pictures of an arid and remote interior. Yet average rainfall in this area varies from about 22 to 40 inches, and in drought years only shows an average reduction in rainfall of 45 percent.

Rainfall of this magnitude would seem like manna from heaven to ranchers in southwest Arizona. However, the rainfall is seasonal and hence continuous dry years can be disastrous. It is interesting to note that seasons are defined by precipitation, not temperature, in Ceará, a state in northeast Brazil. "Winter," the first six months of the year, is wet (about nine-tenths of the aggregate annual precipitation). "Summer," the second season, is dry.

Program Began in 1910

Because of disruption of all economic activities when deficiencies in rainfall occur, the National Department of Anti-Drought Works (DNOCS) was established in 1910. Since then their program against droughts includes the following measures: wells drilled at the rate of 375 per year, and completion of 755 surface water storage units with a further 230 units presently under construction.

The combined capacity of all the reservoirs will be about 13,000,000 acre feet (about one-half that of Lake Mead). The earlier surface water storage units were constructed essentially for purposes of fishing and providing a local domestic water supply, hence development of the water resources took place without the benefit of detailed regional planning. Some of the earlier projects have been adapted to provide water for irrigation, and projects presently under construction have added irrigation and sometimes power development to their list of objectives.

In addition to DNOCS, many government agencies have been established, at least in part, for water resource development, utilization and conservation in northeast Brazil. There are, for example, the superintendency of Northeast Development (SUDENE) established in 1959, National Department of Mineral Production (DNPM), Special Service of Public Health (SESP), Northeast Association of Credit and Rural Assistance (ANCAR), State Secretariats of Agriculture, and state universities like the University of Cearà. Examples of other agencies engaged in the program are USAID and their contract groups, USDA, Food for Peace, Peace Corps, Inter-American Geodectic Survey, FAO, OAS, Inter-American Development Bank, and Ford Foundation.

A Drought of Research

It might seem that with all these groups involved, one might have to stand in line to give assistance or find something to do, but with all this help there is little hydrologic data available and little research underway in hydrology or irrigation and drainage.

A research program in agricultural hydrology and irrigation and drainage, to be accomplished through the University of Ceará essentially at their new experiment station which is about 50 miles from Fortaleza and in the "sertao", is in the discussion stage. The program would be under the supervision of Dr. José Dario Soares, Director of the Institute of Rural Technology, and conducted by Dr. José Matias Filho, Acting Head of the Chair of Hydraulics, Topography, and Rural Construction.

The research program being discussed consists of studies involving the following: Drainage investigations to determine how to alleviate salinity problems created by poor irrigation methods, flooding, and seepage from canals. Irrigation studies to determine how to properly use the limited water supply, but mostly how to prevent waterlogging and salinity in the shallow, heterogenous soils that make up the irrigable areas in the narrow river valleys. Consumptive use studies to provide data for planning irrigation projects. Hydrologic investigations to provide data for the planning of the development of the water resources of Ceará.

More Needs Doing

Because of limited personnel and facilities, the above investigations are probably all that should be considered at present by the University of Ceará. However, of dire need are studies concerning water management on non-irrigated areas, a program with tremendous possibilities, in my opinion; and, studies to properly develop the third type of agriculture in the "sertao," which is farming of river bottoms in the summer season, using improved pumping methods.

The agricultural engineering staff members at the University of Ceará have excellent theoretical backgrounds, and are industrious. Working with a group like this should lead to an interesting two years for this hydrologist in Brazil.

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[1]Sternberg, H. O., Land Use and the 1951 Drought in Ceará. International Geophysical Union, Proceedings 8th General Assembly, Washington, D. C., 1952.

Prof. Sol Resnick was head of the Institute of Water Utilization in the U of A College of Agriculture before going, last spring, to Fortaleza as a member of this college's team of agricultural scientists. A gracious man termed "muy simpatico" by the people with whom he works, in whatever part of the world, Prof. Resnick served some years ago in India under Chester Bowles in the early days of the Point Four program. A top hydrologist, he is a key man in the U of A team in Ceará.

Por mucho tiempo se ha descuidado la importancia del magnesio como elemento nutritivo esencial. No sólo no se ha tratado de reparar las pérdidas de este elemento sufridas por el suelo, sino que se han aumentado con aplicaciones intensivas de cal y abonos químicos. Mientras se reincorpora en el suelo el magnesio necesario, puede proporcionarse directamente al ganado, dando a los vacunos 20 gramos diarios de magnesia y a los borregos de la cuarta a la octava parte de esta dosis según el peso. Esto durante unas 6 semanas en caso de peligro de tetania hipomagnesiana.