



WAA TA

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INTRODUCTION

There are many regions of the world that have seriously deficient water supplies similar to those we know here in the northeastern Caribbean. Historically, people living in parts of the Mediterranean and South Pacific have collected rainwater and used the technique of cistern storage. The island of Hong Kong for instance, has an elaborate rain collection system to help meet the needs of it's 4 million inhabitants. Rainwater catchments have also been used throughout the continental United States since earliest settlement.

Recent droughts in the United States have compelled water resource managers to review the performance of conventional development programs which encouraged growth and expansion of water systems. A significant number of public utility commissions and water companies now favor programs which emphasize conservation.

This issue of Waa ta' presents portions of a research study which was undertaken at the California Water Resources Center in 1976 under funding provided by the State of California and the U.S. Department of Interior, Office of Water Research and Technology. (Report No. 35, Project No. A-048-CAL).

Residential Water Conservation by Professor Murray Milne expands the concepts of water and water rights which are found in the California State Constitution; an excerpt from that Article is also included in this issue.

message which should be heeded of us who live in the Virgin

Islands is that reducing consumption is equivalent to increasing supply.

CONSTITUTION OF CALIFORNIA

ARTICLE XIV: Water and Water Rights

SEC. 3. It is hereby declared that because of the conditions prevailing in this State the general welfare requires that the water resources of the State be put to beneficial use to the fullest extent of which they are capable, and that the waste or unreasonable use or unreasonable method of use of water be prevented, and that the conservation of such waters is to be exercised with a view to the reasonable and beneficial use thereof in the interest of the people and for the public welfare. The right to water or to the use or flow of water in or from any natural stream or water course in this State is and shall be limited to such water as shall be reasonably required for the beneficial use to be served, and such right does not and shall not extend to the waste or unreasonable use or unreasonable method of use or unreasonable method of diversion of water...

WHY CONSERVE WATER?

Think how much water you use to flush the toilet, to take a shower, brush your teeth, or to grind up an orange peel. Consider where that water came from. Imagine how long it took to move through the stream, lake, river, reservoir, spillway, aqueduct, pump, main, lateral, meter, pipe, valve, tube, and faucet before it finally flows out to fill your glass. Now think about the rest of its trip; down the drain, through the trap, out and down into a network of merging pipes and tunnels, and finally through a treatment

plant and back into the water course. That same water can be drawn off again and again before it finally reaches the ocean.

Think about the complexity of the system that brought that water to you. Imagine the number of people, the miles of pipes, and the amount of energy needed to drive all the pumps. And yet it costs you less than a penny to fill and refill your glass 200 times.

The way a nation uses water is less affected by technological forces than by the taboos and traditions of its people. Some think that water, like air, is a 'free good' and the value of conserving it is as irrelevant as the value of breathing less. However, socio-cultural attitudes sometimes shift rapidly. The 1974 oil crisis offers a powerful object lesson in the speed with which a culture can change or be changed. Almost overnight the entire nation completely revised its attitude about the value and use of petroleum products. If there was a "water crisis," then this lesson shows unmistakably that it is possible to quickly implement massive changes in water consumption which could affect the entire nation. But in fact there is no "water crisis."

Why Bother Conserving Water?

That is a very reasonable question. After all, there is more water on the face of the earth than anything else. This country has an enormous supply of fresh pure water: the daily average rainfall is 4,200,000,000,000 gallons. About 28% of it flows underground or into streams and lakes where 700 billion gallons per day (b.g.d.) is economically available for human consumption, industrial, and agricultural needs. By the year 2000 as much as 900 b.g.d. may be required but because over 80% of all this water is available for reuse again and again, experts like Abel Wolman conclude that, "For many years beyond A.D. 2000 total water shortages for the U.S. as a whole are highly improbable." Except for irrigation, consumptive use will, Wolman predicts, always be negligible; he defines "consumptive use" as the amount of withdrawn that subsequently becomes unavailable for reuse.

