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ISSUE BRIEF

RAIN TO THE RESCUE:

Stormwater's Power to Increase California's Local Water Supplies

STORMWATER AS A RESOURCE

Climate change and California's ongoing drought have had significant impacts on cities, farms and ecosystems—impacts that are intensifying as dry conditions continue.[1] However, government and residents can take action to provide relief both now and for the long-term.

This brief examines two efforts featuring stormwater's potential as a solution—one by NRDC and the Pacific Institute, and one by the Los Angeles Department of Water and Power, TreePeople and Geosyntec.

NRDC and the Pacific Institute's 2014 report, *The Untapped Potential of California's Water Supply*, identified four key strategies to respond to the state's historic drought.[2]

One strategy was to capture runoff from paved areas in Southern California and San Francisco Bay Area communities.[3] Capture could be achieved either by: 1) directing runoff to open spaces and other unpaved areas, which allows it to seep into the ground to recharge groundwater supplies, or 2) by harvesting rainwater, on rooftops or in rain barrels and cisterns, for non-drinking (nonpotable) uses. Overall, the report's powerful finding was that using these methods could increase water supplies for these regions by as much as 630,000 acre-feet each year alone.[4]

In 2015, TreePeople worked with the Los Angeles Department of Water and Power (LADWP) and engineering firm Geosyntec to complete the City of Los Angeles' first ever Stormwater Capture Master Plan.[5] The Plan serves not only as a 20-year road map for a secure local water supply for Los Angeles—but also as a persuasive case study for other cities and municipalities across the state. Through a modeling analysis, the Plan estimates a promising long-term future for the City with the help of stormwater capture—ranging between 169,000 and 258,000 acre-feet per year.[6]

STORMWATER RUNOFF, CAPTURE, AND SUPPLY

Groundwater has supplied growing Southern California communities for more than 150 years, and today it accounts for approximately 38 to 46 percent of the region's overall water needs.[7]

As its population has grown, much of California's natural landscape has been covered by buildings or paved over for streets, sidewalks, and parking lots. When rain falls onto these "hardscapes," it picks up animal waste, trash, metals, chemicals, and other contaminants before sweeping this pollution—through storm drains—into nearby rivers, lakes, or ocean waters. That's not all—diverted stormwater also reduces groundwater recharge and creates tremendous surface water pollution, flooding, and erosion.

But we can change this—systems that mimic natural processes, otherwise known as "green infrastructure," can offer California solutions to infiltrate or store its stormwater. Green infrastructure can include strategies like green roofs, trees, rain barrels, cisterns, rain gardens, and permeable pavement. These techniques reduce water pollution while also helping to increase local water supply.

NRDC

TREEPEOPLE

Visit these links for more information on how to get involved:

NRDC: www.nrdc.org/issues/prepare-drought
www.nrdc.org
www.facebook.com/nrdc.org
www.twitter.com/NRDC

TreePeople: www.treepeople.org/action/at-home
www.facebook.com/TreePeople1
www. twitter.com/TreePeople_org

Additionally, solutions provide the community added public health and economic benefits, such as:

- beautifying neighborhoods
- increasing green space
- mitigating flooding
- improving air quality
- reducing asthma and heat-related illnesses
- lowering energy costs (reducing the need for heating and cooling), and
- supporting local jobs and economies.[8]

THE POTENTIAL FOR STORMWATER CAPTURE IN SOUTHERN CALIFORNIA AND THE SAN FRANCISCO BAY AREA

There is tremendous need and opportunity to sustainably increase water supplies in California, and green infrastructure plays a large role. Right now, for each inch of rain that falls onto the City of Los Angeles, 3.8 billion gallons of runoff is flushed out to the Pacific Ocean, dragging pollution with it.[9] This not only puts marine life at risk, but people too, for days after a rain in the City.[10]

In their analysis of the potential for stormwater capture in urbanized Southern California and the San Francisco Bay Area, NRDC and the Pacific Institute based calculations for runoff on the total impervious cover for each land-use type and average annual precipitation for different regions.[11] They also analyzed runoff capture opportunities from activities such as watering a lawn or washing a car.

The analysis also explored development built over a groundwater aquifer already contributing to the municipal water supply to see if infiltration could add to the existing supply. Where infiltration wasn't an option, the analysis assumed rainwater harvesting (through tanks or cisterns) would be used to supply water for nonpotable uses such as outdoor irrigation and toilet flushing.

