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Redefining expectations for urban water supply systems to fight wildfires

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Three major implications stemming from the water supply narratives around the Los Angeles fires have emerged: the need for greater infrastructure resilience, considering the uneven costs of new expectations, and combating disinformation.

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Urban water systems in the Los Angeles fires

The January 2025 wildfires that tore through large swaths of Los Angeles were devastating in their impacts: they claimed dozens of lives, destroyed over 17,000 structures, and forced the evacuation of hundreds of thousands more, often for weeks as they waited for permission to return and utility service to be restored. Even for a region that has always lived with fire risk, the catastrophic effects of the Palisades, Eaton and other concurrent fires demonstrate how climate change is altering that risk profile, exposing more urban residents to fires that are fast-moving and highly destructive. The fires shone a spotlight on the region's fire preparedness, raising calls for urban water systems to take on an unprecedented role in wildfire response.

When wildfire reaches into urbanized areas, urban water systems are challenged to deliver water supply and pressure beyond the limits of system design. At least ten water supply systems in the Los Angeles region supported firefighters in the hilly, urbanized neighbourhoods where the fires raged, supplying water through existing piped infrastructure and tanker trucks for ground efforts, and with reservoirs that fed aerial operations. Like urban water systems throughout the world, these systems were designed to meet more modest fire suppression demands typically expected in urban neighbourhoods. That is, to deliver water supply at high pressure for structure fires and smaller-scale brushfires, with some degree of additional wildfire fighting capacity beyond what is typical in less fire-prone cities.

They were not designed to control wildfires supercharged by intense Santa Ana winds and fuel conditions made more extreme by the effects of climate change. And indeed, ultimately they were not up to the monumental challenge: as fire roared through densely settled neighbourhoods, firefighters in the foothill community of Altadena encountered low water pressure battling the Eaton fire, while across town hydrants ran dry in the steep coastal enclave of Pacific Palisades after several hours. The consequences were all the more devastating because firefighting planes and helicopters needed to reach the most challenging terrain were grounded for a time due to high winds.

In typical conditions, the support of water systems in firefighting efforts is rendered invisible: few apart from water system operators question how such large quantities of water manage to flow immediately to where they are needed, and what the limits might be. As is true for many elements of water service, people only notice when the system fails to operate as desired or expected. Uniquely here however, within hours of the fires starting, a narrative developed in social and mainstream media that the fires' destruction was attributable to dry fire hydrants. Storylines with varying degrees of accuracy emerged about the ways in which everything from operating decisions by individual water systems to statewide water allocations might have contributed to the fires' spread. Urban water systems — especially the Los Angeles Department of Water and Power — came under intense scrutiny, triggering investigations and criticism that are ongoing. We had a front row seat to these conversations. As the events unfolded, we played a part in trying to inform public understanding of the role of water systems in supporting firefighting, as well as the structure and function of urban water systems more broadly. From where we sit, we see at least three major implications stemming from the Los Angeles fires for urban water supply systems in the United States and beyond.

Obstacles, opportunities and the harsh reality of new resilience expectations.

First, there appears to be a new mandate for 'all hands on deck' efforts to identify and implement best practices to bolster the role of urban water supply systems in responding to wildfire. Residential development in the fire-prone wildland–urban interface is still steadily expanding, alongside climate whiplash cycles that heighten the risk of intense fires spreading into densely populated areas. Urban and suburban water systems in high fire-risk areas must step up preparedness. There are few if any easy answers, but priority has to be given to low-hanging technical design improvements, capacity enhancements, and planning practices that are feasible within existing financial and operating models. This review should also encompass water investments on private property such as roof sprinkler systems and filled tanks and hydrants that would provide immediate risk-reduction benefits, but which could

be activated without drawing down public supply during fire events. We expect that because of the LA fires, research, collective learning and engagement in this space will be productive over the coming years throughout the American Southwest and in other regions experiencing similar risks globally.

Alongside the adoption of feasible best practices, there needs to be a broader reckoning about the expectations for urban water systems in responding to the magnitude of climate-altered wildfire. Large-scale innovation and investment in four broad aspects of water supply systems could improve their wildfire readiness, especially in challenging mountainous or hilly urban terrain: increased water supply, whether raw or treated; infrastructure to hold and move water hyper-locally, including reservoirs, holding tanks, pipes, and the much-discussed hydrants; power supply redundancy, including more and better generators and batteries necessary to move water; and frontiers of demand responsiveness that might allow water pressure to be maintained by limiting usage elsewhere in the system through advanced metering, information and communication technology, and other tools already in use in the power sector. Yet while the scale of destruction in LA demands consideration of major investments in water systems across fire-prone urban settings, how much risk reduction even heavy-duty measures and major investments can deliver remains an open question. Although investigations of the LA fires are ongoing, all credible experts have stressed the profound limits of assuming that bolstering urban water supply systems alone can prove effective in controlling major wildfires. Some have said bluntly that no amount of water would have stopped the LA fires' destructive path.

