COLLEGE OF THE VIRGIN ISLANDS
Caribbean Research Institute

WATER RESOURCES RESEARCH CENTER

CAPSULE REPORT NO. 5
AUGUST 1985

WATER RESOURCES APPRAISAL OF THE COLLEGE OF THE VIRGIN ISLANDS AREA, ST. THOMAS

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INTRODUCTION

The water shortage problem of the College of the Virgin Islands primarily stems from inadequate water storage capacity. Rainfall provides groundwater which recharges the aquifers that provide water to the wells on campus. However, there currently is not sufficient storage capacity for this water; therefore, it flows to the sea and is lost.

COLLEGE WATER DEMAND

Although there are no exact figures on either past or present water consumption at the college, the current estimate of water consumption is in the order of 40,000 gallons per day. In the future, water consumption is expected to increase in direct proportion to increases in student enrollment. At present, it is projected that for the next 20 years the college's enrollment will grow at a rate of 5% annually.

COLLEGE WATER SUPPLY AND DISTRIBUTION SYSTEM

Since the present supply and distribution system was not designed to serve the needs of the college, the system is very unsatisfactory. The college obtains its water from a variety of sources. There is a 210,000 square foot hillslope catchment as well as the rooftop catchments of campus buildings. In addition to these there are wells. The college is also capable of receiving potable water directly from the public supply and distribution system. The elements of the supply and distribution system recognized in this study were hillslope and rooftop catchments, cistern storage, tank storage and water supply and distribution lines.

Catchment Surfaces - Hillslope and Rooftops

The hillslope catchment (red catchment) harvests an average of 7,500 gallons of water per day. However, this catchment is badly in need of repair. If this catchment were repaired, it could provide up to 10,000 gallons per day or one-quarter of the estimated need of the college. The combined rooftop catchment area of the 33 buildings on campus is about 220,000 square feet. The potential long term yield of this area is nearly 112,000 gallons per day. Yet, less than 40 percent of this potential is currently being realized because many of the roofs are not connected to cisterns.

Cistern and Tank Storage

College buildings have an estimated 1.3 million gallons of cistern storage capacity. However, some of the buildings do not have associated cistern storage. The college also has approximately 2.2 million gallons of usable tank storage capacity, but nearly 175,000 gallons of this capacity is not "on-line."

Water Supply and Distribution Lines

Rain water from the hillslope catchment and rooftops, groundwater, and potable water from the public supply line are stored in intermediate storage tanks then fed into a central one million gallon tank. Water is pumped from this one million gallon tank to a 67,000 gallon gravity-fed tank. Most of the buildings on the campus are supplied with water from this gravity-fed tank.

At present, there are three supply lines feeding directly into the one million gallon tank: one from the public distribution system, another from the wells on campus, and the last from the reverse osmosis plant on campus. The water distribution lines take water from the 67,000 gallon gravity-fed tank and branches into two lines which eventually form a loop distributing water to the library, academic buildings and dormitories.

Groundwater Potential

The college has been withdrawing approximately 20,000 gallons of water per day from its wells. But, these well could yield as much as 45,000 gallons per day. A critical finding of the study was that there is no concept or scheme for the maximum exploitation of groundwater. The water is pumped as needed rather than when it is abundant.

After a rain, unless the groundwater is pumped quickly it is rapidly lost. The loss occurs because the groundwater flows towards and is discharged into the ocean. After a major rain, both groundwater recharge and filling of cisterns take place. However, water from cisterns is used first, allowing the groundwater to be lost. This natural groundwater discharge should be intercepted and stored in tanks or cisterns specifically built for the purpose of groundwater recovery. The total water needs of the college can be satisfied by incorporating this concept of enhanced groundwater recovery into the overall water management system.

RECOMMENDATIONS

1. Decrease the reliance on the public water supply system by fully utilizing all available rooftops for water harvesting and all available storage capacity for water storage.
2. Tanks and cisterns should be maintained close to full storage capacity at all times by pumping groundwater into available storage. Unless this is done, some groundwater will be lost.
3. Devise a plan of integrated water supply and distribution to improve the economy of the operating system at the college.
4. Maintain a separate account for water related expenses to provide a more accurate picture of the system's cost.
5. Conduct a study to determine the optimum storage capacity for the college.
6. Finally, the college should continue and improve upon the groundwater monitoring efforts in order to reduce uncertainties in estimating the potential contribution of this vital resource to the overall water supply of the college.

Condensed by Yahaya Bello from: "Land Use, Runoff and Recharge on Selected Watersheds in the U.S. Virgin Islands" by Henry H. Smith and Owolabi Ajayi, Technical Report No. 13, Water Resources Research Center, Caribbean Research Institute, CVI, St. Thomas, September 1983.

The research on which this report is based was financed in part by the United States Department of the Interior, Geological Survey, through the Water Resources Research Center. Contents of this publication do not necessarily reflect the views and policies of the United States Department of the Interior, nor does mention of trade names or commercial products constitute their endorsement by the United States Government.

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