The report concluded that stormwater capture in urbanized Southern California and San Francisco Bay region can potentially increase water supplies by 420,000 to 630,000 acre-feet per year—the equivalent of filling the Rose Bowl with water 1,622 to 2,432 times![12,13]

The report went on to conclude that groundwater infiltration offers the greatest stormwater-based opportunity to increase urban water supplies—whether through smaller distributed capture, or large, regional groundwater recharge projects. NRDC and the Pacific Institute found that in areas overlying groundwater basins used for municipal water supply, 365,000 to 440,000 acre-feet of runoff could be captured and stored each year through projects such as green streets, park retrofits, building and parking lot retrofits, and infrastructure changes to divert runoff to large-scale spreading grounds.[14] Smaller scale rainwater capture could additionally increase water supplies by up to 190,000 acre-feet per year, of which nearly 145,000 acre-feet could be gained via residential rainwater capture systems.[15] Yields could be even higher if rooftop rainwater capture were installed in areas where infiltration and groundwater recharge are feasible.

CASE STUDY

STORMWATER IS THE FUTURE FOR LOS ANGELES

The City of Los Angeles is home to approximately 4 million people, with an annual water demand of 575,000 acre-feet (according to data between 2008 and 2012.)[16] Historically, 89 percent of that water has come from imported water supplies (from the eastern Sierra Nevada Mountains via the Los Angeles Aqueduct, the San Joaquin-Sacramento Rivers via the California Aqueduct, and the Colorado River Basin via the Colorado River Aqueduct). The remaining portion of the region's supply comes from local sources like groundwater, recycled water, and conservation.

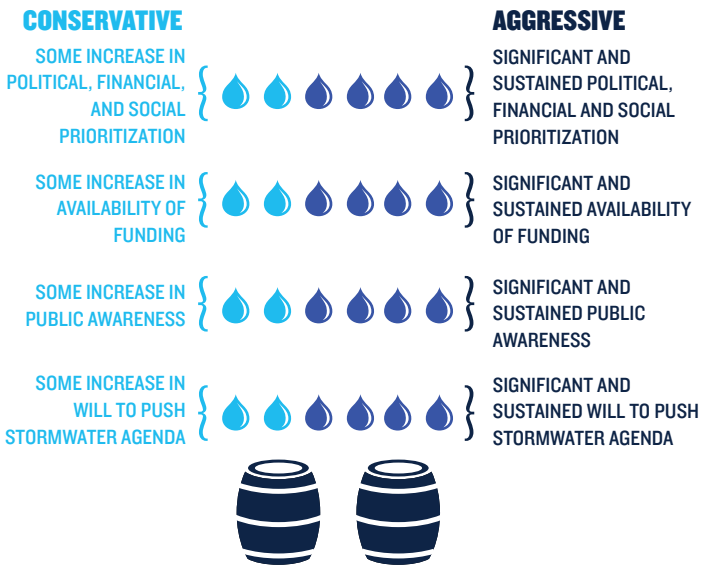
The City increasingly recognizes the need to limit its reliance on imported water and invest in local supplies as climate change, drought, and other factors have made far off sources expensive and unreliable. Given these challenges, stormwater capture has emerged as a key pathway to achieve this goal.

In 2015, Los Angeles completed its first ever Stormwater Capture Master Plan as a guide to expand its capture efforts. The Plan identified the City's long-term stormwater capture potential up to the year 2099, and then outlined strategies for the LADWP and its partners through 2035 using an array of large and small projects, including a significant role for green infrastructure. The Plan considers "conservative" and "aggressive" scenarios to create a range of potential outcomes depending on a variety of factors, many beyond the direct control of LADWP. For example, in the conservative scenario, human-caused constraints such as groundwater contamination remain as barriers, as they are today. In the aggressive scenario, however, they are addressed, eliminating those barriers. (See figure 1 for differences in these scenarios.)

Los Angeles' long-term stormwater capture potential through 2099 is very promising (see figure 2). Currently per year, the City actively captures approximately 29,000 acre-feet of stormwater, and another 35,000 acre-feet passively (in open spaces and other unpaved areas). Through its modeling analysis, the Plan estimated long-term potential capture between 169,000 and 258,000 acre-feet per year, in the conservative and aggressive scenarios, respectively.[17,18] Estimates from the models showed locally captured rainfall could satisfy between 30 percent and 45 percent of the City's current water demand if the required infrastructure, programs, and policies were funded and implemented.[19] Once supported, these investments could provide billions of gallons of water for public use and decrease the City's reliance on imported water.

Twenty year-projections show that LADWP could potentially increase stormwater capture by 68,000 to 114,000 acre-feet per year by 2035 (see figure 3).

