Investing in America's Onsite Wastewater Treatment Systems for Equity and Sustainability

Sion Calabretta,
Maureen Cunningham,
and Sridhar Vedachalam

ENVIRONMENTAL POLICY INNOVATION CENTER

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Authors:
Sion Calabretta, Environmental Policy Innovation Center
Maureen Cunningham, Environmental Policy Innovation Center
Sridhar Vedachalam, PhD, formerly with Environmental Policy Innovation Center (now with Environmental Consulting & Technology, Inc. or ECT)

Acknowledgments:
The authors wish to thank Mimi Majumdar Narayan, Michael Claiborne, Sophie Young, Tim Male, Katy Hansen, Breeana Gonzalez, and Olya Egorov for providing comments and feedback. Thank you to Michael Claiborne, Willie Morgan, Colleen Neely, Julie Waetcher, and Sophie Young for participating and presenting in a March 2022 webinar hosted by EPIC that preceded this report. Thank you to the Leadership Counsel for Justice and Accountability and the California Strategic Growth Council for their partnership. Thanks also to the experts listed in the Appendix who were interviewed for this report.

This report is supported by a grant from the Health Impact Project, a collaboration of the Robert Wood Johnson Foundation and The Pew Charitable Trusts. The views expressed are those of the author(s) and do not necessarily reflect the views of the Health Impact Project, The Pew Charitable Trusts or the Robert Wood Johnson Foundation.

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Suggested citation:
Calabretta, S., M. Cunningham, and S. Vedachalam. (2022). "Investing in America's Onsite Wastewater Treatment Systems for Equity and Sustainability." Environmental Policy Innovation Center.

For more information, please contact maureen@policyinnovation.org

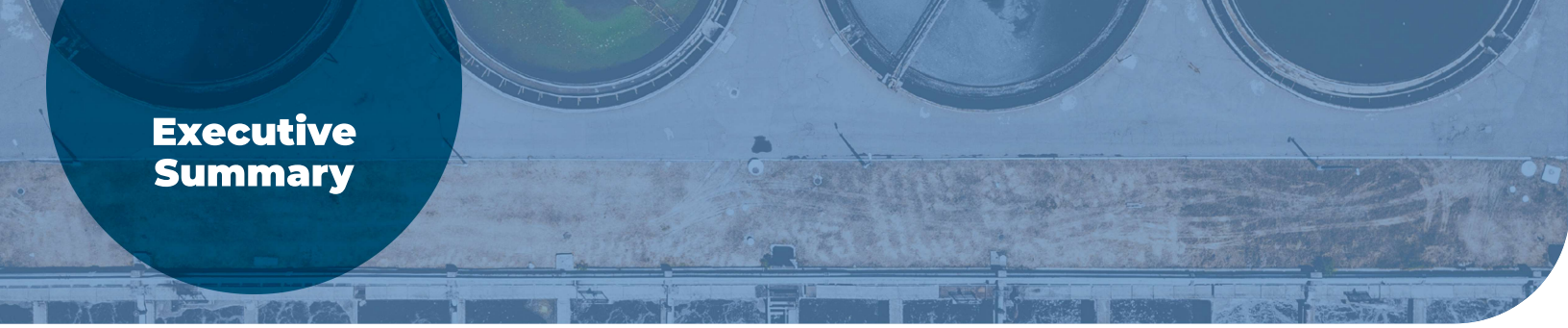
Report layout: Meredith Haynes
Cover image: Douglas Bagg on Unsplash

Contents

List of acronyms

AES - Advanced Enviro-Septic
AIAN - American Indian and Alaska Native
AWIA - American Water Infrastructure Act
BIL - Bipartisan Infrastructure Law
BIPOC - Black Indigenous People of Color
CBOs – Community-Based Organizations
CBR - Clean Water Benefits Reporting
CDFI - Community Development Financial Institution
CSSLP - Community Septic System Loan Program
CWA - Clean Water Act
CWSRF - Clean Water State Revolving Funds
DEP - Department of Environmental Protection
EPIC - Environmental Policy Innovation Center
FPL - Federal Poverty Level
HAB(s) - Harmful Algal Bloom(s)
HH - Household
HSTS - Home Sewage Treatment System
MHI - Median Household Income
NESC - National Environmental Services Center
NIMS - National Information Management Systems
NNPDC - Northern Neck Planning District Commission
OWTS - Onsite Wastewater Treatment Systems
RCAP - Rural Community Assistance Partnership
SB - Senate Bill
SEFO - Septic Extended Funding Option
SHED - West Virginia Safe Housing and Economic Development
SRLP - Septic Rehabilitation Loan Program
SWAP - Septic and Well Assistance Program
USDA - US Department of Agriculture
US EPA - US Environmental Protection Agency
US HUD - US Department of Housing and Urban Development
WAI - Wastewater Alternatives & Innovations
WIFIA - Water Infrastructure Finance and Innovation Act
WPCLF - Water Pollution Control Loan Fund
WRRDA - Water Resource Reform and Development Act
VEE - Virginia Environmental Endowment

Executive Summary



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Ensuring that all US households have access to clean water and sanitation will require a break from the past, and ultimately, a re-alignment of resources and investment. Nearly twenty percent of America's households today depend on onsite wastewater treatment systems (OWTS or onsite systems),[1] whereas only about two percent of federal wastewater dollars have been invested to support these systems to date.[2] There are enormous discrepancies across the country, states, and localities in the availability, amount, accessibility, and use of funding for onsite systems, and more importantly, for the households and residents who rely on them.

Affordability is a key concern when it comes to onsite systems, since households are largely responsible for the installation, operation, and maintenance costs. In many cases, these costs are unaffordable for many low-income people who rely on decentralized systems. While some public funding (and even private funding) exists to support onsite system replacement, operation, and maintenance, not all households and communities are able to access or benefit from these assistance programs. Failing onsite systems often are the result, which in turn are linked to numerous detrimental health impacts.

There are two primary federal funding sources for onsite systems: the US Department of Agriculture (USDA) under its Rural Development Program and the Clean Water State Revolving Funds (CWSRFs). Only rural users and homeowners are able to access USDA Rural Development funds. Just over half of states allocate CWSRF funds for onsite systems, but only eleven states do so on a regular basis, and four states represent 70 percent of this usage. Only one state, Delaware, provides direct loans to households using the CWSRF funds. Overall, the CWSRFs are greatly underutilized when it comes to providing support to onsite systems.

There are incredible—and innovative—funding programs at the local, regional, and watershed level that take advantage of CWSRF and other funds.

There are incredible—and innovative—funding programs at the local, regional, and watershed level that take advantage of CWSRF and other funds. These programs can serve as models for others to replicate—and for more communities to access. For example, a philanthropic, donor-supported and state-administered grant fund in the James River watershed in Virginia supports up to 100 percent of costs to replace failing septic systems in order to bring more systems into compliance, and therefore reduce total nitrogen and fecal coliform loads in the watershed. There are also innovative strategies: Ohio uses a third party intermediary, county health departments, to disburse CWSRF principal forgiveness loans to individual households, and both Oregon and Washington provide loans to households though Craft3, a community development financial institution (CDFI)

1 US Environmental Protection Agency. (2022). *Septic Systems Overview* [online]. Available from: https://www.epa.gov/septic/septic-systems-overview [accessed May 2, 2022].

2 Refers to the Clean Water State Revolving Fund program only, where $3.4 billion of $153 billion spent since the program inception in 1988 has been invested in decentralized systems. Data from the National Information Management Systems (NIMS).

intermediary. Washington and West Virginia use authority under the Federal Water Pollution Control Act to provide loans to nonprofit entities. In addition, numerous programs link funding to monitoring and regulatory compliance of onsite systems.

With so much water infrastructure funding flowing to states and communities through the Bipartisan Infrastructure Law (BIL), not investing in onsite wastewater treatment systems at the same time and with a corresponding effort as centralized systems would be a missed opportunity. With an increased focus on investing in disadvantaged communities in BIL spearheaded by the Biden-Harris administration's Justice40 initiative, it would be an oversight not to address the sanitation needs of nearly 22 million households served by onsite systems, many of whom are low-income.

This report presents an overview of the nation's onsite wastewater treatment systems based on available data, some of the underlying reasons behind their failures based on 19 interviews, and a summary of existing federal, state, and regional/local funding programs to build, repair, and replace onsite septic systems.

Several changes could improve onsite systems across the country. This report offers key policy recommendations:

Collect more data.
The data on onsite systems is insufficient. We need a clear understanding of the number of onsite systems around the country and the demographics of who uses them, in addition to how many and where septic systems fail. This is critical to addressing the problem not only of failing onsite systems and ensuring more resources and investment reach the households who need them, but also understanding the extent to which current health inequities are a result of those failing systems.

Utilize more CWSRF funding for onsite systems.
With the large number of low-income households relying on onsite systems, we need to ensure the primary source of federal funding—the CWSRF program—reaches more communities and households in need. We believe more states should utilize this funding, and employ the options that are available, from direct loans to the use of intermediaries and nonprofit organizations, among others.

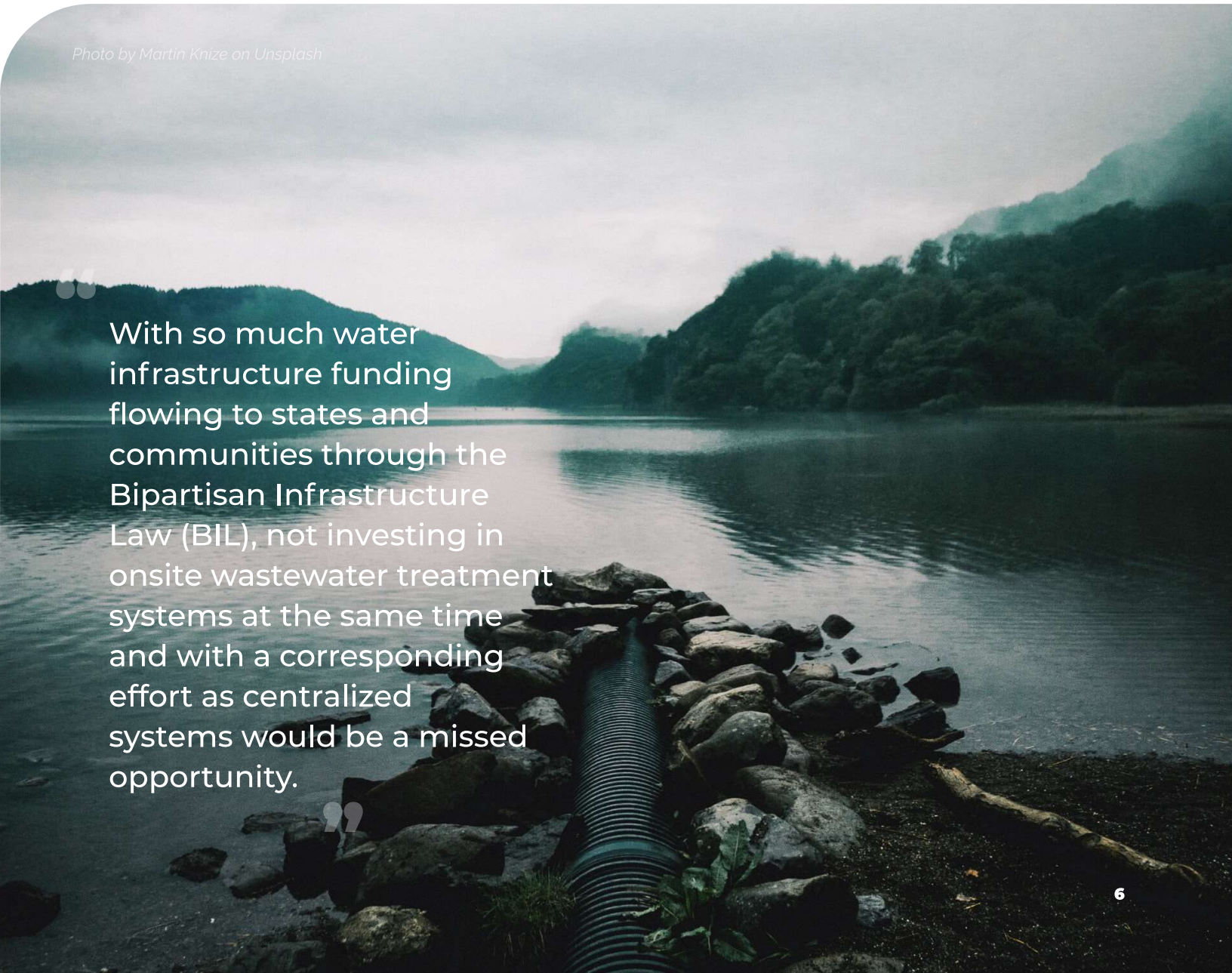
Make USDA's Single Family Housing Repair Loans and Grants accessible to more households.
With some key changes, the USDA program could be accessible to more households, from expanding the program to renters, increasing the maximum grant amount per household, and eliminating the age requirement for grants.

Use intermediaries to reach more households.
Connecting 22 million households to available funding is a challenge, so taking advantage of third-party intermediaries can increase access to programs to invest in onsite systems. Federal and state governments can encourage the use of intermediaries through the CWSRF and other funding sources. Nonprofits and community-based organizations (CBOs) are uniquely positioned to play an effective intermediary role.

Conduct more outreach and coordination.
Information about funding programs to support onsite systems is scattered and not available in one place. There is a need for a one-stop shop online for this information at the federal and state levels.

Encourage local governments to play a role.
Local governments have a big role to play, from mapping onsite system users and helping households access funding to incorporating planning strategies that are inclusive of neighborhoods and communities who rely on decentralized systems. For new developments, local governments can require Responsible Management Entities (RMEs). Local governments can also share resources and oversight with other municipalities in a watershed or region, through the use of intermunicipal agreements.