So why bother to conserve? If we have enough water to meet our needs until well into the next century why did New York City pass laws prohibiting lawn sprinkling in the summer of 1965? Why were sewer hook-ups embargoed in Washington, and water supply connections prohibited in parts of California? Why are bond issues voted down and legal action taken to stop the construction of water shortage and distribution facilities that water supply companies say are badly needed?

Thus instead of one big simple problem there are lots of smaller more complex problems, all of them interconnected in one way or another.

This report discusses the following water resource issues and shows how they are directly or indirectly effected by residential water conservation:

Energy: The fastest growing cost item in the nation's water budget is the energy needed to pump water from one place to another. In fact some experts believe that within ten years energy shortages will force the institution of strict water conservation programs in many parts of the nation.

Domestic Water Heating: For the homeowner, it is likely that the amount of money he pays for energy to heat water is greater than the cost of all the water he uses. On a national basis domestic water heating alone consumes 4% of our total national energy budget. Therefore, saving water saves energy.

Other Utilities Affected By Water Consumption: In order to reduce the loads on their own systems sewage treatment commissions in Maryland and gas companies in California are promoting and even giving away water-conserving devices (such as flow restricters, water saving shower heads, etc.)

Storage and Supply Limitations: In recent years the growth rate in the demand for water in our cities and towns is creeping dangerously close to the supply capacity limits of local water companies. In some cases this means that no new customers can be hooked-up until either supply increases (more pumps, pipes, and reservoirs) or until demand increases.

Costs of Developing "New" Water: In most areas of the country the most easily exploited

water sources have already been developed, and so tapping each new source will be more costly and complicated than the last one.

Environmental Impact: Voters and lawmakers are becoming so sensitive to environmental concerns that it is almost impossible to create "new" water by damming wild rivers or diverting water from natural drainage basin to another. They claim that huge interstate and international water redistributing systems are unnecessary until all the possibilities for local water conservation and reclamation have been exhausted.

Sewage Treatment Plant Construction: The nationwide sewage clean-up mandated by the Clean Water Act of 1972 should stimulate a huge increase in the construction of new sewage treatment plants; their size and cost reflects the amount of residential, commercial, and industrial effluent they must treat. Less water consumed means less sewage produced.

Waste Water Reclamation: It is now economically feasible in many parts of the country to use treated waste water for irrigating cropland, golf courses, and freeway landscaping, for ground water recharge, and for water sports facilities. In the future, increased water reclamation and reuse will be the primary method of meeting increased demand because rainfall and ground water resources are relatively fixed, and water importing is becoming virtually impossible.

Sewage Treatment Costs: In a growing number of municipalities the cost of sewage treatment is now being billed directly to the homeowner as a percentage of the water bill, so it is doubly clear that reducing water consumption also reduces the amount of sewage produced.

Septic System Overloads: Homeowners with individual on-site sewage treatment systems can often postpone extensive replacement costs by simply reducing the amount of water consumption in their home.

Local Government Action: When confronted with the likelihood of shortfalls in water supply, local governments have shown their willingness to stop the growth in demand. In California this has taken the form of

rate surcharges and penalties for excessive use, connection prohibitions, building permit moratoriums, development of rationing plans, and rebates for reduced consumption.

National Coordination: The Environmental Protection Agency, the EPA, has emerged as a national focus for a coordinated attack on water conservation problems. This includes research on reducing the total flow of sewage and developing devices to prevent unnecessary water consumption, plus forecasting and facilities planning guidance.

Laws Mandating Water-Conserving Fixtures: Undoubtedly in the near future there will be more laws similar to the one now before the California Legislature which prohibits the sale of toilets which use more than three and one-half gallons per flush.

Community Education: A serious and urgent tone has appeared in the water conservation campaigns initiated by utilities across the country that are at the limits of their capacities to supply water or treat sewage.