FIGURE 1: EXAMPLES OF FACTORS INCLUDED IN CONSERVATIVE AND AGGRESSIVE SCENARIOS



Source: Adapted from the Stormwater Capture Master Plan, page ES-7.

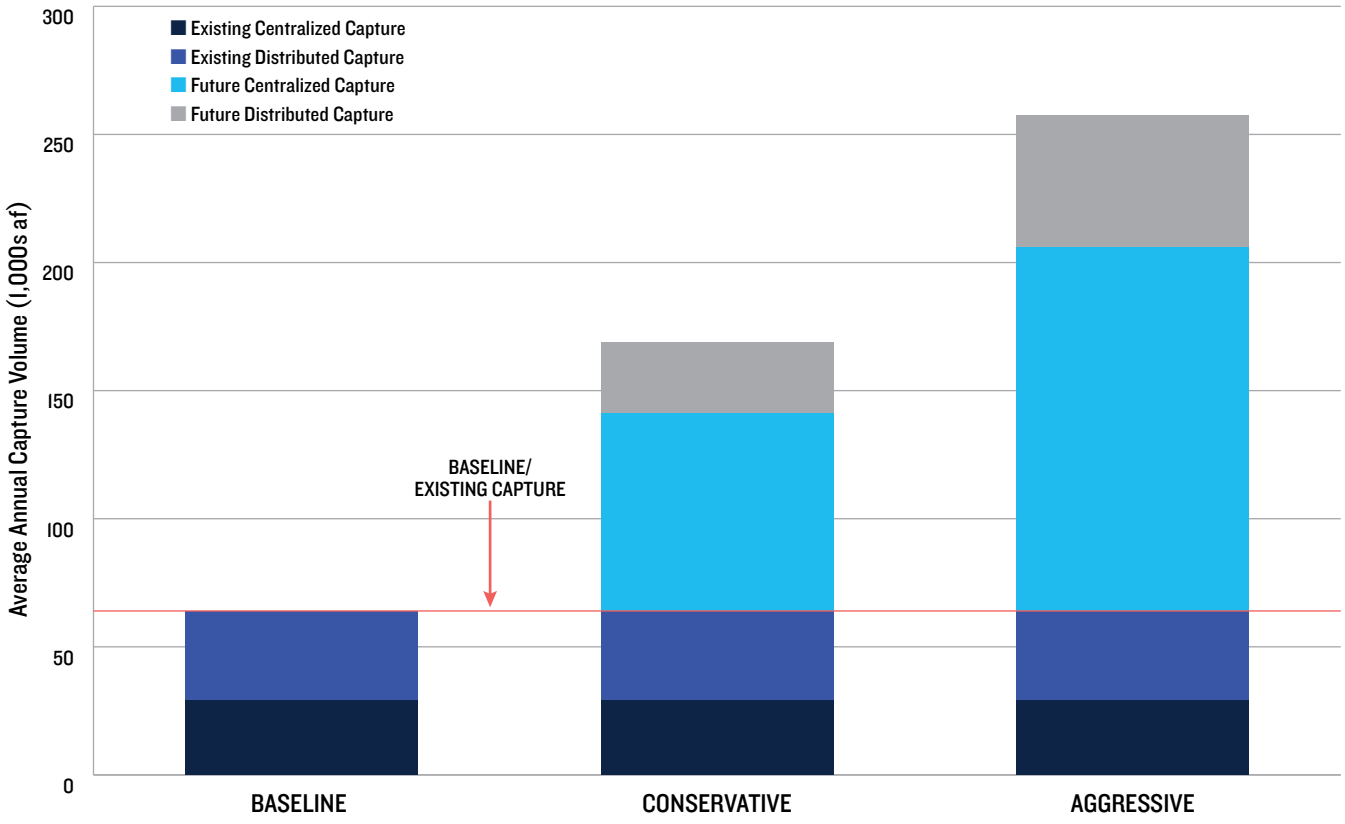
DID YOU KNOW?

LA families use most of their drinking quality water for nonpotable uses. It's a fact! An average Los Angeles family of four uses a whole 68 percent of its water for toilet flushing, landscaping, washing clothes and other non-drinking uses.[20]

They pay approximately $500 for the 112,420 gallons of drinkable water used each year[21,22]—that's equivalent to 1,798,720 8 oz glasses of drinking water! Think about it. That money (and water) could be saved if people installed water-efficient home appliances or a rainwater harvesting system instead.