Center equity and community at the core of all solutions.
Supporting onsite systems is a burden that many households cannot afford. Centering equity means acknowledging this, and ensuring that all households have greater access to funding and other solutions. Listening to the needs of communities and designing programs with them and with local geography in mind, increasing grants (rather than just loans), helping households apply for funds, not requiring residents' legal status or documentation, and embracing renters are all basic tenets of equity that should be incorporated into funding programs.



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> "With so much water infrastructure funding flowing to states and communities through the Bipartisan Infrastructure Law (BIL), not investing in onsite wastewater treatment systems at the same time and with a corresponding effort as centralized systems would be a missed opportunity."

Introduction

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Federal data indicates that there are an estimated 21.7 million US households who rely on onsite wastewater treatment systems—which treat and dispose of wastewater on individual properties—as opposed to 99.6 million who rely on centralized and public sewer systems.[3] For middle and upper class households, the use of onsite wastewater treatment systems, the most common of which are septic systems, is affordable and sustainable, and presents a viable alternative to centralized systems; in other cases, these systems are difficult or unaffordable to maintain for the households relying on them, and if alternatives exist, these systems should be replaced.[4]

When properly maintained, onsite systems can be an environmentally sustainable option for wastewater treatment and disposal. There is insufficient data on the demographics of the households that rely on these systems, and where the systems are failing. What we do know is that households at or below state median household income (MHI) are ten percent more likely to not have access to wastewater treatment, according to data from 2017. Evidence does point to BIPOC and Latinx populations being less likely to have access to water and sanitation, and this may be especially true in unincorporated and underbounded communities throughout the country.[5]

Several challenges occur that disrupt the function of onsite systems. The maintenance of onsite systems is typically expensive and requires technical knowledge. When onsite systems are poorly sited, designed, installed, and maintained, they fail to adequately treat wastewater. Failure occurs due to structural, operational, or environmental conditions. Climate change can further exacerbate the problems for already failing onsite systems due to changes in sea level, patterns of rainfall, and an increase in flood risk. When systems fail, they are expensive to repair or replace. The average cost of installation ranges from $8,000 to $30,000, and maintenance can be an additional $1,000 to $20,000 every few years.[6] These financial burdens often prevent low-income households from properly maintaining or replacing their systems when they fail. And, due to decentralized governance for onsite systems, it is difficult to ensure proper installation, maintenance, and repair without expertise.

Several options exist to address failing onsite systems. Regular maintenance and repairs can address many issues. In cases where the system failure cannot be addressed, separate households can be connected to a centralized wastewater system, in the form of septic to sewer conversions or regionalization.[7] In this case, the centralized system takes responsibility for wastewater treatment

3 US Environmental Protection Agency (2021). *Report to Congress on the Prevalence Throughout the U.S. of Low- and Moderate-Income Households Without Access to a Treatment Works and Use by States of Assistance under Section 603(c)(12) of the Federal Water Pollution Control Act* [online]. Available from: https://www.epa.gov/system/files/documents/2022-01/low-mod-income-without-treatment_report-to-congress.pdf [accessed March 20, 2022].

4 Hernandez, A. and Pierce, G. (2022). *Off the Water Grid: The geography and socioeconomic characteristics of U.S. households reliant on private wells and septics*. Unpublished manuscript.

5 US Environmental Protection Agency. *Report to Congress on the Prevalence Throughout the U.S. of Low- and Moderate-Income Households Without Access to a Treatment Works*.

6 Email with William Morgan, May 12, 2022.

7 Martin, Deb. (no date). *Affordability and Capability Issues of Small Water and Wastewaters Systems: A Case for Regionalization of Small Systems* [online]. Available from: https://rcap.org/wp-content/uploads/2021/09/Regionalization-Great-Lakes-RCAP-final.pdf [accessed May 1, 2022].

from the individual household, extends sewers, and the household is then part of the centralized system and is charged for the service. Cluster systems are another option, connecting two to ten households in one wastewater treatment system. Research and innovative designs can help create systems to withstand diverse soil types, terrain, flooding, and sea level rise. Creating and increasing the accessibility of financing and funding programs can increase the number of people who can afford necessary maintenance, repair, and replacement of systems.

There are several financing options for onsite systems, including the CWSRF program and the USDA Rural Development Program under Section 504. CWSRF programs, in particular, allocate funding through direct loans, pass-through loans, financing through CDFI, linked deposit loans, sub-state revolving funds, sponsorship, and co-financing. There are additional programs functioning in each state, as outlined extensively in Table 1 of this report.

Photo by Michael G. White

> When properly maintained, onsite systems can be an environmentally sustainable option for wastewater treatment and disposal.

Background

Photo by Margaret Bowman

What are onsite wastewater treatment systems?

Onsite wastewater treatment systems are multi-stage treatment[8] systems that collect, treat, and discharge wastewater into soil, and are used to treat wastewater in an estimated one-fifth of households across the United States.[9] They are often referred to as septic systems, which involve a septic tank for treatment.[10] Compared to centralized wastewater treatment systems, onsite systems offer many advantages in low-density areas. Onsite systems allow households in rural areas to treat and discard the water near their homes, rather than establishing a long connection to a centralized wastewater treatment plant. They give individual households the autonomy and power to manage their own wastewater treatment.

The most common and traditional septic systems consist of a septic tank where initial wastewater is collected and separated into solids and liquids. Gravity pushes the separated wastewater to a soil adsorption field for final treatment and dispersal. The septic tank allows particulate matter to settle to the bottom of the tank so that large solids do not plug the drain field. An effluent screen placed in the outlet of the septic tank is used to filter suspended solids out of the effluent. Final treatment and dispersal of the wastewater takes place in the soil adsorption field.[11]

Septic systems need to be adapted when location, space, laws and regulations, soil type, and/or quantity of wastewater being treated become a limiting factor. A non-traditional system may be used in such instances. These are systems that perform the same basic actions as the conventional septic systems, but use pumps or advanced treatment techniques that require greater investment in operation and maintenance.[12]

When properly maintained and replaced at the end of their life, septic systems can be an excellent way to treat and dispose of wastewater. However, not every location is suitable for conventional septic systems. Conventional septic systems require specific soil conditions to function properly. Land with high groundwater table levels, flooding, or non-aerated soils cannot properly support conventional septic systems. Septic tanks may also not be suitable for smaller lots, particularly in cases where private drinking water wells or drinking water sources are in proximity, due to the risk of cross-contamination.

Another form of an onsite system is a cesspool, an underground holding tank or a soak pit with no wastewater treatment component. Straight piping—when households discharge waste directly

8 Department of Environmental Conservation. (2022). *What Is An Onsite Wastewater System?* [online]. Available from: https://dec.vermont.gov/water/wastewater/what-is-an-onsite-wastewater-system#:~:text=Onsite%20wastewater%20systems%20are%20multi,to%20a%20wastewater%20treatment%20plant [accessed June 23, 2022]

9 US Environmental Protection Agency. *Report to Congress on the Prevalence Throughout the U.S. of Low- and Moderate-Income Households Without Access to a Treatment Works*.

10 Texas A&M. (no date). *On-site Sewage Facilities* [online]. Available form: https://ossf.tamu.edu. [accessed June 23, 2022].

11 Texas A&M. *On-site Sewage Facilities.*

12 Texas A&M. *On-site Sewage Facilities.*

into local streams—is another practice in absence of centralized sewer systems which is harmful to public health and the environment.[13] At least 15 states document that at least some residents use straight piping practices. In some areas, up to 50 percent of residents use straight pipes.[14]

Who relies on onsite wastewater treatment systems?

In the absence of systematic data collection, the exact number, location, and demographics of those served by onsite systems remain rough estimates. The US Census last collected information on decentralized systems in 1990. This information is three decades old; more recent sources also have limitations.[15] The US EPA has acknowledged, "The absence of current electronic data on decentralized wastewater system use at a national, state, and county level is a significant impediment."[16]

There is a heavy reliance[17] on these decentralized wastewater systems across the country, especially in New England as well as parts of the South. Approximately 55 percent of households in Vermont rely on onsite systems. Contractors are still building new homes with onsite systems, following existing geographical trends; in fact, more than half of new homes in New England are not connected to a centralized sewer system.[18]

The US EPA has acknowledged, "The absence of current electronic data on decentralized wastewater system use at a national, state, and county level is a significant impediment."[16]

While rural households are most likely to rely on onsite systems, micro-urban areas in rural counties, exurban development around urban areas, and urban areas can—and are—also served by onsite systems.[19] The EPA estimates that households at or below state median household income are ten percent more likely to not have adequate access to wastewater treatment and 52 percent of households with onsite systems live at or below the median household income.[20]

Many households with onsite systems are low-income, but less is known about the demographics of those households. The use of decentralized wastewater systems may correlate with racial/ethnic composition of the household, though the data is sparse or non-existent, at least in part because the US Census changed how it reported the demographics of plumbing access in the early 2000s.[21] Little is known, too, about the condition of these systems throughout the country, particularly the number and location of systems that are failing and potentially a risk to public health.

13 These are also called "wildcat sewers" in Pennsylvania. See https://iop.pitt.edu/sites/default/files/Committees/RWMTF/Rural%20Challenges.pdf

14 Maxcy-Brown, J. et al (2021). *Making waves: Right in our backyard-surface discharge of untreated wastewater from homes in the United States* [online]. Water Research, 190, 116647 [accessed March 13, 2022].

15 US Environmental Protection Agency. *Report to Congress on the Prevalence Throughout the U.S. of Low- and Moderate-Income Households Without Access to a Treatment Works*.

16 US Environmental Protection Agency. *Report to Congress on the Prevalence Throughout the U.S. of Low- and Moderate-Income Households Without Access to a Treatment Works*.

17 LaFond, Kaye. (2015). *Infographic: America's Septic Systems* [online]. Available from: https://www.circleofblue.org/2015/world/infographic-americas-septic-systems/ [accessed May 18, 2022].

18 LaFond, Kaye. *Infographic: America's Septic Systems*..

19 Vedachalam, S., Vanka, V. S., & Riha, S. J. (2015). *Reevaluating on-site wastewater systems: expert recommendations and municipal decision-making* [online]. *Water Policy*, 17(6), 1062-1078 [accessed March 15, 2022].

20 US Environmental Protection Agency. *Report to Congress on the Prevalence Throughout the U.S. of Low- and Moderate-Income Households Without Access to a Treatment Works*.

21 After 2000, the US Decennial Census switched from a long form asking more household data to the American Community Survey (ACS) delivered to a smaller number of households every year and is combined to create 5-year rolling averages. For more information see https://www.census.gov/history/www/programs/demographic/american_community_survey.html

Who has access to water and sanitation, more broadly?

According to the Rural Community Assistance Partnership (RCAP), 736,626 households lack plumbing in the United States (including the District of Columbia, and Puerto Rico). This means about 1.95 million people do not have access to adequate sanitation, the majority of whom are elderly, poor, and live in rural areas. RCAP found that rural households were four times more likely to lack adequate plumbing compared to urban households.[22]

A related study by Gasteyer and others also shows that lack of access to plumbing correlates with race/ethnicity, lower educational attainment, and higher percentages of unemployment. Counties with higher percentages of non-White households were more likely to experience lack of access to complete plumbing. American Indian and Alaska Native (AIAN) households were the most likely to lack complete plumbing followed by Hispanic, Native Hawai'ian Oceanic Pacific Islander, and Black/African American households. The authors conclude these correlations point to "a legacy of structural racism, where investments were not made for those pushed to marginal places in society, be they Indian reservations, counties with migrant farmworkers, or postindustrial "rust belt" cities."[23]

Throughout the country, somewhere between 12 to 37 percent of the US population live in unincorporated communities, which often lack basic services, including sanitation services. Limited access to local public services is often the result of 'municipal underbounding'[24] and other forms of structural discrimination, especially of Black communities in the South. Incorporation status explains a portion of public health disparities.[25] For example, the Central Valley of California has approximately 310,000 people living in unincorporated communities,[26] many of whom identify as BIPOC and/or Latinx and rely on failing onsite systems for wastewater treatment.[27] There are hundreds of disadvantaged unincorporated communities throughout California, many of which lack access to adequate wastewater services, resulting in the increased presence of pathogens and corresponding health impacts.[28] More about California's unincorporated communities and their push for adequate wastewater treatment can be found on the EPIC website.

More data is needed to understand the extent to which failing onsite systems contribute to racial health inequities in the country's unincorporated communities. Connecting these communities to available resources to invest in infrastructure is only one part of the solution. Clearly, lack of public services in unincorporated places deserves more attention, and policymakers need to realize that adequate municipal governance is closely linked to the human right to clean water and sanitation.

22 Rural Community Assistance Partnership, (no date). *Still Living Without the Basics in the 21st Century. Analyzing the Availability of Water and Sanitation Services in the United States* [online]. Available from: http://opportunitylinkmt.org/wp-content/uploads/2015/07/Still-Living-Without-the-Basics-Water.pdf [accessed June 16, 2022].

23 Gasteyer, S. et al. (2016). *Basics Inequality: Race and Access to Complete Plumbing Facilities in the United States* [online]. Du Bois Review: Social Science Research on Race, 13(2), 305-325. doi:10.1017/S1742058X16000242 [accessed March 2, 2022].

24 Aiken, C.S. (1987). Race as a Factor in Municipal Underbounding [online]. Ann. Assoc. Am. Geogr. 77, 564–579. doi:10.1111/j.1467-8306.1987.tb00181.x [accessed May 16, 2022].

25 Gomez-Vidal, Cristina and Gomez, Anu Manchikanti. (2021). *Invisible and unequal: Unincorporated community status as a structural determinant of health* [online]. Soc Sci Med. Sep; 285:114292. doi: 10.1016/j.socscimed.2021.114292. Epub 2021. Available from: https://pubmed.ncbi.nlm.nih.gov/34411968/ [accessed May 23, 2022].

