Study Suggests Cost-Effective Way to Capture Storm Runoff

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Researchers at UC Riverside have proposed a cost-effective alternative to capture stormwater runoff that could help communities suffering water shortages and reduce the amount of pollution flowing into ecologically sensitive bodies of water.

In a study published today in *Policy Matters*, the policy journal of the University of California, Riverside, researchers connected with UCR studied the cost-effectiveness of implementing parcel-level capturing devices, such as porous pavement and infiltration trenches, using competitive bidding. They found that the cost of building and maintaining these smaller, decentralized devices in urban areas could be 30 percent to 50 percent cheaper than constructing and operating large, centralized stormwater facilities. They also found that the value of the water that could be captured and used to recharge aquifers could amount to 38 percent of the cost of the smaller devices.

“It’s a cheaper way to reduce the amount of pollution that typically ends up in the Santa Monica Bay or Los Angeles River, and reduce the damage to marine life and human health,” said Kenneth Baerenklau, a co-author of the study and an associate professor of environmental policy at UC Riverside. “It’s also a way to capture runoff and use it as a resource.”

The study, “Capturing Urban Stormwater Runoff: A Decentralized Market-Based Alternative,” was co-authored by Bowman Cutter, assistant professor of economics at Pomona College and an adjunct assistant professor in the UCR Department of Environmental Sciences;

Autumn DeWoody, who received her M.S. in environmental sciences from UCR in 2007 and is programs director for Inland Empire Waterkeeper in Riverside; Ritu Sharma, a postdoctoral researcher in environmental sciences at UCR; and Joong Gwang Lee, an environmental and water resources engineer with TetraTech Inc. in Boulder, Colo.

Urban stormwater is both a source of pollution and a potentially valuable resource, the researchers wrote. Large centralized facilities such as detention basins, culverts and paved waterways have traditionally been used to reduce flooding by quickly carrying runoff to larger bodies of water, they said.

Building small-scale capture devices on many parcels within a watershed could decrease the need to buy expensive urban land or use scarce publicly owned land for larger, centralized facilities, such as detention basins, the researchers found. Small-scale devices also would allow runoff to infiltrate the ground and recharge aquifers depleted by drought, and reduce the flow of heavy metals, petroleum residue and solid waste into lakes and the ocean.

Given the relatively large quantities of urban runoff typically found in urban areas such as Los Angeles and in light of recent predictions of long-term drought in the Southwest, it is imperative to evaluate the economic viability of augmenting local water resources with runoff capture, the researchers said.

The researchers studied 918 commercial, industrial, retail and multifamily land parcels in the Sun Valley watershed near Los Angeles, a watershed that is representative of problematic runoff-generating urban landscapes.

“Although decentralized devices cannot provide the same scale

economies as centralized facilities, they do not require large contiguous land areas," Cutter said. "They can be placed on parcels with relatively low marginal land use value, thus effectively reducing the total installation cost. This is particularly beneficial in dense urban areas where land values can be in the millions of dollars per acre."

They recommend an incentive system that would reimburse individual landowners directly for providing ecosystem services on their properties. This entails a decentralized approach where runoff is captured on each individual property by small-scale stormwater capture devices such as porous pavement and infiltration trenches.

Offering financial incentives through competitive bidding to owners of commercial, industrial, retail and multifamily parcels would be cost-effective, they said. Small-capture devices on single-family home parcels is not cost-effective, however, because of monitoring costs required to assure that devices are maintained properly.

"It's more cost-effective to have fewer properties that generate a lot of runoff that can be directed into infiltration devices," Baerenklau explained.

Although the concept of building more small-capture devices in a watershed is not new, consideration of competitive bidding to keep costs down is a novel approach, he said. "We think there are gains to be had when you adopt a bidding or subsidy approach rather than build large, centralized facilities," he said.

The full report is available online at policymatters.ucr.edu/

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