URBAN WATER

To live and drink in Los Angeles

Many cities rely on not just traditional delivery systems for potable water, but also standard economic models for valuing those systems. Both must be questioned to ensure future water security in drought-challenged urban regions.

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In the movie *Chinatown*, a syndicate secretly acquires water rights for a desperately thirsty Los Angeles. Although a fictionalized recounting of the city's skirmish with the Owens Valley, the film's chief villain offers an illuminating assessment of Los Angeles's strategy that cleaves closely to fact. "If you can't bring the water to Los Angeles" he says, "then you have to bring Los Angeles to the water." The terminus for the Owens Valley aqueduct (completed in 1913) was the rural San Fernando Valley, annexed by the city, partly to attract investors to fund the expensive public works project. Writing in *Nature Sustainability*, Erik Porse and colleagues refute the legacy of this approach by illuminating alternatives to diverting water from distant sources at considerable cost, the traditional approach of seasonally dry cities such as Los Angeles[1]. In the twenty-first century, wastewater reuse and stormwater capture — coupled with conservation — are feasible, economically competitive alternatives.

The authors adroitly make the case that there are rigorous, economic assessments that can identify cost-effective options to dramatically reduce reliance on imported water. Their argument is consistent with previous studies that show how the kind of water infrastructure cities like Los Angeles have built can itself modify natural water cycles and degrade water quality. By tapping into imported water supplies, rivers that used to flow seasonally with intermittent discharge now experience increased summer flows due to wastewater discharges and urban run-off. Moreover, 'impervious' surfaces alter urban hydrology in multiple ways: the paved streets and parking lots ubiquitous to cities such as Los Angeles worsen water pollution, especially after storms carry numerous contaminants into waterways[2].

The authors also correctly contend that local water agencies throughout Southern California are increasingly prioritizing local sources to replace water diverted from the Eastern Sierra, Bay-Delta and Colorado River. The reliability of those distant sources is becoming more precarious with each passing year due to climate change-induced drought, environmental demands to protect endangered species and withdrawal restrictions mandated by numerous judicial and administrative decisions, especially in the Colorado River Basin[3].

Revenue-pressed agencies are also undertaking long-term cost assessments and modelling of the 'full cycles' of water supply (that is, the embedded energy, long-term indebtedness and other 'hidden' costs associated with various supply options) to better compare alternatives and promote strategies to encourage recharge of groundwater basins, for instance. In addition, during California's most recent drought, many water agencies enhanced long-standing residential conservation programmes through rate-payer incentives designed to encourage the adoption of drought-tolerant landscaping and other measures — with varying degrees of effectiveness[4].

Notwithstanding these important findings, one limitation of the study by Porse and colleagues is that depicting the economic benefits and costs of water supply alternatives alone will probably not compel Los Angeles to entirely change its ways. Governance-related concerns are at least as important. Chief among these are: (1) overcoming path-dependent decisions towards water supply set in place decades ago, which continue to impede cross-jurisdictional cooperation; and (2) public and decision-maker apprehension regarding water innovations.

Path dependency is exemplified by the fact that communities are so used to planning, implementing and managing water projects separately — and through different programme 'pockets' (for example, flood control districts, water supply agencies) that they often have difficulty agreeing on a single funding strategy for urban run-off programmes. One multi-agency study determined that widespread adoption of stormwater capture and use projects in Los Angeles will require creative ways for communities and public agencies to partner with one another, and with private sector investors, to build and maintain projects[5]. This is a problem facing many municipalities that still do not fully acknowledge stormwater as a potential water supply source.

Public acceptance is an equally significant governance challenge. Proposals to adopt wastewater reuse and stormwater capture and use face broad-based concerns regarding up-front costs, health and environmental risks, long-term resilience and social equity. Perceptions of wastewater reuse are influenced by positive messages family members, peers and colleagues share with one another about its safety and reliability. Prescribed end uses for reclaimed wastewater are also important determinants of public perceptions. Will recycled water — or harvested stormwater — be used mostly for landscaping, a use that only 'indirectly' affects people? Or will we come into direct contact with this reclaimed water through drinking, bathing, or swimming? Furthermore, who decides which communities will be supplied by this wastewater?

In all cases, acceptability is strongly influenced by the trust and confidence people have in the decision-makers responsible for managing these alternatives. Are agencies and their leaders regarded as competent managers who act both as honest brokers and guardians against unnecessary risks? Are their decisions viewed as reasonable, carefully considered and fair[6–9]?

In summary, there is an important lesson for Los Angeles and other US cities to learn from the recent experiences of places such as Melbourne, Australia, that have weathered serious, protracted drought. Water governance authorities engaged the public in democratic processes to elicit and respond to their legitimate apprehensions while demonstrating governmental resolve to weigh and address every conceivably

worthwhile water supply alternative[10]. Moreover, authorities were prepared to institute practical means for agencies and communities to work together towards common, economically efficient and just solutions. ❐

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