26 Grossi, Mark, (2017). *The American Dream took root here. Now it's filled with ghosts. But one man's passion won't let it die* [online]. Available from: https://amp.fresnobee.com/news/local/article140643763.html [accessed May 29, 2022].

27 Bacon, David. (2022). *The Color of Water* [online]. Available from: https://www.randomlengthsnews.com/archives/2022/04/19/clor-of-water/39145 [accessed June 1, 2022].

28 Seaton, Phoebe, Sinclair, Ryan (2019). *An Opportunity to Improve Health Through Improved Wastewater Service: A Health Impact Assessment on Fresno County's Pending General Plan Update* [Online]. Available from: https://leadershipcounsel.org/wp-content/uploads/2020/07/Wastewater-HIA-LCJA-2020.pdf [accessed May 10, 2022].

Challenges of Maintaining Onsite Systems

Photo by Kelly Sikkema on Unsplash

Onsite systems may fail due to structural, operational, or environmental conditions, such as soil quality, lack of maintenance, utilization beyond intended life, and more. Maintaining onsite systems is challenging due to the cost, climate, and governance issues. Onsite systems that are poorly designed, sited, constructed, and/or maintained can fail to adequately treat wastewater before it re-enters water bodies. This creates risks to human and environmental health, and subsequently decreases educational, economic, and quality of life outcomes. If systems are unable to treat waste properly, discharges of nitrogen and phosphorus, byproducts of human waste, may contribute to oxygen-depleted zones in waterways and harmful algal blooms (HABs), which affect the natural habitats of fish and other creatures. And worse, the bacteria and parasites from human waste that is discharged without proper treatment may infiltrate nearby drinking water sources, generating a public health crisis. With nearly one-fifth of households managing their own wastewater systems, several issues need to be addressed to safeguard public health and the environment over the long term.

Onsite systems are unaffordable for many homeowners

Onsite systems can be expensive to install and maintain: many of the costs associated with onsite systems are significantly higher than the $5,300 that the median US adult has in their bank account.[29] Estimates of the average cost of installation of a conventional septic system range from $8,000 to $30,000, and challenging site conditions sometimes require alternatives that can be even more expensive. Repairing, replacing, operating, and maintaining these systems is also cost prohibitive for many homeowners. For example, septic pump-outs (the necessary maintenance of removing solids that collect in the septic tank) can cost up to $1,000 and are required every three to five years.[30] Other repairs such as replacing broken pumps and filters, repairing drain fields, and tank inspections can cost up to $20,000. All of these costs can be a burden for low-income households.[31]

Climate change is exacerbating the situation

Climate change exacerbates the challenge of maintaining septic systems. Flooding, sea level rise, precipitation patterns, and water table changes—all impacts of climate change—are major contributors to the failure of septic systems. For example, when the soil becomes too saturated or flooded, effluent cannot properly flow out of the system. The failure to discharge waste properly puts households at risk of waste backflowing into their homes or yards. Yet, the opposite holds true too: the lack of snow in the Midwest can allow frost to build, resulting in frozen drain fields and septic system failure.[32] Septic systems also require that groundwater is at a certain level for the soil

29 Board of Governors of the Federal Reserve System. (2022). *Survey of Consumer Finances (SCF)* [online]. Available from: https://www.federalreserve.gov/econres/scfindex.htm [access March 16, 2022].

30 Email with Willie Morgan from SouthEast Rural Communities Assistance Partnership, May 12, 2022.

31 Interview with Jon Bernstien ,February 2, 2022.

32 Morrison, Jim. (2022). *Backed-up pipes, stinky yards: Climate change is wrecking septic tanks* [online]. Available from: https://www.washingtonpost.com/climate-environment/2022/04/12/backed-up-pipes-stinky-yards-climate-change-is-wrecking-septic-tanks/ [accessed July 20, 2022].

to filter the pollutants. In Miami, Florida, for example, the requirement is that the groundwater must be at least 42 inches below the ground.[33] However, onsite systems were designed with the assumption that groundwater levels, sea-level, and rainfall patterns, among other environmental factors, would remain static, and we know this is no longer true. The functionality and effective maintenance of onsite systems has shifted due to climate change, risking systems that are in place—not only in coastal areas but across the country.

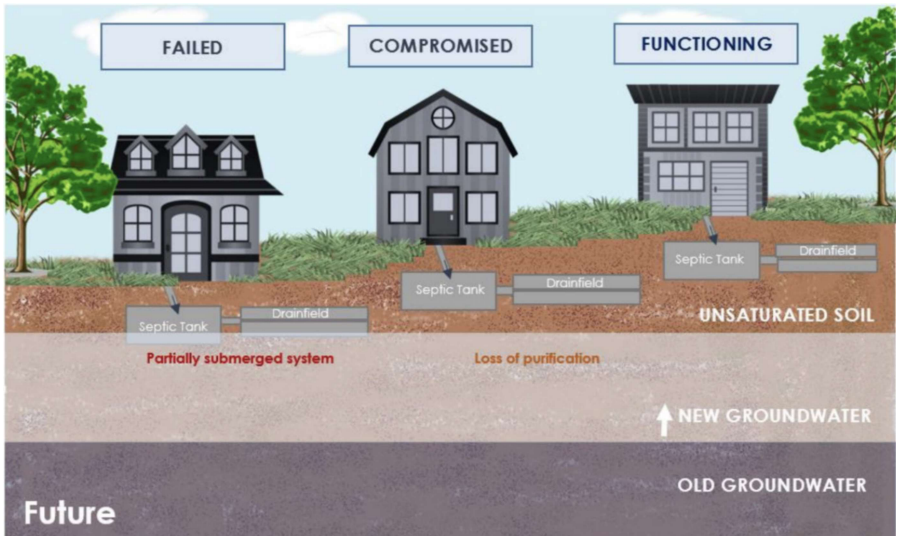


Figure 1: How rising groundwater can compromise septic systems. Source: Elmir 2018

Fragmented authority and governance

The governance of onsight systems is fragmented. While the construction and operation of onsite systems are guided by state-level regulations, permitting authorities vary across and within a state depending on system size, type, and/or location, creating a patchwork of regulations and authorities across the country. The National Environmental Services Center conducted a survey[34] of state regulators and found that states or counties permit onsite systems in about half of the states, while local health departments or local authorities permit onsite systems in the other half.[35] Without centralized permitting authority, the patchwork of permits and regulation is another reason for the failure of so many onsite systems across the country.

33 Miami-Dade County Department of Regulatory & Economic Resources, et al. *Septic Systems Vulnerable to Sea Level Rise*.

34 West Virginia University. (2022). *Assessment of U.S. Onsite System Installations, 2015 through 2018* [online]. Available from: https://www.nesc.wvu.edu/topics-of-interest/assessment-of-u-s-onsite-system-installations-2015-through-2018 [accessed July 14, 2022].

35 West Virginia University. *Assessment of U.S. Onsite System Installations, 2015 through 2018*.

Solutions to Failing Onsite Systems

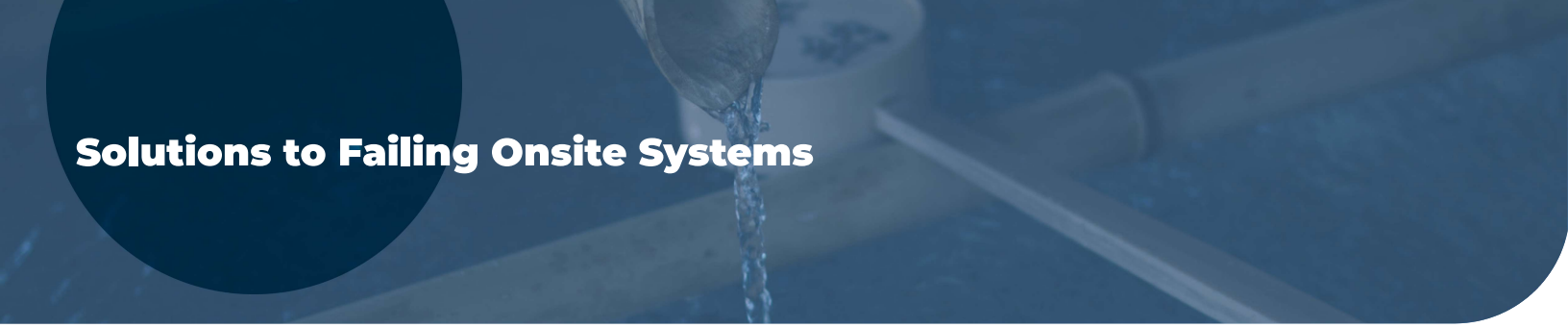


Photo by Vladimir Solomianyi on Unsplash

There are several solutions to address failing onsite systems. Expanding financing and funding programs for onsite repair, replacement, maintenance, and installation is a crucial component—and this report covers funding programs extensively in the following section. Other solutions to address failing onsite systems are: 1) septic to sewer conversions and regionalization, 2) cluster systems, and 3) innovative strategies and designs.

Connecting to Centralized Wastewater Treatment Systems and Regionalization

Connecting households with onsite systems to centralized wastewater systems is one possible path forward. The Rural Community Assistance Partnership (RCAP) identifies regionalization as a key to achieve sustainability and resiliency, with potential cost savings and improved compliance with regulations.[36] Generally, larger wastewater utilities have more capacity to plan, absorb shocks, and finance operations and maintenance.

Regionalization should not be considered as a universal solution. The opportunities vary and depend on the specific circumstances of the community. Under certain physical and financial conditions, onsite systems may be better suited to meet the needs of many small and rural communities. However, some households are so far apart that it is geographically impracticable to connect to centralized systems. Comparisons of centralized and onsite systems are limited by a lack of data, leaving households and communities to make choices with limited information.

Septic to sewer conversions are also a considerable expense. For example, the Miami-Dade Water and Sewer Department's Connect 2 Protect—a multi-year effort aimed at connecting over 100,000 onsite systems to the county's centralized sewer infrastructure—is a $4 billion initiative. Connect 2 Protect is designed to address rising sea levels and build climate resilience.[37]

Cluster systems

Cluster systems are an intermediary solution to sewer connections and regionalization. A few households, typically two to ten, can consolidate their wastewater treatment to a cluster system. Households can choose a few different options to transport their wastewater to a centralized treatment system that then treats and disposes of the wastewater. Cluster systems offer advantages in areas where there are too few households to create a centralized system, or in cases where households are too far away to connect to a centralized system. While cluster systems can be fairly expensive and still require technical knowledge to operate, they allow households to work together and share the costs of wastewater treatment.

36 Landes, Laura, et al. (2021). Regionalization: RCAP's Recommendations for Water and Wastewater Policy [online]. Available from: https://rcap.org/wp-content/uploads/2021/09/RCAP-Regionalization-Research-Report-May-2021-Final.pdf [accessed March 2, 2022].

37 Bilzen Sumberg (2022). Septic to Sewer: Miami-Dade County Continues to Lead Resilience Projects Aimed at Curbing Impacts of Sea-Level Rise and Improving Communities [online]. Available from: https://www.jdsupra.com/legalnews/septic-to-sewer-miami-dade-county-7885579/ [accessed June 12, 2022].

Innovative designs

Innovations in design can greatly improve the operation of onsite systems, especially within constrained situations such as poor quality soils, smaller lot sizes, or sensitive environments. Onsite systems with advanced water dispersal systems can accommodate diverse soil types. When the soil is too porous or not porous enough to properly filter wastewater, leach fields[38] can be used to provide an additional step of filtration for wastewater. Leach fields can be made of sand[39] that wastewater is pumped through, or just a pipe with holes for dispersion into the soil. Decentralized wastewater treatment plants can serve 20 to 200 homes.

Many innovative systems capture and reuse resources from waste. The EPA is currently testing an enhanced innovative/advanced system[40] that has a denitrification unit to filter wastewater through an additional holding tank prior to being released into a leach pit or field. These systems reduce nitrate contamination of groundwater. Other innovations take advantage of biological ecosystems that digest organic matter in wastewater, such as Advanced Enviro-Septic® (AES) Treatment Systems[41] and the Living Machine.[42] In Hawaii, Cinderella Toilets burn waste.[43]

38 Mr. Rooter Plumbing. (2020). *What Is a Leach Field?* [online]. Available from: https://www.mrrooter.com/about/blog/2020/may/what-is-a-leach-field-/ [accessed May 3, 2022].

