Water Supply Planning

Watching the Horizon

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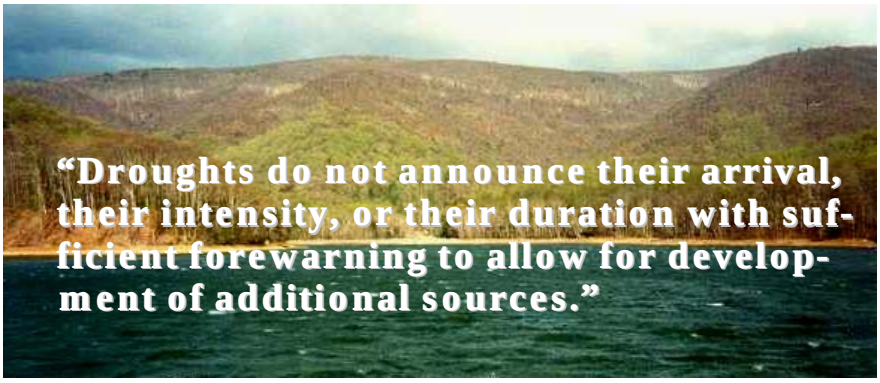
In this new century, the United States will be challenged to provide sufficient quantities of high-quality water to its growing population. Water is a limiting resource for human well-being and social development, and projections of population growth as well as changing social values suggest that demands for this resource will increase significantly. These projections have fueled concerns among the public and water resources professionals alike about the adequacy of future water supplies, the sustainability and restoration of aquatic ecosystems, and the viability of our current water resource research programs and our institutional and physical water resource infrastructures.

National Research Council, 2001, Preface to "Envisioning the Agenda for Water Resources Research in the Twenty-First Century"

This is a solemn reminder that growing communities need to be prepared to meet increasing water demands, with sufficient reserves to carry them through critical drought conditions similar to or, perhaps more prudently, worse than those that have currently been experienced. It can take a long time to get a new water source on-line, so planning needs to occur well in advance of need.



Population growth places stress on all of our infrastructure systems, requiring both incisive and timely action to keep facilities ahead of the growth curve. Among the most critical of infrastructure development concerns is water supply source development. Why? Because lead times of a decade or two are commonly needed to get a new source of supply permitted and on-line.

Simply stated, safe yield is defined as the dependable rate of water supply diversion that can be sustained throughout a critical drought. Safe yield is dependent upon rainfall, runoff, and infiltration characteristics, seasonal water use variations, available water supply storage, regulatory criteria used to define critical drought test conditions, competing uses for source water, required in-stream flow releases, regulated withdrawal limitations and the cooperation of Mother Nature.

As water system demand starts creeping towards a water system's available yield, it is high time to get moving on adding a new or expanded source of supply. Droughts do not announce their arrival, their intensity, or their duration with sufficient forewarning to allow development of additional supplies

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sources once a severe drought is underway. Given the critical nature of water supply to public health, public safety, and economic well-being, it is imperative for water providers to plan well ahead to develop adequate supplies to meet potable water needs during an extended drought.

Proactive water system managers commonly initiate the water supply planning process *at least* a decade in advance of need. This allows them to take advantage of available resources and opportunities, and avoid the pitfalls and escalated costs of responding in crisis mode. It is important to remember that a growing population not only increases water demand, but also stimulates development activities that can eliminate the best water supply reservoir alternatives from consideration.

Water use efficiency and conservation measures (demand management) can be used as initial efforts to manage demand growth and to slow the impending need for additional supplies. Conservation and efficiency programs will also need to be addressed as part of the regulatory review and approvals process for a new source. Once demand management practices are in place, demand growth can be compared with available yield to estimate the timing and magnitude of source development needed to meet demand growth over a reasonable planning period. The length of planning period can be affected by a number of variables, including the type of source development options available, longer-term growth projections, build-out population estimates, and economic and financial considerations. It is typical to use a 40 year to 50 year planning horizon for reservoir projects. The more difficult it is to locate and permit a source, the longer the recommended planning period. This costly and torturous process is not one to be repeated often.

Water supply alternatives that can satisfy identified planning period needs are first identified and catalogued. Depending upon the size and setting of the water system, alternatives may include new on-stream reservoirs (recharged by watershed runoff), new pumped-diversion reservoirs (recharged primarily by pumped diversions from a nearby river), expansion of existing reservoirs, surface influenced or confined aquifer ground water, interconnection with a nearby provider with excess capacity, or a combination of these options. Where feasible, regional water supply development options need to be given careful consideration. Other options, such as desalination or water reuse, need to be considered in coastal locations.

An initial screening is performed to identify potential sites and sources, which are then assessed on a qualitative basis and develop a listing of candidate projects. A short-list of sources showing promise, and lacking a fatal flaw, are then examined in more detail based upon site investigations and conceptual studies of environmental, technical, cost, public support, water quality and treatment needs, and other factors.

The permitting process that follows is generally comprehensive and time consuming, even for a highly justifiable project. Identification and permitting of a new source of supply will greatly benefit from experience in recognizing both the opportunities and the constraints related to site settings, costs, environmental impacts and mitigation, land use and public acceptance. Additionally, the planning and permitting team needs to be appropriate for your home turf, so that local, state and regional regulatory and political considerations are appropriately identified and addressed. Critical expertise may also be needed in reservoir siting / dam design, groundwater development, stream and wetland mitigation, rare/endangered species, and other locally important factors to select a viable, cost effective and permissible project.

What is most important for the water supplier is that all of this translates into a long lead-time. It is also a lead-time that can be made much longer if all of these attendant factors are not given consistent and credible attention.