

Myths of Sustainable Water Management: A Hydrologist's Perspective

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Challenges of managing uncertain and variable water supplies face the American West and many other regions of the world. There is little doubt in the water management community that the long-term solution is the identification, development and allocation of *sustainable* water supplies among diverse and competing needs. Once identified, the allocation of this supply is a daunting task, one that will be the object of discussion, mediation and litigation for decades and longer. Many water managers and planners recognize the difficulty of allocating water among diverse needs, within a complex system of state laws, federal mandates, reserved rights, interstate stream compacts and international treaties. But, often lost in the battle over allocation, is adequate definition of that elusive quantity, the *sustainable water supply*.

At first glance, the definition of sustainable water supply is simple: the sustainable water supply is that which returns year after year, and is not impacted by man's activities. Clearly, this would include the surface water supply available to a region (subject, of course, to the vagaries of nature, in-stream flow requirements, senior rights, interstate compacts or international treaties.) And, in regions with sufficient aquifers, the sustainable water supply might include some replenishable portion of the groundwater reserve. Many regions are actively developing a conjunctive use water supply, tapping both surface water and groundwater resources. Their success in developing a truly sustainable supply will require careful technical evaluation of the resources, and avoidance of a handful of myths and popular misconceptions. Examples of such myths include:

- *New demands can be met without diminishing groundwater reserves or impacting existing conditions, so long as the development does not exceed the recharge to the aquifer.* This myth fails to recognize that, typically, groundwater recharge has already been put to use – perhaps it satisfies riparian growth in a wetland or discharges to a stream. Mass balance requires that one or the other of the following will result: diversion of the recharge to a new use will diminish the benefit to pre-existing uses, or, groundwater mining will occur.
- *Aquifer storage and recovery (physical water banking) can be conducted to save “extra” water for future periods of drought, without impact on the sustainability of the water supply.* While workable in concept, this tenet crosses the line into the realm of mythology in many situations – for example, when groundwater is pumped from deep wells in lieu of using surface water in an irrigation project, shallow salts may be drawn deep into the aquifer below drain elevations, increasing in salt load to the aquifer and compromising the sustainability of the supply for future users; or, the drawing down of the aquifer to use or create aquifer storage impacts an adjacent stream, thus diminishing the partner element of the conjunctive use supply.

Myths in water management propagate when the water budget is inadequately quantified; and, when surface water – groundwater interactions are not well understood or are ignored. Regions are vastly different in their sophistication, handling and integration of hydrologic realities in water resource planning. Many regions, despite well-intended efforts, have not accurately assessed their sustainable supplies. Truly sustainable water supplies can be identified through careful study of the water budget and dynamic hydrologic system interactions; however, many regions will find that this supply is far less than they have previously expected.

Biographical Note:

Ms. Hathaway is Vice President at S.S. Papadopoulos & Associates, Inc., a water resource and environmental consulting firm, and has managed their Boulder office since 1994. Ms. Hathaway has over 20 years experience in hydrogeologic investigations involving water rights, water-supply development, contaminant transport, and groundwater remediation, including providing technical support on these issues for litigation. Recently, Ms. Hathaway has conducted basin-wide hydrologic studies for water resource planning purposes along the Rio Grande in New Mexico and the San Joaquin River in California. Ms. Hathaway is a registered professional engineer in four states, including New Mexico and Colorado.

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