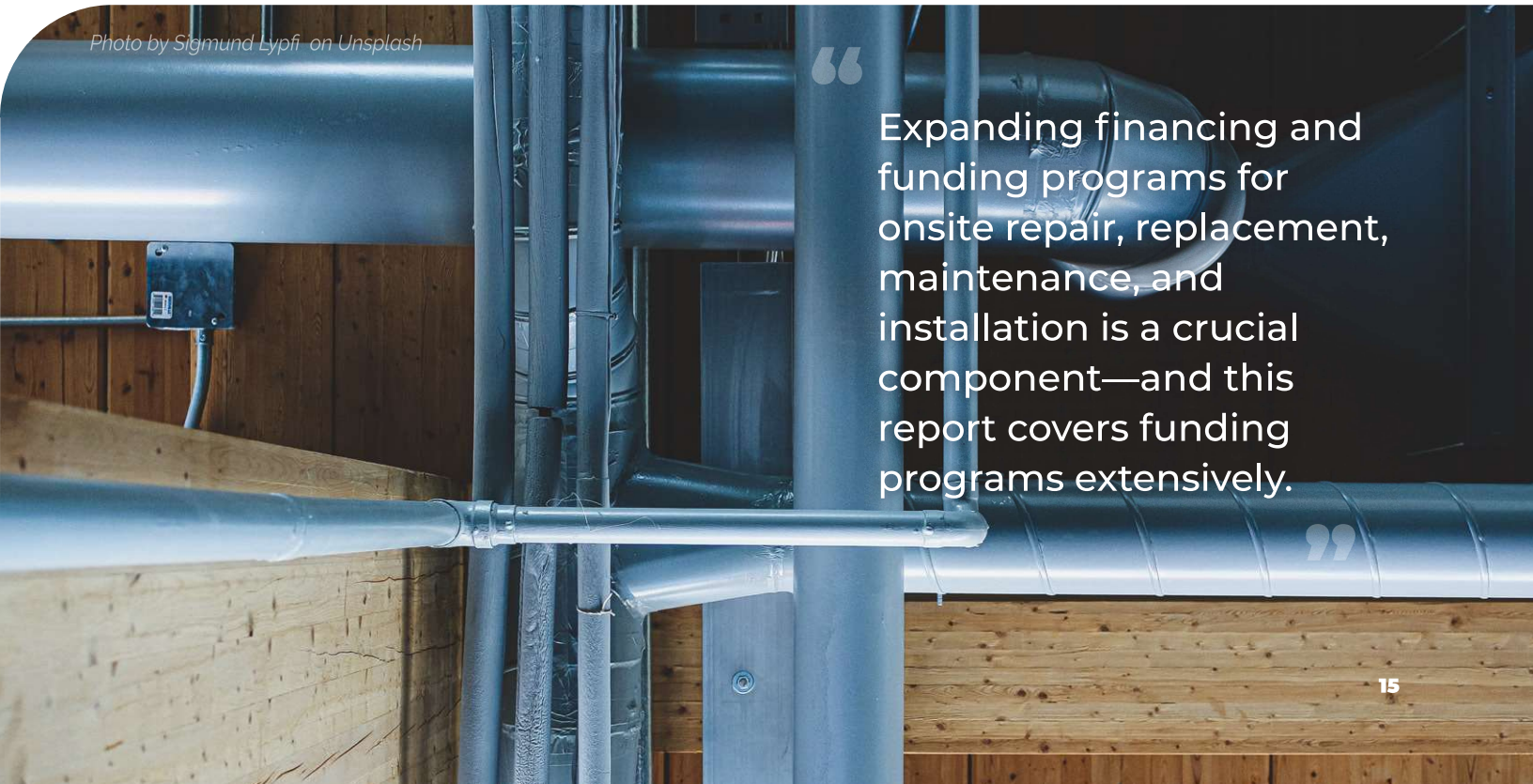
39 NexGen Engineering & Consulting. (no date). *Septic System Designs* [online]. Available from: https://nexgeneng.com/services/septic-system-designs-california/ [accessed May 27, 2022].

40 US Environmental Protection Agency. (2022). *Innovative/Alternative Septic Systems* [online]. Available from: https://www.epa.gov/water-research/innovativealternative-septic-systems [accessed April 22, 2022].

41 Infiltrator Water Technologies. (no date). *Advanced Enviro-Septic* [online]. Available from: https://www.infiltratorwater.com/products/presby-environmental/advanced-enviro-septic/ [accessed April 24, 2022].

42 US Environmental Protection Agency. (2002). *Wastewater Technology Fact Sheet* [online]. Available from: https://www3.epa.gov/npdes/pubs/living_machine.pdf [accessed March 26, 2022].

43 Cinderella Incineration Toilets. (no date). *What is an incineration toilet?* [online]. Available from: https://www.cinderellaeco.com/us-en/articles/228/what-is-an-incineration-toilet [accessed May 10, 2022]



Available Options to Finance Onsite Systems in Different States

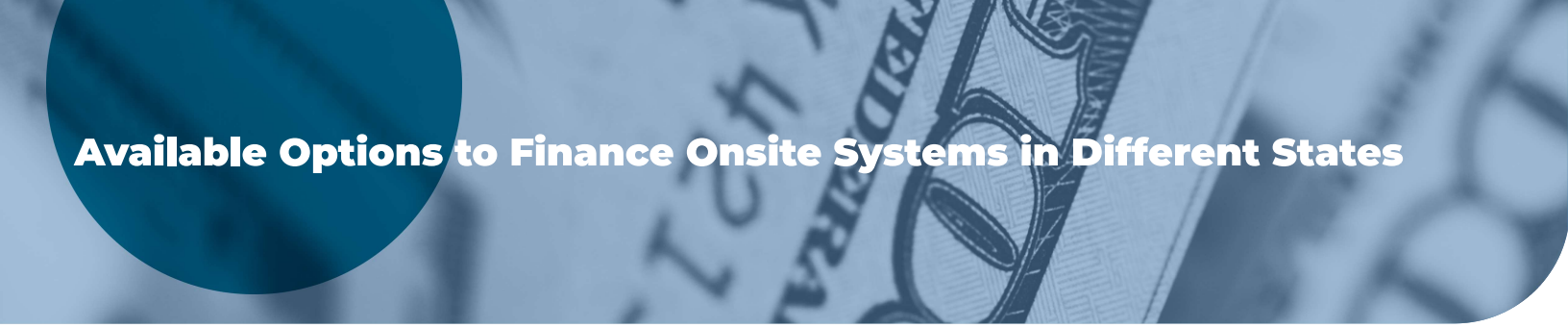


Photo by Pepi Stojanovski on Unsplash

Financial investment is one crucial solution to maintain onsite systems over the long term. Federal funding for wastewater infrastructure is provided by several agencies, but the two most prominent are the Single Family Housing Repair Loans and Grants administered by the USDA and the CWSRF administered by the EPA. All states offer residents access to the USDA Single Family Housing Repair Loans and Grants and CWSRF funding for septic-to-sewer projects. In many instances, however, CWSRF assistance is not an option because several states do not fund or finance privately-owned decentralized systems. In addition, there are numerous state and regional programs, described in some detail below and in Table 1.

These funding programs are as follows:

1) USDA Section 504

The US Department of Agriculture Rural Development Program seeks to improve the economy and quality of life[44] in rural American communities. Section 504[45] outlines criteria for grant and loan support for small communities. Although much of the funding goes towards centralized systems, one of the financing options under Section 504 is the Single Family Housing Repair Loans & Grants for low-income owner occupants of modest single family homes.[46]

Every state has a Single Family Housing Repair Loans & Grants[47] program in which individual homeowners can apply for funding to repair, improve, or modernize homes, or remove health and safety hazards. Replacement, maintenance, and installation of septic and onsite systems are all eligible projects under this funding program. This program provides homeowners up to $40,000 in loans and up to $10,000 in grants. To qualify for funding, individuals must own the home and be below 50 percent of the median household income. To qualify for grants, the homeowner must be 62 years of age or older. The loan and grant funding is distributed directly to the homeowner, who must find contractors to complete the project. In some communities, the program is largely inaccessible for many households due to the homeownership requirement for loans, and in some cases, the age requirement for applicants for grants. Despite its limitations, the program established under Section 504 helps distribute millions of dollars for home maintenance, modernization, and repairs, effectively aiding low-income rural homeowners to keep their onsite systems safely functioning.

44 US Department of Agriculture. (no date). *Rural Decentralized Water Systems Grant Program* [online]. Available from: https://www.rd.usda.gov/ [accessed May 23, 2022].

45 US Department of Agriculture. (no date). *Chapter 12: Section 504 Loans and Grants* [online]. Available from: https://www.rd.usda.gov/files/3550-1chapter12.pdf [accessed July 20, 2022].

46 US Department of Agriculture. *Chapter 12: Section 504 Loans and Grants.*

47 US Department of Agriculture. (no date). *Single Family Housing Repair Loans & Grants* [online]. Available from: https://www.rd.usda.gov/programs-services/single-family-housing-programs/single-family-housing-repair-loans-grants [accessed July 19, 2022].

2) Clean Water State Revolving Fund (CWSRF)

The CWSRF was created in 1987 by the Amendments to the Clean Water Act under 33 US Code §1383 as a financial assistance program to support a variety of water quality projects, including wastewater infrastructure. The program is a partnership between EPA and the states.There are 51 CWSRF programs; one in each state and Puerto Rico. Each state is responsible for the operation and management of its program, which functions like an environmental infrastructure bank. CWSRFs provide financial assistance, primarily in the form of below-market interest rate loans, to eligible borrowers for water quality and wastewater infrastructure projects.

Collectively, the CWSRF has provided over $145 billion in financial assistance for water quality and wastewater infrastructure projects through June 30, 2020.[48] This includes decentralized wastewater treatment projects such as:

- Installation of new individual septic systems
- Repair and/or replacement of existing septic systems
- Conversion of cesspools to septic systems
- Conversion of septic systems to centralized wastewater treatment systems
- Replacement or modification of existing cluster or small community package plants,
- Payment of costs associated with establishing a Responsible Management Entity (RME) such as a special district to oversee decentralized systems in a particular neighborhood or region

The proportion of CWSRF dollars that finance decentralized wastewater treatment must increase if we are to truly address the issue of failing onsite systems.

The CWSRF has provided more than $3.4 billion in combined assistance for various types of decentralized wastewater projects and septic to sewer conversions since 1988, representing over two percent of the total CWSRF assistance provided.[49] Nearly 86 percent of the $3.4 billion funding has gone for septic-to-sewer projects, which are more expensive than individual decentralized projects. Aside from septic to sewer conversions, 26 states have provided over $469 million in funding for decentralized treatment projects (e.g. new construction, repairs, or replacement) since 1988. The highest annual funding for decentralized wastewater projects was in 2019, when states allocated over $44 million to these projects (Figure 2).[50] Although the allocation of CWSRFs to onsite systems is growing,[51] only two percent of the CWSRF funding has gone to onsite systems when nearly 20 percent of the US population depends on them. The proportion of CWSRF dollars that finance decentralized wastewater treatment must increase if we are to truly address the issue of failing onsite systems.

48 US Environmental Protection Agency. (2022). *Clean Water State Revolving Fund* [online]. Available from: https://www.epa.gov/cwsrf [accessed June 2, 2022].

49 US Environmental Protection Agency. *Report to Congress on the Prevalence Throughout the U.S. of Low- and Moderate-Income Households Without Access to a Treatment Works*.

50 US Environmental Protection Agency. *Report to Congress on the Prevalence Throughout the U.S. of Low- and Moderate-Income Households Without Access to a Treatment Works*.

51 The sudden increase in funding during 2010-2012 is due to the increased SRF appropriations through the American Recovery and Reinvestment Act ("stimulus").

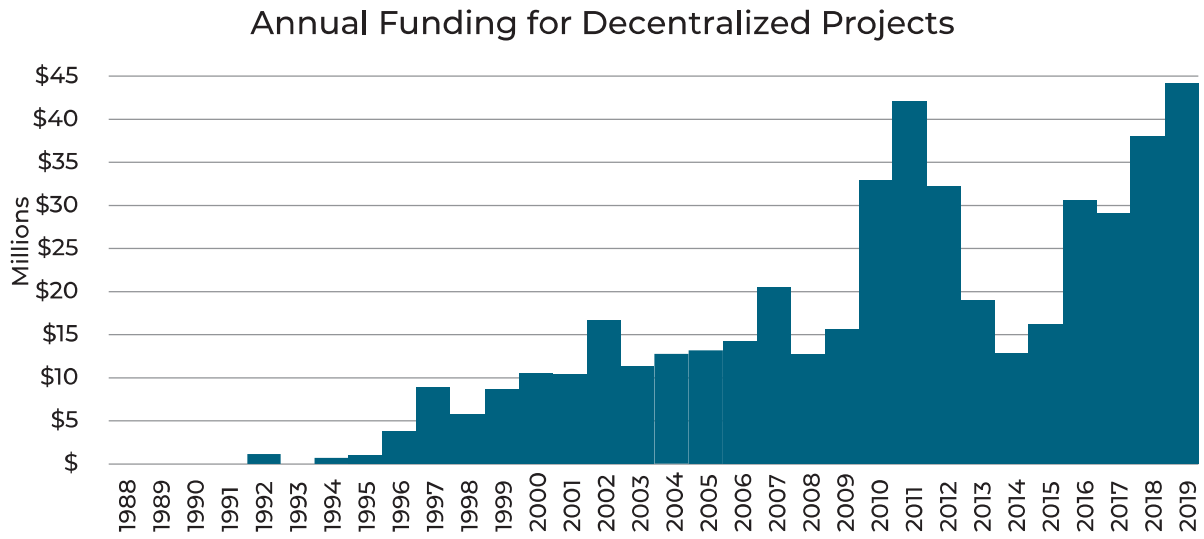


Figure 2. Annual funding for decentralized projects under the Clean Water State Revolving Fund. Source: US EPA.

Not only is the level of spending not comparable to the percentage of households depending on decentralized systems, but the use of existing federal funding varies greatly from state to state. Half of the CWSRF programs have made loans to these types of projects at one time, but as of 2020, there were only 11 state programs that continue to do so on a regular basis. Only four states – Massachusetts (27.5 percent, $128.8 million), Minnesota (20.4 percent, $95.7 million), Ohio (13.5 percent, $63.2 million), and Washington (9.0 percent, $42.1 million) – represent a little over 70 percent of the cumulative decentralized wastewater assistance (Figure 3).