Utility Company Management Philosophy: Board room debates now explicitly consider the question of when it is proper for a public utility company to cease encouraging growth and expansion and instead to operate on a policy of resource conservation. Whatever the outcome there will be a significant impact on both the economy and the quality of life in the community.

Consumer Convenience: Still the primary motivation for consumer behavior, residential water-conserving devices will not prove successful in the marketplace if they tend to reduce convenience. (It is still easier to hose off the driveway than to get out the push broom).

Consumer Economic Behavior: Homeowners inevitably make many non-cost-effective decisions, simply to satisfy whim and preference, and so it would be a mistake to overestimate the relevance of the added costs or increased savings of various water-conserving devices. Homeowners do not make cost/effectiveness calculations when deciding to spend their money for a new Mercedes and the same is true when they buy bottled water, Jacuzzi tubs, backyard swimming pools, or exotic landscaping.

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Cultural Attitudes Affect Water Consumption: Every group of people seems to have some illogical biases against certain perfectly functional water-conserving appliances; consider for example Americans' aversion to having a bidet or urinal in their homes.

Commercially Available Products: Plumbing manufacturers are extremely reluctant to change the design of their products, but now for the first time new plumbing fixtures that use less water are being marketed at prices that are competitive with traditional plumbingware. Most of these devices are intended for new construction, although there is a huge untapped market for retro-fitting existing dwellings. If water and energy costs continue to rise, even the most expensive replacement fixtures will become cost-effective.

Future Technology: The homeowner will soon be able to enjoy spinoffs from the new water recycle, reuse, and treatment systems that have been developed and tested in spaceships and other new transport vehicles.

Solar Water Heating: To maximize the economic feasibility of solar systems, the consumption of the household hot-water-using appliances must be minimized.

Consumer Response to Water Price Increases: Consumers are looking for effective residential water conservation methods as a way of dealing with ever-increasing water costs.

Utility Company Respond to Reduce Consumption: Because fixed operating costs make up such a high proportion of a utility company's expense, a truly effective water conservation program might lead to falling income which in turn would necessitate a rate increase. (Ideally a water conservation program should bring about reductions in demand which just balance increases in demand from new customers.)

Revisions in Water Rate Structures: Public utility Commissions and water companies are being pressured to replace declining block rates, which favored large users, with flat rates or even increasing block rates which encourage progressive water conservation. Consumers are also beginning to discover that some types of rates indirectly subsidize future growth

and development in their communities, something many of them would prefer to discourage.

New Residential Development: The temporary embargoing of water and sewer hook-ups has halted some construction projects and has convinced many developers that it is in their best interest to plan for water consumption from the beginning, for example by installing shallow trap toilets, flow reducing shower heads, hot water pipe insulation, and water conserving appliances and by landscaping with natural vegetation.

Bond Issue Ballot Defeats: Voters have become extremely sophisticated in their understanding the issues involved in water and sewage construction bond ballot measures, and are voting them down for a variety of reasons. One is that this is an effective way to stop unlimited development and growth in their community.

Desalinization: The growing amount of research and development effort being expended in this area increased the likelihood of a breakthrough within this century, but it is inevitable that reclaimed sea water will turn out to be more expensive than current water prices, and this again increases the premium on water conservation.

Water Quality: If there is to be a water crisis in this country it almost certainly will be qualitative rather than quantitative. The Safe Water Drinking Act of 1974 reflects the nation's growing concern for water quality standards and the possibility that cancer-causing agents, heavy metals, and chemical toxins may be present in residential water supplies.

Natural disaster or Sabotage: Earthquakes are only one of the many possible ways a city's entire water system could be made unusable, but a population that is experienced in the methods of water conservation should be able to implement the disaster relief plans more competently and should survive with much less inconvenience.

Long Range Planning: If present trends continue into the middle of the 21st century, municipal consumption will increase 8.6 times to the point where California's cities will be using almost one third of the region's water. Most of this increase will be due to increase in population and the rest can be attributed to increasing standards of living.