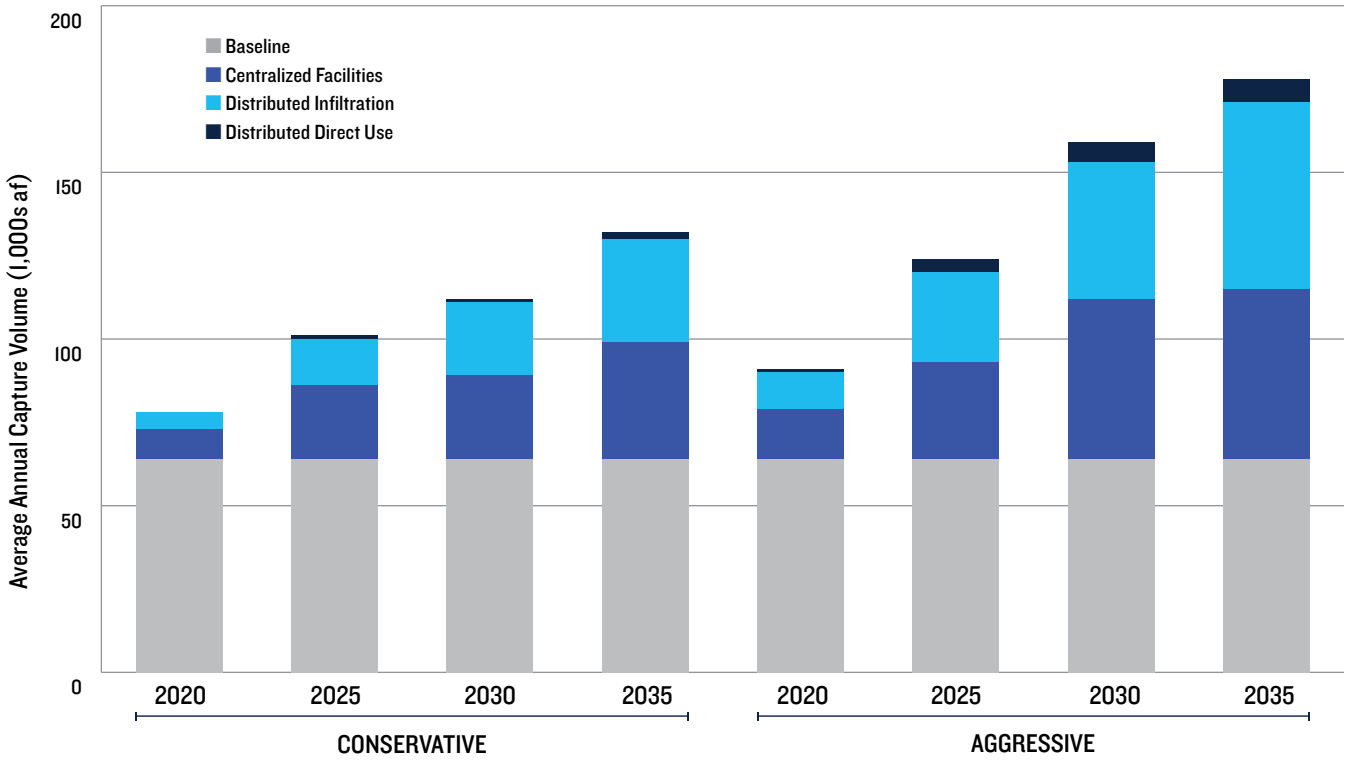
There's good news though! Angelenos now have the permission to use the right water for the right use.[23] In February of 2016, the Los Angeles County Department of Public Health released new guidelines opening the door for Angelenos to use captured rainwater for nonpotable uses like irrigation, toilet flushing, dishwashers and more.[24]

FIGURE 2: POTENTIAL STORMWATER CAPTURE BY 2099



Source: Adapted from the Stormwater Capture Master Plan, page 31.

FIGURE 3: STORMWATER CAPTURE TARGETS IN CONSERVATIVE AND AGGRESSIVE SCENARIOS



Source: Adapted from the Stormwater Capture Master Plan, page 78.

CONCLUSION

The 2014 report *The Untapped Potential of California's Water Supply* and the 2015 Stormwater Capture Master Plan point to the same conclusion: stormwater capture offers tremendous potential to augment local water supplies in California, among other benefits. This strategy can provide effective near-time drought response and long-term water security.

MAKE YOUR VOICE HEARD!

NRDC and TreePeople strongly support stormwater capture projects throughout California, but to get there, we need action from policymakers, state agency representatives, residents, and business owners.