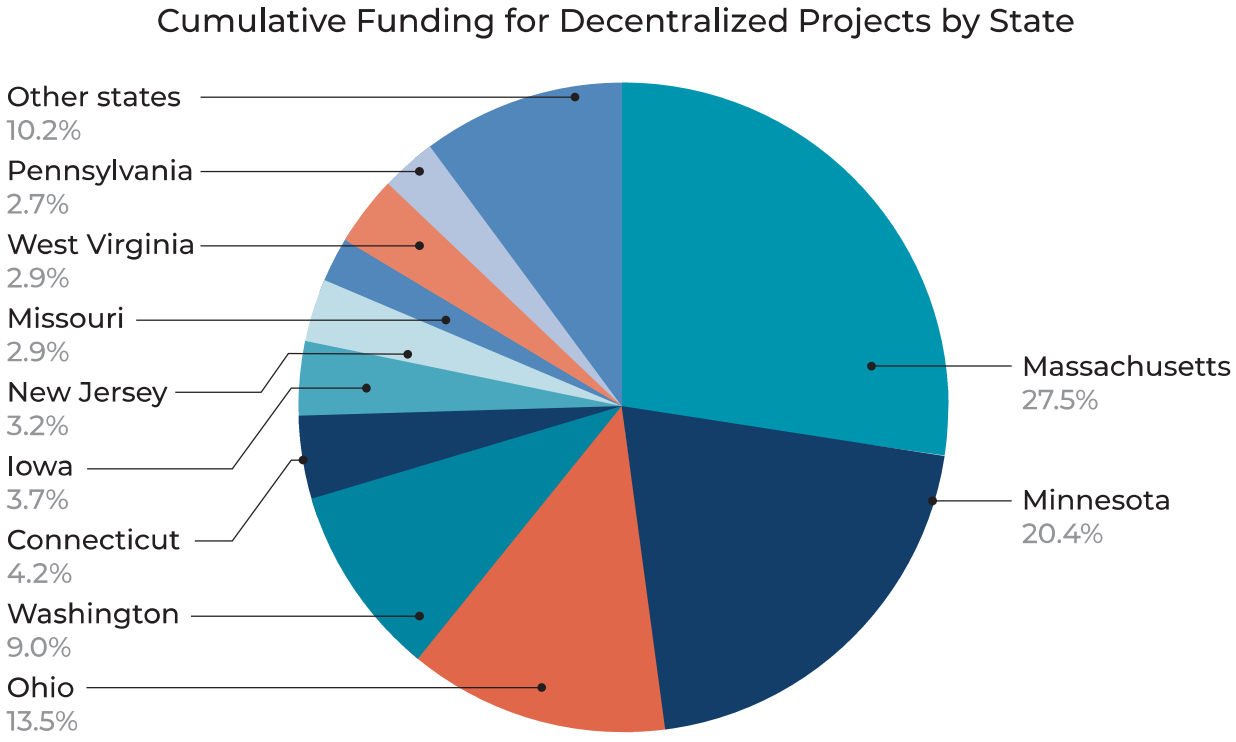


Figure 3. Cumulative decentralized funding by states under the Clean Water State Revolving Fund. Source: EPA's NIMS data.

Further analysis of the CWSRF National Information Management Systems (NIMS) and Clean Water Benefits Reporting (CBR) system indicate that two states used the Section 603(c)(12) authority under the Federal Water Pollution Control Act to provide assistance through nonprofit entities.[52][53] Washington provided two loans to Craft3, a nonprofit CDFI. West Virginia provided one loan of $100,000 to the West Virginia Safe Housing and Economic Development (SHED), a nonprofit organization. Those two loans total almost $12.5 million, including $1 million as principal forgiveness. This is a critical role nonprofits can continue to play, as an intermediary for this federal funding.

Legislative changes to the CWSRF program in recent years through the Water Resource Reform and Development Act of 2014 (WRRDA) and the American Water Infrastructure Act of 2018 (AWIA) broadened the types of decentralized wastewater project activities eligible to receive financing. Eligible activities now include the installation of new decentralized systems as well as the repair and replacement of existing systems. CWSRFs may make loans to both public and private entities for decentralized projects. Although most existing programs are not designed to make loans directly to individual homeowners, EPA states that this can be accomplished and should not discourage local stakeholders from seeking CWSRF assistance for decentralized wastewater projects.[54]

Legislative changes to the CWSRF program in recent years broadened the types of decentralized wastewater project activities eligible to receive financing.

The CWSRF can finance decentralized wastewater projects in one of the following ways:

Direct Loans

CWSRFs make direct loans to wastewater utilities and local governments for centralized wastewater projects. Similarly, they can make direct loans to newly created entities for septic to sewer conversion projects.

Only one state—Delaware—directly finances individual septic or cluster system projects. Delaware runs the Septic Rehabilitation Loan Program (SRLP),[55] which was set up in the mid-1990s and is one of the oldest septic financing programs in the country. SRLP has approximately $1.2 million available annually, more than half of which is loaned out.[56] Homeowners sign a loan directly with the Delaware Department of Natural Resources and Environmental Control, the state's CWSRF administrator. The program offers financing at interest rates of 1.5 percent or 3 percent, depending on income, for loans of $1,000 to $35,000 for individual systems and $250,000 for community or mobile home park systems. Eligible costs for onsite systems include site evaluation, septic system design, permits, construction costs, and closing and recording charges. The program is well-known but does not offer options for renters or homeowners who are unable to take on loans.

52 US Environmental Protection Agency. (2022). *Clean Water State Revolving Fund (CWSRF) Reporting Summaries* [online]. Available from: https://www.epa.gov/cwsrf/clean-water-state-revolving-fund-cwsrf-reporting-summaries [accessed June 25, 2022].

53 US Environmental Protection Agency. (2022). *Clean Water State Revolving Fund (CWSRF) National Information Management System Reports* [online]. Available from: https://www.epa.gov/cwsrf/clean-water-state-revolving-fund-cwsrf-national-information-management-system-reports [accessed June 25, 2022].

54 US Environmental Protection Agency. *Report to Congress on the Prevalence Throughout the U.S. of Low- and Moderate-Income Households Without Access to a Treatment Works*.

55 Delaware Department of Natural Resources and Environmental Control. *Septic Rehabilitation Loan Program*.

56 Interview with Jessica Velasquez, March 16, 2022.

Delaware also offers the Septic Extended Funding Option (SEFO). Homeowners can get interest-free loans after placement of a lien on the property for the loan amount. The loan is forgiven (and the lien removed) after 20 years, but if the property is sold or refinanced before 20 years, the loan is repaid. Borrowers are required to pump out the septic tank every three years as a condition of the loan. The average loan amount is $18,000 and the delinquency rate is less than two percent. Contractors provide homeowners with a two-year warranty on the septic systems.

Conduit Approach

CWSRF programs often conduct their decentralized system lending via an intermediary, including state and local government agencies, banks, and nonprofits. This approach may take the following forms:

Pass-Through Loans

In a pass-through program, CWSRF financing is provided to the loan/grant recipient through a partner organization. The partner evaluates, approves, and services the loan or grant. Depending on the set up, the partner lender may request disbursements from the CWSRF as the award recipient incurs cost on the project. In the case of loans, the recipient repays the loan to the partner organization and has no contact with the CWSRF agency. Pass-through intermediaries can be private or governmental entities.

In Ohio, for example, the county health districts serve as pass-through intermediaries. The Ohio EPA administers the Water Pollution Control Loan Fund (WPCLF), providing funding to low and moderate-income homeowners for Home Sewage Treatment System (HSTS) repair and replacement. The Ohio EPA distributes up to $150,000 in principal forgiveness loans to each participating county health district from the CWSRF. The funds are then used by the local health department to assist the homeowners in the repair and replacement of failing septic systems. The program began in 2009; since 2016, the program has been in full swing serving nearly all counties in Ohio. The program receives approximately $10,000,000 annually through the WPCLF. Not all of the funds are spent every year due to factors such as the health districts' lack of resources, and recently, being overburdened by the Covid-19 pandemic. The Ohio EPA has disbursed $48 million for septic repair, replacement, or sewer connections since the program began. There are an estimated 300,000 failing septic systems in Ohio. The program has replaced 3,343 systems, repaired 694 systems, and connected 335 systems to centralized sewers since 2016. A more descriptive version of this program is available on the EPIC website.

Financing through CDFIs

Washington and Oregon have embraced a different intermediary financing model by contracting with Craft3, a community development financial institution serving the Pacific Northwest, to offer loans to owners of residential and commercial properties to repair or replace failing septic systems through their Clean Water Loans program. With an estimated one million septic tanks in Washington and 450,000 in Oregon, Craft3 has helped more than 2,100 property owners address failing septic systems by lending more than $50 million in Clean Water Loans since 2002.

Property owners can apply to Craft3 for loans for septic repairs, replacements, or connections to sewage systems when their existing systems fail. The Clean Water Loan addresses community needs by covering all eligible permitting, design, and installation costs, offering lower rates and deferred repayment options to low-income borrowers, and available to applicants who may not have perfect credit. Details on current rates, terms, and eligibility requirements can be found on their website. Over 40 percent of Clean Water Loan borrowers are low income (earning less

than 80 percent of the area's median household income). There are no predetermined maximum loan amounts; while the average loan is $25,000, loan amounts could be much higher or lower depending on project costs. A more descriptive version of this program is available on the EPIC website.

Linked Deposit Loans

States may choose to partner with local banks to provide CWSRF financing to eligible homeowners. In such a case, the bank will conduct the credit review and approve the loan once the permits have been received. Operationally, the CWSRF program will make an investment at the bank at a lower rate of return than typical investments. The interest rate differential or discount is then offered by the bank to the borrower. As a result, the individual borrower pays an interest rate that is below the bank's typical rate and sometimes even guided by CWSRF agencies.

Linked deposits are a suitable option in cases where CWSRFs are legally unable to make loans to private parties like homeowners. This option also allows property owners to work directly with their community lender with whom they may already have a relationship. Since the loan amounts are small, allowing banks to handle these loans is efficient for the CWSRF agency, which is used to handling larger loans to utilities and local governments.

Sub-State Revolving Fund

In some cases, the CWSRF may capitalize another revolving loan fund by providing initial loans to a state agency, which may seek other grants for capitalization. The sub-state revolving fund makes loans to and receives repayments from individual borrowers for decentralized system projects. The repayments are used to pay off the CWSRF and finance new loans, with the intention of becoming self-supporting over time.

Sponsorship

In a sponsorship loan, the CWSRF may award a loan to a community or wastewater utility. In addition, the loan recipient will "sponsor" a nonpoint source project and the value of that project is added to the CWSRF loan. To facilitate the process, the CWSRF lowers the interest rate on the loan so the annual payments are equal to what they would have been to finance the centralized treatment project alone without the addition of the nonpoint source sponsored project. In this manner, the CWSRF agency is able to finance two projects, of which the nonpoint source sponsored project is essentially grant-funded. This model has not yet been used for decentralized systems, but several states have used this to finance nonpoint source projects for land conservation, wetland restoration, and source water protection.

Sponsorship is a suitable option for financing septic repair, replacement, and remediation projects. A wastewater treatment facility could, for instance, sponsor a grant program for decentralized wastewater treatment in nearby communities by providing homeowners with grants to upgrade septic systems rather than expand the collection system network in a low-density area.

Co-Financing

Every CWSRF program co-finances projects with other federal agencies like the US Environmental Protection Agency (EPA) and the Department of Housing and Urban Development (HUD), with EPA's other programs like the Water Infrastructure Finance and Innovation Act (WIFIA), as well as other state and local funding. In a co-financing arrangement, the CWSRF loan can be paired with a grant or other low-interest loans from other programs, bringing down the costs for borrowers and expanding the reach of limited grant funds. This is an option more suitable for community-scale projects like cluster systems, packaged decentralized treatment systems, and septic-to-sewer conversions, and not for individual onsite systems.

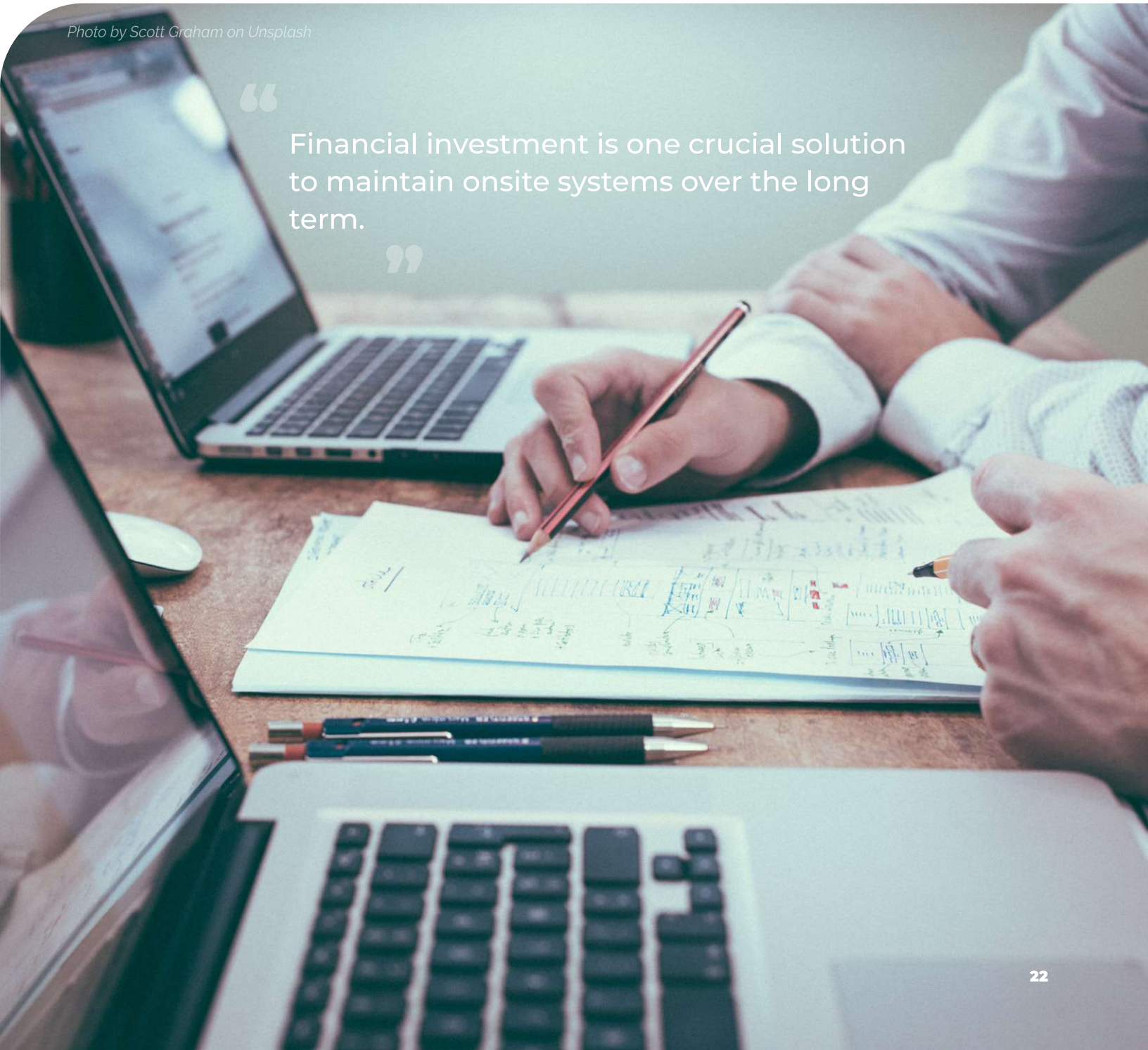


Photo by Scott Graham on Unsplash

> "Financial investment is one crucial solution to maintain onsite systems over the long term."