Considering the costs, benefits and who pays for greater resilience

Second, large-scale investments in supply or infrastructure must be evaluated for cost-effectiveness and tradeoffs along three lines: the value of enhanced water supply relative to other means of wildfire fighting, the value of treated and piped water infrastructure relative to other water sources for wildfire fighting, and the value of wildfire readiness relative to other priorities for urban water systems. Any further investment in water supply systems is best evaluated in the context of the entire toolbox of means to fight urbanized wildfires, which extends far beyond water. Water systems in fire-prone areas should coordinate with local, state, and federal firefighting agencies to identify the scope of needs and possible alternative water sources for meeting those needs. Investing in supply, infrastructure, or personnel at the scale needed to fight wildfires at several multiples beyond water systems' current capacity will be extremely costly, if even feasible in a water system's local context. Regulatory demands to over-design systems could saddle communities, and the agencies that serve them, with infrastructure that they cannot afford, jeopardizing water systems' fiscal integrity and putting households at risk of further water debt and service shutoffs. Investing in increased wildfire fighting capacity also competes with other pressing demands for investments in urban water systems — to improve reliability, to address legacy and emerging contaminants (including some that wildfire may contribute to surface and groundwater), to increase affordability for low-income customers, and to mitigate and adapt to other climate-driven impacts, including drought and flooding.

When considering massive new costs for urban water systems to fight wildfires, we also need to look hard at the distribution of benefits from these investments, and design legal and fiscal cost recovery mechanisms that align with those benefits. In the service area for the Los Angeles Department of Water and Power, greatly expanding capacity for water supply and fire-flow for the highest-elevation areas of the city would be delivering a benefit to communities that are much wealthier, on average, than the rest of the city. There is danger of placing a burden on less-resourced households to pay for the protection of well-resourced households, which would compound existing and profound environmental inequities in the city. Adjustments to state fiscal rules may be needed to enable mechanisms such as property-based special assessments and differential rate structures that could help fund these investments without exacerbating inequities.

Redefining expectations and a common understanding in a disinformation age

Third, the LA fires highlight the importance of defining expectations for water supply systems during moments that are not clouded by crisis. Narratives that emerged after hydrants ran dry in the Pacific Palisades reflected a fundamental misunderstanding about how water systems and broader infrastructures operate. We should not be surprised by this misunderstanding: while many in the water industry yearn for greater public knowledge, hoping that it will lead the public to attach higher value to water, most people don't want to know more about how their infrastructure works than they need to. Nor should we be surprised that the visible and immediate failure represented by a dry hydrant became a target for people's anger and despair over an event that was beyond human scale and had such devastating consequences. Locally, dry hydrants became a scapegoat for people who were experiencing grief. Globally, in an era of hyper-partisanship and viral hot takes, dry hydrants have been opportunistically linked with longer-standing and largely unrelated discourses, especially around the decades-old debate over additional importation of water to Southern California from the wetter northern part of the state.

Alongside many local leaders and water experts, we attempted to counter these narratives in the moment and battle the spread of misinformation. Yet still, we observed and continue to see the power of these narratives in shaping decisions at the highest levels of government. We need better strategies and more effective science communicators to assist in such moments when salience is high. But the spread of information and disinformation during crises like this is beyond any one person's or entity's control. What may be more possible is to work during non-crisis moments to build a foundation of common understanding about what we can expect from water systems in the face of catastrophic wildfire, and to discourage hasty decision making based on narratives that emerge in moments of crisis.

The January 2025 wildfires in Los Angeles are a tragedy that we are only beginning to reckon with personally and professionally. These events have highlighted the mismatch between human-built systems and the magnitude of climate-altered wildfires. They also present a window of opportunity to initiate and implement significant changes. Engaged water scholars and practitioners need to come together both in the short and long term to meet this moment and thoughtfully consider what those changes should be, what tradeoffs they are tethered to, and what a twenty-first-century vision for water system equity and resilience looks like. This includes simultaneously addressing the dangers and realizing the opportunities that the LA fires and subsequent destructive fires present to help communities better adapt to climate-related disasters — as well as understand the value of and more thoughtfully invest in the urban water systems of the future.

Comment

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