POLICYMAKER AND AGENCY ACTIONS:

- Support policies, laws, and incentive programs that promote rainwater and stormwater capture
- Encourage local stormwater capture planning (such as Los Angeles' Plan)
- Determine if existing funding sources are enough to support needed infrastructure. If not, support new programs and policies to create necessary resources
- Evaluate and implement opportunities to involve agencies whose missions can also be served by these multi-benefit stormwater projects

RESIDENT OR BUSINESS OWNER ACTIONS:

- Install a rain barrel, tank or cistern at your home or business
- Encourage policymakers at all levels to support funding, laws and policies for stormwater capture projects

Visit these links for more information on how to get involved:

NRDC: www.nrdc.org/issues/prepare-drought
www.nrdc.org
www.facebook.com/nrdc.org
www.twitter.com/NRDC

TreePeople: www.treepeople.org/action/at-home
www.facebook.com/TreePeople1
www. twitter.com/TreePeople_org

ENDNOTES

1 Natural Resources Defense Council (hereinafter NRDC), *Climate Change, Water, and Risk: Current Water Demands Are Not Sustainable*, July 2010.

2 NRDC, *The Untapped Potential of California's Water Supply: Efficiency, Reuse, and Stormwater*, June 2014.

3 The analysis focused on urbanized Southern California and the San Francisco Bay Area, as they are the two most heavily urbanized and developed regions of the state. Combined, they account for approximately 75 percent of California's population. NRDC, *Stormwater Capture Potential in Urban and Suburban California*, June 2014.

4 630,000 acre-feet is equal to approximately 205 billion gallons.

5 Los Angeles Department of Water and Power (hereinafter LADWP), *Stormwater Capture Master Plan*, August 2015.

6 Ibid.

7 California Department of Water Resources, Groundwater: Introduction, 2016, www.water.ca.gov/groundwater/.

8 Jeffery Odefey et al., *Banking on Green: A Look at How Green Infrastructure Can Save Utilities Money and Provide Economic Benefits Community-Wide*, American Rivers, Water Environment Federation, American Society of Landscape Architects, and ECO Northwest, April 2012.

9 Los Angeles's average runoff volume is 174,300 acre-feet per year. Using the annual rainfall average of 15 inches cited in the *City's Integrated Resource Plan*, the annual runoff results in roughly 3.8 billion gallons per inch. City of Los Angeles, *Integrated Resource Plan for Water*, section 4, "Runoff Characterization," 2004.

10 Suzan Given et al., *Regional Public Health Cost Estimates of Contaminated Coastal Waters: A Case Study of Gastroenteritis at Southern California Beaches*, Department of Environmental Health Sciences, Environmental Science and Engineering Program, Center for Health Sciences, University of California, Los Angeles, and Environmental Water Studies, Department of Civil and Environmental Engineering, Stanford University, July 15, 2006.

11 Residential, commercial, and institutional uses, as well as roads, were analyzed. Airport, military, and heavy industrial uses were not.

12 NRDC, *Stormwater Capture Potential*.

13 420,000 to 630,000 acre-feet per year is approximately equal to 127 billion to 205 billion gallons.

14 NRDC, *Stormwater Capture Potential*.

15 Ibid.

16 LADWP, *LA's Water Reliability 2025*, Executive Report, 2014.

17 LADWP, *Stormwater Capture Master Plan*.

18 169,000 to 258,000 acre-feet per year is approximately equal to 55 billion to 84 billion gallons.

19 Using an average water demand of 575,000 acre-feet per year, 169,000 acre-feet of stormwater capture could represent nearly 30 percent of annual demand, and 258,000 acre-feet could represent 45 percent of annual demand.

20 Yoram Cohen, *Graywater—A Potential Source of Water,* UCLA Institute of the Environment, 2013. (This study finds that 68 percent of the water used in single-family homes in Los Angeles goes to nonpotable uses, specifically toilet flushing, garden irrigation, washing clothes, and other uses that do not require potable water.)

21 Based on LADWP-reported average residential water use of 77 gallons per person per day in FY 2014-15.

22 Based on Tier 1 2015 water rate average of $4.82 per hundred cubic feet (HCF). 68% of 112,420 gallons = 76,446 gallons = 102.2 HCF. 102.2 x $4.82 = $492.17.

23 "Let's Reimagine Our Water Supply," TreePeople, infographic: "The Right Water for the Right Use," February 17, 2016, blog.treepeople.org/policy/2016/02/lets-reimagine-water-supply.

24 Los Angeles County Department of Public Health, *Guidelines for Alternate Water Sources: Indoor and Outdoor*, February 2016.