3) State Financing Options

Federal funding through CWSRF programs for individual onsite systems are not available in every state and currently do not cover every eligible borrower. This void may be filled by other state, regional, watershed, and local programs funded by government and non-government sources. The financing options for onsite systems varies greatly across states and represents a patchwork of possible solutions to navigate.

A comprehensive look at states' funding options is found in Table 1.[57] A few states have onsite system financing programs, but participation may be restricted based on local jurisdiction and income, and subject to available funds. A total of 19 states offer statewide funding for septic repair and replacement; 10 states have regional programs. Notable statewide programs include Ohio's Water Pollution Control Loan Fund,[58] Craft3[59] in Washington and Oregon, Virginia Department of Health's Septic and Well Assistance Program (SWAP),[60] Rhode Island's Community Septic System Loan Program (CSSLP)[61], and Delaware's Septic Rehabilitation Loan Program.[62]

Virginia's SWAP program[63] covers up to 100 percent of costs for septic repair or replacement of failing septic systems including replacing straight pipes and privies, installing conventional system repairs, alternative system repairs, or sewer connection. To receive funding, applicants' income must be at or below 200 percent of federal poverty guidelines. Funding for the program comes from $11.5 million allocated in the Governor's Budget Bill to the Virginia Department of Health. This program is an excellent resource for low-income households to repair and replace failing onsite systems as 100 percent of costs are covered with grants. For households above 200 percent of the federal poverty guideline, this program does not offer households any support despite the reality that such septic repairs and replacement can be largely unaffordable.

A few states have onsite system financing programs, but participation may be restricted based on local jurisdiction and income, and subject to available funds.

Rhode Island's Community Septic System Loan Program (CSSLP),[64] a 22-year-old program established at the Rhode Island Infrastructure Bank, annually provides $300,000 zero percent interest rate loans with CWSRF funds to communities across the state. The communities are then responsible for distributing loans to individual households. End loans are typically $15,000 per household which are repaid monthly with terms up to ten years, and eligibility is determined by each county. The CWSRF issues the loan at zero percent interest, but residents are charged a one percent interest rate that serves as an annual fee and is split equally between the Rhode Island Infrastructure Bank and Rhode Island Housing Authority, who administers the loans.

57 Table 1 was created by searching for '[state] septic financing programs' and '[state] septic funding programs'. Information about programs that fund septic installation, replacement or maintenance was added to the table.

58 Ohio Environmental Protection Agency. (2021). *Water Pollution Control Loan Fund* [online]. Available from: https://epa.ohio.gov/static/Portals/29/documents/ofa/WPCLF-2022-Final-PMP.pdf [accessed May 2, 2022].

59 Craft3. (no date). *Financing For Better* [online]. Available from: https://www.craft3.org/ [accessed May 4, 2022].

60 Virginia Department of Health. (no date). *VDH's Septic and Well Assistance Program* [online]. Available from: https://www.vdh.virginia.gov/environmental-health/swap/ [accessed May 3, 2022].

61 Rhode Island Housing. (no date). *Community Septic System Loan Program (CSSLP)* [online]. Available from: https://www.rihousing.com/community-septic-system-loan-program-csslp/#:~:text=This%20program%20allows%20communities%20without,cesspool%20with%20a%20septic%20system. [accessed July 22, 2022].

62 Delaware Department of Natural Resources and Environmental Control. (no date). *Septic Rehabilitation Loan Program* [online]. Available from: https://dnrec.alpha.delaware.gov/environmental-finance/septic-rehabilitation/ [accessed May 5, 2022].

63 Virginia Department of Health. *VDH's Septic and Well Assistance Program*.

64 Rhode Island Housing. *Community Septic System Loan Program (CSSLP)*.

Rhode Island also has strict rules for septic systems, so if a system is failing or out of compliance, it is the homeowner's responsibility to upgrade, repair, or replace the system. The CSSLP is an important tool in ensuring compliance, helping low-income residents pay for repairs and replacement. To date, the program has loaned $21 million to 16 of 39 communities across the state who have opted into the program. This program has also been instrumental in replacing all of the cesspools in the state.[65]

The Deep Well Project Safe Sewer System Assistance[66] in Hilton Head, South Carolina provides grants for households to connect to centralized sewers on Hilton Head Island in South Carolina. Depending on income, the program will cover up to 100 percent of the costs of connection.

The Sewer Connection Assistance Program[67] in Monroe County, Florida provides grants to households to connect to centralized sewer. The county's location in the Florida Keys makes septics vulnerable to sea level rise and intensified rain events, therefore connecting to centralized sewer can protect human health and the environment from failing onsite systems.

Table 1 displays funding and financing programs available across the nation, broken down by state. The highlighted programs above are only a few examples of the many programs available to households who rely on onsite systems across the country.

65 Interview with Sydney Usatine, February 7th, 2022.

66 Deep Well Project. (no date). *Furniture and Other Special Services* [online]. Available from: https://www.deepwellproject.org/copy-of-children-s-programs-1 [accessed July 20, 2022].

67 Monroe County. (no date). *Sewer Connection Assistance* [online]. Available from: https://www.monroecounty-fl.gov/402/Sewer-Connection-Assistance [accessed July 2, 2022].

Recommendations

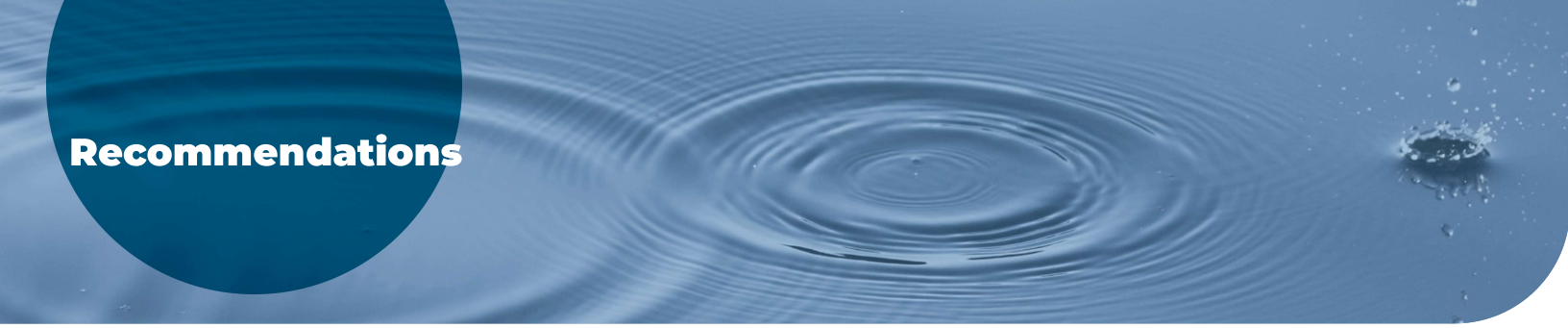


Photo by Linus Nyland on Unsplash

There is an incredible amount of funding, tracking, outreach, and oversight that is needed to ensure 22 million onsite systems are effectively treating wastewater and not posing a risk to individual and public health and the environment. Funding these systems—which are often individually owned, scattered throughout the country, largely unmapped, relied on by low-income and disadvantaged communities, and operating with little government oversight—is a challenge, but certainly not impossible. Effective funding programs and innovative funding strategies exist. Reforms are necessary to ensure that more households, communities, local governments, nonprofits, and other entities can access these resources. Stakeholders at all levels of government, corporate entities, and nonprofit organizations can—and should—play a role.

To ensure more households depending on onsite systems receive the support and investment they need, our recommendations are as follows:

Collect more data.

We agree with the US EPA that the lack of data is an 'impediment'[68] for moving forward. Without a clear understanding of the number of onsite systems and the demographics of who is using them, addressing the issues related to them becomes difficult. We especially need a clearer picture of onsite system use and failures in disadvantaged and unincorporated communities, where the situation is dire and public health is at stake. More—and regular—data collection and monitoring is needed for onsite septic use—and its users—across the country. At the state level, the Washington Post reported[69] that Georgia is the only state to complete a comprehensive inventory[70] of its onsite systems, and the EPA noted in 2021 that four states (Delaware, Florida, Hawaii, and Rhode Island) also have state-wide data,[71] but more states can—and should—follow suit. We simply need more data for effective oversight and management, as well as to address issues of disinvestment and structural racism in many communities who rely on onsite systems.

Utilize more CWSRF funding for onsite systems.

Starting this year, we have an unprecedented amount of funding flowing from the federal government to communities through the Bipartisan Infrastructure Law (BIL). As much funding as possible should be targeted to disadvantaged communities and available to those communities in the form of grants, not only for centralized systems but also for onsite systems serving many low-income households. Although only one state uses the CWSRF for direct loans, the funding can be used in a number of ways—from pass-through loans to private or governmental entities and the use of intermediaries such as community

68 US Environmental Protection Agency. *Report to Congress on the Prevalence Throughout the U.S. of Low- and Moderate-Income Households Without Access to a Treatment Works*.

69 Morrison, Jim. *Backed-up pipes, stinky yards: Climate change is wrecking septic tanks*.

70 Welstrom. (no date). *Welcome to the Well and Septic Tank Referencing and Online Mapping Website* [online]. Available from: https://www.welstrom.com/help.html [accessed July 23, 2022].

71 US Environmental Protection Agency. *Report to Congress on the Prevalence Throughout the U.S. of Low- and Moderate-Income Households Without Access to a Treatment Works*.

development financial institutions and nonprofits to linked deposit loans through local banks, sub-state revolving funds, sponsorship, and co-financing options. We believe that more states should utilize this funding, and employ as many of these options as possible.

Make USDA's Single Family Housing Repair Loans and Grants accessible to more households.
As one of two primary federal funding sources for onsite systems and for septic to sewer replacements, this program is critical—but also limited. With some key changes, this funding program could be made more accessible for individual households. The maximum grant amount of $10,000 for home repairs (including septic repairs) is inadequate in some cases, especially since the household needs to pass structural integrity requirements that might limit how much is left over for the onsite system repairs. The homeowner requirement limits people who may be renting properties, and the age requirement for grants of 62 years and older makes the grants inaccessible to younger households. This is a critical program for rural households throughout the country, but could easily be expanded to be more inclusive and accessible.

Use intermediaries to reach more households.
The challenge of connecting 22 million dispersed households to available funding is immense, which is why the use of third-party intermediaries can be extremely useful in making all types of funding for households more accessible. This includes federal and state funding, as well as philanthropic dollars like those used in the James River Septic System Repair Cost-Share Program.[72] An example of using a local government authority as an intermediary is the Ohio Water Pollution Control Loan Fund[73] which provides principal forgiveness loans, from the CWSRF, to county health districts to assist low and moderate-income homeowners with septic repair and replacement of failing septic systems. An example of a nonprofit community development financial institution (CDFI) as an intermediary is Craft3,[74] which Oregon and Washington both use to offer CWSRF loans to owners of residential and commercial properties to repair or replace failing septic systems. Another nonprofit intermediary example is West Virginia Safe Housing and Economic Development (SHED). As much as possible, state SRF administrators can help make funding options more well-known and easier to access by potential intermediary groups. Nonprofits and community-based organizations are also well-positioned to serve this critical intermediary role, and to encourage and assist more households in applying for funding.

The challenge of connecting 22 million dispersed households to available funding is immense, which is why the use of third-party intermediaries can be extremely useful.

Conduct more outreach and coordination.
One reason we believe that more states and other entities are not taking advantage of available funding is that the information about these programs is scattered and not available in one place. We undertook this report to better understand the landscape of available funding, but federal, state, and local officials can better coordinate among themselves to make sure their constituents know about and can access these programs. Though this report serves as an initial review of available programs, there is a need for a one-stop shop online for this information at the federal and state levels.

72 Virginia Department of Health. (no date). *James River Septic System Repair Cost Share Program* [online]. Available from: https://www.vdh.virginia.gov/environmental-health/veesepticgrant/#:~:text=James%20River%20Septic%20System%20Repair%20Cost%20Share%20Program&text=The%20grant%20provides%20homeowners%20with,or%20connect%20to%20public%20sewer [accessed July 20, 2022].

