Use It or Lose It

By Vaikko Allen

Prioritizing storm water in the West

We have always had roughly the same amount of freshwater on Earth—about 2.5% of the total water volume on the planet. Unfortunately, it seems that at the local level, the amount of freshwater made available through precipitation is increasingly erratic, with the past year featuring historic floods in the eastern U.S. and historic drought in the West. In my adopted home state of California, 2013 was the driest year on record, and snowpack, groundwater and reservoir levels throughout the state are critically low. Although we have undertaken extensive engineering feats in the form of reservoirs, diversions and water supply pipelines, local water management decisions provide our greatest leverage on local water supply.

A look at the water balance in both natural and man-made environments gives some clues on managing water for optimal benefit. Throughout the arid and semi-arid West, the fraction of the total precipitation volume that is recoverable for human use as overland flow or deep aquifer recharge is commonly less than 10% in a natural environment. The remainder is unrecoverable, as it is intercepted by vegetation or soaks into the first couple of feet of soil. In an urbanized but unmitigated environment, the water balance shifts toward increased runoff, which creates both an engineering challenge and a water supply opportunity.

Most green infrastructure and low impact development (LID) programs focus primarily on runoff reduction as the preferred means of reducing downstream pollutant loading and reducing investment in flood control and runoff conveyance infrastructure. From this perspective, local, small-scale evapotranspiration; harvest and use; and infiltration strategies are preferred and are roughly equivalent solutions. In regions where local water demand outstrips local water supply, however, a more reasonable strategy would be to prioritize storm water control measures that increase supply rather than those that simply reduce runoff.

This shift in priority would give water supply analysis a central role in watershed-based storm water planning and individual project design. Direct rainwater capture and use would be a preferred alternative anywhere there is adequate demand for the harvested water, but it may be supersized and/or regionalized to capture as much annual rainfall volume as possible at the lowest unit cost. Local infiltration, including small-scale decentralized bioretention cells and other vegetated landscape practices, would be prioritized only where there is hydraulic connectivity to a recoverable aquifer. Even where local retention facilities are feasible, regional facilities may be preferred if they offer an economy of scale and allow better operation and maintenance control. Where infiltration or water harvesting facilities exist downstream, evapotranspiration-intensive practices like biofiltration cells, swales and filter strips might be deprioritized in favor of conventional treatment and curb and gutter flow, which maximize the conversion of rainfall to recoverable runoff.

Integrated regional water management planning efforts are underway around the country to coordinate our limited drinking water, wastewater and storm water resources. When storm water management policy is drafted within this holistic context, the LID movement's emphasis on small-scale, distributed, vegetated practices is tempered with a "use it or lose it" awareness. Some areas already have adopted such approaches; for example, the Las Vegas Valley watershed's storm water management plan states that "the best beneficial use of storm water is to deliver as much runoff of good quality as possible to Lake Mead." In Los Angeles and San Diego, Phase I municipal storm water permits have been adopted that encourage integrated watershed management planning. With a lot of planning and construction work and a little cooperation from Mother Nature, we should experience not only water quality improvements, but also added water supply resiliency. SWS

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