73 Ohio Environmental Protection Agency. (2020). *Ohio EPA Finalizes 2022 Water Pollution Control Loan Fund Program Management Plan* [online]. Available from: https://epa.ohio.gov/about/media-center/news/ohio-epa-finalizes-2022-water-pollution-control-loan-fund-program-management-plan#:~:text=Ohio%20EPA%20has%20finalized%20the,lakes%2C%20and%20other%20water%20bodies. [accessed March 4, 2022].

74 Craft3. *Financing For Better*.

Encourage local governments to play a role.

Local governments should work alongside their residents and CBOs to connect households with funding and financing opportunities. Local governments should work to locate and map disadvantaged communities and neighborhoods, identify wastewater infrastructure deficiencies, plan for solutions alongside residents, and help residents apply for funding to implement solutions. They should treat decentralized systems on par with centralized systems in terms of planning, tracking, and oversight, since these systems also can affect local public health and water quality. This prioritization should be reflected in municipalities' comprehensive planning processes, greater wastewater management, and source water protection strategies.

In new developments, local governments can require Responsible Management Entities[75] to be established to provide oversight and management of onsite systems. In the case of the Canandaigua Lake Watershed Inspection Program[76] in the Finger Lake region of Upstate New York, several municipalities came together to protect the lake—and their drinking water source—in an intermunicipal agreement, sharing resources to fund a county-based inspector to consult with residents on siting, repairs, and construction; conduct inspections; maintain records of systems; investigate violations; and respond to spills. There is much local governments can and should do to provide better management of decentralized systems.

Center equity and community at the core of all solutions.

The inability of many households to pay for repairs, operation, maintenance, and replacement of their onsite systems affects public health and water quality. We see this in the example of Lowndes County, Alabama, where failing onsite systems led to the existence of new public health hazards that have no place in the United States.

Residents should be at the center of all discussions about the needs and challenges that communities face, and at the core of all funding programs and other solutions. Funding programs need to be more accessible for residents of all backgrounds, with a focus on low-income and historically disinvested households, neighborhoods, and communities.

Making grants available instead of loans and assisting homeowners with applications are also key to make funding more accessible. To protect undocumented residents, applications for funding should not require documents or information that identifies the legal status of the resident. Nor should applications require the applicant to be a homeowner, which excludes renters who want to apply. Just like Newark, New Jersey[77] and more municipalities have embraced renters alongside homeowners in lead service line replacement programs, realizing that replacing all of the pipes requires this holistic approach, the approach to managing onsite systems needs to embrace all users, including renters. Funding for onsite systems should not require homeownership as a prerequisite.

75 US Environmental Protection Agency. (no date). *Using a Responsible Management Entity (RME) to Manage Tribal Onsite (Septic) Wastewater Treatment Systems* [online]. Available from: https://www.epa.gov/sites/default/files/2018-02/documents/tribal_rme_guidance_508c.pdf [accessed July 2, 2022].

76 Ontario County Soil & Water Conservation District. (no date). *Canandaigua Lake Watershed Inspection Program* [online]. Available from: https://www.ontswcd.com/canandaigua-lake-watershed [accessed July 4, 2022].

77 Cunningham, Maureen. (2022). *Echoing Newark: How American Cities Can Replicate Newark's Success in Replacing Over 23,000 Lead Pipes in Under Three Years* [online]. Available from: https://www.policyinnovation.org/blog/echoing-newark-how-american-cities-can-replicate-newarks-success-in-replacing-over-23000-lead-pipes-in-under-three-years?rq=newark [accessed May 23, 2022].

A lack of adequate plumbing is closely linked to the status of municipal incorporation. Many unincorporated communities illustrate how structural racism has left communities without a safety net or the necessary resources to manage issues like failing septic systems effectively. Connecting these communities to services is imperative from an equity and environmental justice perspective. While this report primarily focuses on financial investment as a solution, addressing this legacy of disinvested, unincorporated communities and municipal underbounding around the country is clearly an ongoing and urgent need for policymakers to address.

To create more sustainable, resilient, and equitable onsite wastewater systems, we need to drive more investment to the households and communities who really need it, from the many unincorporated communities to other disinvested communities across the country. The human right to sanitation[78] requires a collective responsibility that onsite systems—like centralized systems—are serving a greater purpose linked to public health and the environment, and we need to ensure that we have the necessary systems and investment to support them.

78 United Nations. (no date). *Human Rights to Water and Sanitation* [online]. Available from: https://www.unwater.org/water-facts/human-rights/#:~:text=The%20right%20to%20sanitation%20entitles,provides%20privacy%20and%20ensures%20dignity [accessed June 2, 2022].

Photo by Raeng on Unsplash

> There is an incredible amount of funding, tracking, outreach, and oversight that is needed to ensure 22 million onsite systems are effectively treating wastewater and not posing a risk to individual and public health and the environment.

Comprehensive State Financing and Funding Programs for Onsite Wastewater Systems

State*	Administered by	Funding/ financing program	Source of Funds outside CWSRF and USDA	Active since	Income Requirement****	Type of financing	Program Budget	Maximum loan or grant amount per applicant
Arkansas**	Illinois River Watershed Partnership	Septic Tank Remediation Program (pg 8)	CWSRF	2021	No Income Cap	L (0%), G	$1 million	$30,000
California**	Regional Water Board's Wastewater Consolidation Program	Wastewater Consolidation Program	CWSRF	2018	Disadvantaged communities as defined by California	G		$8 million or $75,000 per household connection
Colorado**	Colorado Department of Public Health and Environment	Water Pollution Control Revolving Fund (WPCRF)	CWSRF			L		$3 million
	Colorado Department of Public Health and Environment	Small Communities Water and Wastewater grant	State Finance	2015		G		$400,000
Connecticut**	Connecticut Department of Energy and Environmental Protection	Connecticut's Clean Water Fund	CWSRF	1986		L, G		
Delaware**	Delaware Environmental Finance	Septic Rehabilitation Loan Program	CWSRF	1990s	Income limits	L, with a lien from the state	$1.2 million	$35,000 for individuals, $250,000 for community or mobile home parks
Florida***	The Department of Environmental Protection	Septic Upgrade Incentive Program		2018		G	$1,575,000	$7,000
	City of Jacksonville Office of Economic Development	Septic Grant Program - Non-Residential				G		$30,000
	Monroe County Social Services	Sewer Connection Assistance	FEMA funds from the Dept of Emergency Assistance	2006	$56k to $107k for 1 to 8 people households	G		No limit
Hawaii***	Hawaii Department of Health Wastewater Branch	Tax Credit Program		2017		Tax Credit	$5,000,000	$10,000

State*	Administered by	Funding/ financing program	Source of Funds outside CWSRF and USDA	Active since	Income Requirement****	Type of financing	Program Budget	Maximum loan or grant amount per applicant
Idaho**	Rural Community Assistance Corp	Idaho SRF/ Household Septic System Program	CWSRF	2018	Loan eligible income < $49,174. Grants eligible income < $24,587.			$15,000
Iowa**	Iowa Finance Authority	on-site Wastewater Assistance Program	CWSRF			L		$2000 to 100% of project
Kansas**	The Division of Conservation	Kansas Cost-Share Programs			Under 55% poverty guideline	G		The county average cost of repair.
Kentucky***	Eastern Kentucky Personal Responsibility in a Desirable Environment	PRIDE Homeowner Septic System Grants	2 small grants through US forest Service 319 Grant	1997	Income dependent	G		Covers full costs
Maine**	Maine Dept of Environmental Protection	Small Community Grant Program	State Fiscal Recovery funding, provided by the American Rescue Plan Act		Residential: HH income < $40,000; Commercial: gross profit < $100,000	G	$1,000,000	Up to 100% of costs
Maryland**	Maryland Dept of the Environment	Bay Restoration Fund	Septic system users pay $60/yr per household to create on-site Disposal Systems Fund	2010		G	$27 million per year	up to $20,00
Massachusetts**	Department of Environmental Protection (DEP), the Executive Office of Administration and Finance, the Office of State Treasurer, and the Department of Revenue	The Community Septic Management Program	SRF	1995		L	$30 million since program began	
Michigan**	Michigan Dept of Human and Health Services	Emergency Relief Home Repairs		1991		G		$1,500

State*	Administered by	Funding/ financing program	Source of Funds outside CWSRF and USDA	Active since	Income Requirement****	Type of financing	Program Budget	Maximum loan or grant amount per applicant
	Michigan State Housing Development Authority	Property Improvement Program (PIP) Loans for Homeowners	Bank Lenders		Annual HH income up to $125,300 with a credit score of at least 620.	L		$25,000
	Federal Home Loan Bank of Indianapolis	Neighborhood Impact Program			Be at or below 80% Area Median Income.	G		$7,500
Minnesota**	Minnesota Public Facilities Authority	Small Community Wastewater Treatment Program	Clean Water Fund via the Clean Water, Land and Legacy Amendment.	2006		L, G		Up to $2 million per year per Cities, counties, townships, sanitary districts or other government subdivisions and grants up to 80% of costs
	Otter Tail County Minnesota	Subsurface Sewage Treatment Systems (SSTS) Local Cost Share Fix Up Fund Program	CWSRF		300% of the federal poverty guidelines	G	$61k	$5,000
	Otter Tail County Minnesota	Zero Interest Septic Replacement Loan	CWSRF		There are no income restrictions.	L		
	Minnesota Pollution Control Agency	Minnesota Pollution Control Agency County SSTS grant	Minnesota Clean Water Fund	2013	Where homeowner is low income and use of sliding scale for grant funds is recommended, based on income	G		$40,000 per county
Missouri**	Missouri Department of Natural Resources, Missouri's regional planning commissions and councils of government.	Missouri On-Site Wastewater Improvement Grant-Loan Program	Missouri Department of Natural Resources		Homeowners must have a sufficient income to make the loan payment and maintain the system.	L, G		$25,000

State*	Administered by	Funding/ financing program	Source of Funds outside CWSRF and USDA	Active since	Income Requirement****	Type of financing	Program Budget	Maximum loan or grant amount per applicant
New Hampshire***	Acton Wakefield Watershed Alliance	Septic System Replacement Cost-Share Program	Watershed Assistance Grant from the NH Department of Environmental Services	2019		G		$4,600
New York**	The State Department of Environmental Conservation and the Department of Health	Septic System Replacement Fund Program		2017		G		$10,000
Ohio**	Ohio EPA	Water Pollution Control Loan Fund	CWSRF	2009	Income-based: 300%-100% FPL	G	$10 million of funds, up to $150,000 for each county	
Oklahoma***	The Grand River Dam Authority, Oklahoma Conservation Commission and the Oklahoma Department of Environmental Quality	Septic system repair or replacement assistance	funded by revenues from electric and water sales	2021				
Oregon**	Craft3	Clean Water Loans	CWSRF and private donations and grants	2002	Income determines loan rates and terms	L	Unknown but $1.5 million of loans distributed in the last year.	As much as is needed
Pennsylvania**	The Pennsylvania Infrastructure Investment Authority (PENNVEST), Pennsylvania Housing Finance Agency (PHFA) and the Pennsylvania Department of Environmental Protection (DEP)	PENNVEST Homeowner Septic Program			No income requirements.	L		$25,000
Rhode Island**	Rhode Island Infrastructure Bank	Rhode Island Community Septic System Loan Program	SRF and private funding	1999		L		$300,000 to each community, typical end loans are $25,000

State*	Administered by	Funding/ financing program	Source of Funds outside CWSRF and USDA	Active since	Income Requirement****	Type of financing	Program Budget	Maximum loan or grant amount per applicant
South Carolina***	Community Foundation of the Lowcountry, Deep Well Project, Hilton Head PSD#1	Deep Well Project Project Safe Sewer System Assistance	Town paid for basic infrastructure, PSD pay for pumps, community foundation raised $3 million	2000	Income determines if 100% grant, 85% grant or 50% grant.	G		Covers 100% of costs
	Charleston County	Safe and Sanitary Water and Septic Systems	federal grant funding	2006	Qualified low to moderate income residents	G		
	Lake Keowee Source Water Protection Team	Septic Repair Program	SC DHEC and Lake Keowee Source Water Protection Team		Income based	G		
Tennessee***	Blount County Soil Conservation District	Homeowner Septic Grant Program			income limits	G	?	
	Southeast Tennessee Resource Conservation and Development Council	Septic Grants	Nonpoint Source Program (aka, 319 Program?	2018		G	?	
Texas***	Lampasas River Watershed Partnership	Lampasas River Watershed On-site Sewage Facilities (OSSF) Remediation	Clean Water Act (CWA) Section 319 grant	2021		G	Enough to repair or replace approximately 15 OSSFs	$8,000
	Angelina & Neches River Authority	On-Site Sewage Facility Grants for Homeowners in the Attoyac Bayou Watershed	CWA Section 319 grant, Texas Commission on Environmental Quality (TCEQ) Nonpoint Source Program and the EPA		HHI is at or below 150% of the Median Household Income,	G		100% of costs covered
Utah**	Utah Division of Water Quality	Non Point Source (NPS) Financial Assistance Application for an Underground Wastewater Disposal System	CWSRF		HHI is no greater than 150% of the State median adjusted income.	L, G		

State*	Administered by	Funding/ financing program	Source of Funds outside CWSRF and USDA	Active since	Income Requirement****	Type of financing	Program Budget	Maximum loan or grant amount per applicant
Vermont**	VT Department of Environmental Conservation Facilities Engineering Division	on-site Loan Program	Loan Program is funded and administered by the Agency of Natural Resources, Department of Environmental Conservation with loan underwriting and servicing by the Opportunities Credit Union in Winooski, Vermont.	2012	Gross HH income < 200% Statewide MHI.	L		Min: 3000, no max
	Champlain Housing Trust	Home Repair Loan			Gross HH income <80%AMI,	L, G		Grant up to $2500, loan up to $22500
Virginia**	Virginia Dept of Health	James River Septic System Repair Cost Share Program	Virginia Environmental Endowment (VEE) and the Smithfield Foundation	2012	Grant max: $18,000 if under 200% FLP; $13,500 if 201-400% FLP; $9,000 if 400% or more FLP	G		$18,000
	Northern Neck Planning District Commission, Virginia Department of Environmental Quality	Northern Necks U.S.	Dept of Env Quality		80% AMI (adjusted median income)	G		Cost of pump out
	Virginia Dept of Health	VDH's Septic and Well Assistance Program	American Rescue Plan Act		HHI at or below 200% of the FPL	G	$11.5 million	100% of costs
	Middle Peninsula Planning Commission District	Septic Repair Program	Virginia dept of Environment Quality, from Virginia Resource Authority as a revolving fund. Main source is CWSRFs, plus other funding such as section 319, VDH SWAP	1994		L, G	Fluctuates	Up to full costs

State*	Administered by	Funding/ financing program	Source of Funds outside CWSRF and USDA	Active since	Income Requirement****	Type of financing	Program Budget	Maximum loan or grant amount per applicant
Washington**	Craft3	Clean Water Loans	CWSRF and private donations grants	2002	Income determines loan rates and terms	L	Unknown but $10 million of loans distributed last year.	Up to full costs
West Virginia**	West Virginia Housing Development Fund and West Virginia Department of Environmental Protection	On-Site Systems Loan Program	CWSRF			L		$10,000
Wisconsin**	Department of Safety and Professional Services	Wisconsin Fund	Revenue from the safety and buildings (Division of Industry Services) operations appropriation	2000	adjusted gross income of all owners and spouses is less than $45,000	G		County dependent
Wyoming***	Sheridan County Conservation District	Septic System Improvement Program	Section 319 Grants from the Clean Water Act and State grants from the Department of Agriculture.	2003		G		50% of costs

*Every state has USDA funding programs and CWSRFs
**Statewide Program
***Regional Program
****Income requirement refers to the eligibility requirements of households yearly income for applicants

Case Studies

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Philanthropic support for septic remediation in a Virginia watershed

With $300,000 from the Virginia Environmental Endowment[79] (VEE) and an additional $200,000 from the Smithfield Foundation, the philanthropic arm of Smithfield Foods, Inc., the Virginia Department of Health administers the James River Septic System Repair Cost-Share Program.[80] The program provides support for failing septic systems and remediates illicit sewage discharges in the James River watershed. The goal of this program is to assist households bring their failing systems into regulatory compliance, and ultimately, to reduce total nitrogen and fecal coliform loads in the watershed. Homeowners with a household income of 200 percent or less of the Federal Poverty Level (FPL) are eligible to have 100 percent of the cost covered up to $18,000. Households earning more are eligible for lower amounts.

Cesspools in Hawaii

Although Hawaii is known as a tropical paradise, it also faces the challenges of failing wastewater infrastructure. Sewage pollution is a threat to public health, the environment, and the economy in Hawaii. Roughly 88,000 households in the state still rely on cesspools, discharging an estimated 53 million gallons per day of untreated sewage into the ground. Cesspools pollute groundwater and threaten drinking water sources in addition to impacting reefs along the shoreline, killing corals, collapsing fisheries, and causing harmful algal blooms. Recently, the state enacted Act 125,[81] which creates a mandate for upgrading all cesspools in Hawaii by 2050. Conventional septic systems do not work in Hawaii because of shallow groundwater, small lot sizes, porous sand, and heavy clays, so they are not a viable solution in these challenging environmental conditions. Wastewater Alternatives & Innovations (WAI),[82] a Hawaiian nonprofit, is working to protect water quality and reduce sewage pollution by providing innovative, affordable, and eco-friendly solutions to waste and wastewater management. Septic system installation costs are higher in Hawaii than in the rest of the country since materials and equipment are imported, and labor costs are also higher. Formed in 2019, WAI is working with the state legislature and agencies to authorize state funding for a financing program that offsets the cost of septic systems, making them more affordable and easier to install. More about this case study is available on the EPIC website.[83]

79 Virginia Environmental Endowment (Vee). (no date). *Vee Receives James Changer Award From James River Association* [online]. Available from: https://www.vee.org/ [accessed July 2, 2022].

80 Virginia Department of Health. *James River Septic System Repair Cost Share Program*.

81 Hawaii State Legislature. (2017). *HB 1244 HD1 SD2 CD1* [online]. Available from: https://www.capitol.hawaii.gov/Archives/measure_indiv_Archives.aspx?billnumber=1244&billtype=HB&year=2017 [accessed July 20, 2022].

82 WAI Wastewater Alternatives & Innovations. (no date). *About Us* [online]. Available from: https://waicleanwater.org/about [accessed July 3, 2022].

83 Calabretta, Sion. *Cesspool Pollution and Conversion in Hawaii: A Wastewater Infrastructure Emergency*.

Florida's septic tank inspection program

Florida is home to more than 2.6 million septic systems that serve roughly one third of the state's population. In 2010, Florida passed Senate Bill 550 (SB550), to grant powers to a water management district governing board, reduce the frequency of compliance reports, and include wastewater utilities, reuse utilities, and the Florida Department of Environmental Protection (DEP) in the regional water supply planning process. The bill highlights the impact of inadequately treated wastewater from septic tanks and other onsite systems on the Florida Keys, which compromises the quality of the coastal environment and natural resources. Specifically, SB550:

- Outlines treatment and disposal requirements with which both centralized systems and privately-owned facilities must comply
- Grants regulators the ability to enter the premises[84] where noncompliance is reasonably suspected, issue citations, and charge fines
- Requires an annual operating permit, inspection with water quality sampling every five years, and monitoring program to identify the suitability of soils for septic systems through soil surveys

Although SB550 was initially seen as a significant environmental and public health victory, concerns over compliance—and its potential cost to homeowners—quickly escalated. The bill does include a grant program for low-income individuals to alleviate some of the costs associated with the required five-year inspection, which can cost roughly $150-300 to conduct sampling and laboratory analysis. Opponents of SB550 highlight the concern that these inspections will potentially reveal other failures that require additional repairs or replacement, which would also fall on the homeowner.

Under pressure from opponents, the legislature delayed implementation. After Governor Rick Scott —who ran on a campaign to repeal the inspection law—took office in January 2011, the inspection requirement was repealed for most counties and all counties could opt out.[85] Since then, some counties have voted to opt out. The current geographic reach of the inspection law is unclear. A pair of bills were introduced in the Florida legislature in early 2020 that would revive the inspection requirement for the entire state, but they did not receive a vote.[86] A task force convened by the current Governor Ron DeSantis to study persistent blue-green algae also recommended septic tank inspections, but it is unlikely to receive serious consideration among the current administration or the legislature.

84 the term "premises" does not include a residence or private building

85 Scott, T. M., et al. (2002). *Florida Counties with First Magnitude Springs* [online]. Available from: https://static-lobbytools.s3.amazonaws.com/press/20120508_counties_with_1st_magnitude_springs.pdf [accessed June 5, 2022].

86 Lindsey, Auriette. (2019). *Florida bill would require regular septic tank inspections* [online]. Available from: https://weartv.com/news/local/florida-bill-would-require-regular-septic-tank-inspections. [accessed March 20, 2022]

Septic pump-out program to comply with state regulations

The Northern Neck Planning District Commission (NNPDC), one of 21 planning districts in Virginia, is a regional government entity that serves member localities in four counties (Lancaster, Northumberland, Richmond, and Westmoreland).[87] Some areas of these counties have centralized sewer systems, but most rely on onsite systems. Proximity to the sea and the types of soils in this area make onsite systems difficult to maintain. In Virginia, septic systems must be pumped out every five years. This requirement is enforced by counties. Although septic to sewer replacements occur, the pace is slow and few entities are eligible.

NNPDC runs a septic pump-out program that covers the cost of pumping out septic systems for low to moderate-income households earning less than 80 percent of the adjusted median household income. Funding for the program comes from the Virginia Department of Environmental Quality.[88]

NNPDC places a competitive bid and receives cost proposals from pump-out companies, finally choosing one bid to conduct 100-150 pump-outs. NNPDC handles the whole process for the homeowner, including scheduling the pump-out, receiving documentation of completion, and sending out documentation to the local health department to notify them about fulfillment of the requirement. NNPDC minimizes the effort for the homeowner, but more importantly saves them money; homeowners are able to secure contracts that cost about $190 per pump-out, whereas typical pump-outs cost $275-400 each. Through this program, geographic coordinates of every pump-out location is recorded to help track the location of septic systems.

87 Interview with John Bateman and Jerry Davis, February 2nd, 2022

88 Northern Neck Planning District Commission. (2022). *Septic Pump Out Program* [online]. Available from: http://www.northernneck.us/septic-pump-out-project/ [accessed April 30, 2022].

In Lowndes County, Alabama, a predominantly Black community, the clay soil is not suitable for effective functioning of standard septic systems. Lowndes County resident and climate and environmental justice activist Catherine Coleman Flowers stated in her testimony to the US Congress in 2019 that "The Black Belt region of Alabama [...] is particularly affected by the lack of adequate sanitation services because the clay-like soil, which worked well for growing cotton during the slavery and sharecropping eras, makes it extremely difficult to install septic systems. Over half of the region is unsuitable for conventional septic systems, meaning that failing septic tanks are common."

Flowers continues, "Affordability is a primary reason poor families in Lowndes County do not have expensive engineered systems needed to treat wastewater on-site in Black Belt soils." An advanced system that could function in these soils costs over $30,000, just a little more than the annual median household income of $27,000 in the county. As a result, many residents resort to "straight piping" which is the practice of draining untreated sewage to the nearest ditch or waterbody. This practice is illegal under the state code in Alabama,[89] as it is in nearly every state, but the state has been especially aggressive in criminalizing the practice, including arresting and threatening to prosecute[90] individuals, but later backed down under intense public pressure.

In her Congressional testimony, Flowers noted that over the course of her career and work in the community, "[she] began to discover that cost was only part of the issue: failing systems remain a larger burden, one that comes along with impacts like disease and illness." A Baylor University study[91] found that nearly 35 percent of participants—Lowndes County residents—tested positive for hookworm and other tropical parasites.[92] Hookworm is a tropical disease that has been thought to have been eradicated in most developed countries. Flowers' testimony[93] and activism brought much-needed national[94] attention[95] to this issue.

89 Justia. (2014). 2014 *Code of Alabama Title 22 - Health, Mental Health, and Environmental Control* [online]. Available from: https://law.justia.com/codes/alabama/2014/title-22/title-1/section-22-26-1/ [accessed July 3, 2022].

90 Vock, Daniel. (2018). *'People Are Literally Being Poisoned': How Sewage Problems in Alabama Got So Bad -- and Why Other States Should Worry* [online]. Available from: https://www.governing.com/archive/gov-alabama-hookworm-sewage.html [accessed July 23, 2022].

91 McKenna, M. L. et al (2017). *Human Intestinal Parasite Burden and Poor Sanitation in Rural Alabama.* The American Journal of Tropical Medicine and Hygiene 97, 5, 1623-1628, https://doi.org/10.4269/ajtmh.17-0396. Available from: https://www.ajtmh.org/view/journals/tpmd/97/5/article-p1623.xml#html_fulltext [accessed July 25, 2022].

92 McKenna, M.L., et al. (2017). *Human intestinal parasite burden and poor sanitation in rural Alabama* [online]. The American journal of tropical medicine and hygiene, 97(5), 1623 [accessed June 2, 2022].

93 Flowers, Catherine Coleman. (2019). *Testimony of Catherine Coleman Flowers* [online]. Available from: https://www.congress.gov/116/meeting/house/109025/witnesses/HHRG-116-PW02-Wstate-FlowersC-20190307.pdf [accessed July 3, 2022].

94 Flowers, Catherine Coleman. (2018). *A County Where the Sewer Is Your Lawn* [online]. Available from: https://www.nytimes.com/2018/05/22/opinion/alabama-poverty-sewers.html? [accessed July 23, 2022].

95 Thrush, Glenn. (2022). *An Alabama Town's Sewage Woes Test Biden's Infrastructure Ambitions* [online]. Available from: https://www.nytimes.com/2022/01/12/us/politics/infrastructure-environmental-racism-alabama-black-belt.html [accessed July 6, 2022].

Appendix

Experts on onsite systems interviewed during this project

This report was generated based on interviews with experts on onsite systems over the course of five months. The interviewees were predominantly state agency staff, but also included a mix of federal agency staff, nonprofit advocates, academics, and representatives from financial institutions.

Maura Allaire, University of California Irvine
Deborah Almazan, Rural Community Assistance Corporation
Jeanie Barbrow, Virginia USDA
John Bateman, Northern Neck Planning District Commission (VA)
Jon Bernstein, Ohio EPA
Nicki Charles, Deep Well Project (SC)
Stuart Coleman, Wastewater Alternatives and Innovations (HI)
Christina Comfort, Wastewater Alternatives and Innovations (HI)
Jerry Davis, Northern Neck Planning District Commission (VA)
Sandy Gills, The Community Foundation of the Lowcountry (SC)
Aseem Kumar, New York State Department of Environmental Conservation
Zach Lowenstein, EPA Decentralized Wastewater Programs
George McGraw, DigDeep
Colleen Neely, EPA Decentralized Wastewater Programs
Jeff Nejedly, Washington State Department of Ecology
Jackie Orsa, Wastewater Alternatives and Innovations
Joko Schneider, Wastewater Alternatives and Innovations (HI)
Carl Seip, Craft3
Desiree Sideroff, Craft3
Allan Smith, Dig Deep
Ted Stiger, Rural Community Assistance Program
David Tiller, Virginia Department of Health
Sydney Usatine, Rhode Island Infrastructure Bank
Jessica Velazquez, Delaware Office of Environmental Finance
Julie Waechter, DigDeep
Kevin Wilson, Monroe County (FL)