February 2023

LWVCA Study Pages on Stormwater

Climate change is having a global impact, but it affects different regions in different ways. In the Cincinnati region, one significant impact will be increased storms with rains that overwhelm stormwater systems. Cincinnati's weather is getting wetter. Over the past 20 years, there has been a significant increase in average annual precipitation, and an even larger increase in extreme precipitation events.

Extreme precipitation or wet weather events are defined as those delivering 2 inches or more of precipitation in a 24-hour period. For about 100 years, from 1900 to 2000, Ohio's average annual rainfall fluctuated from year to year but stayed approximately flat at 39 inches per year. For the last 20 years, the trend has been sharply upward, now totaling about 44 inches per year. This is a 13% increase from historic levels. During the 100-year period from 1900 to 2000, extreme storms occurred approximately 0.9 times per year. Over the last 10 years, Ohio has experienced more than 1.3 extreme storms per year, an increase of more than 40% and Hamilton County has experienced 9 different 100-year storms. Most experts expect the trends we have seen in the last 20 years to continue and accelerate.[1]

What exactly is stormwater?

Stormwater is rainwater that flows into storm drains and is discharged directly into an outfall area. Unlike wastewater from your home**,** stormwater flows through the system and is discharged untreated into local waterways. Stormwater can also seep into the ground and become groundwater. It is imperative to protect the quality of the water entering the storm drain system. When the sewer system is being overwhelmed during heavy downpours by a sudden rain shower pouring into drains in a short space of time, stormwater overflows have been designed to act as a relief valve.

What is stormwater runoff, and how do we reduce it?

Stormwater runoff comes from small, individual sources in all parts of the watershed. It is a problem that everyone plays a part in solving. It is a problem that residents can change by stopping small, individual activities that cause pollution and result in large-

[1] Metropolitan Sewer District 2022 Sustainability Report
https://msdgc.org/downloads/about_msd/Who_We_Are/2022_MSD_Sustainability_Report.pdf

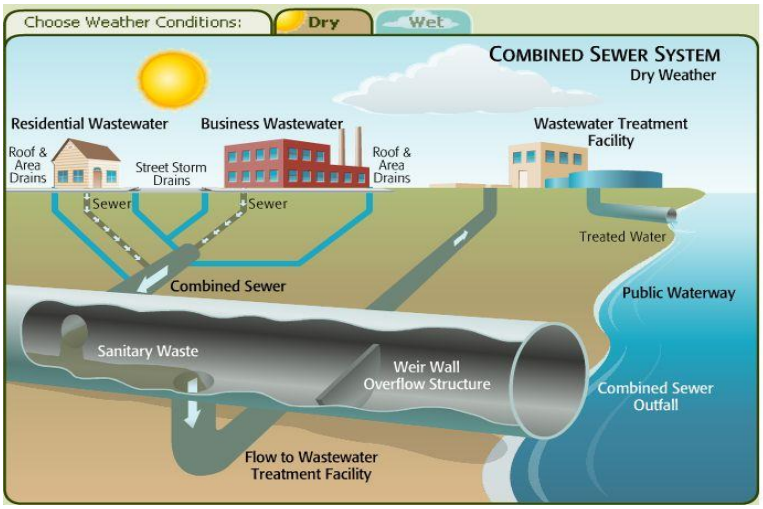
scale pollution. Communities can help prevent stormwater runoff by conserving water using rain barrels, rain gardens, and planting trees on their property.
https://kingcounty.gov/services/environment/water-and-land/stormwater/introduction/stormwater-runoff.aspx

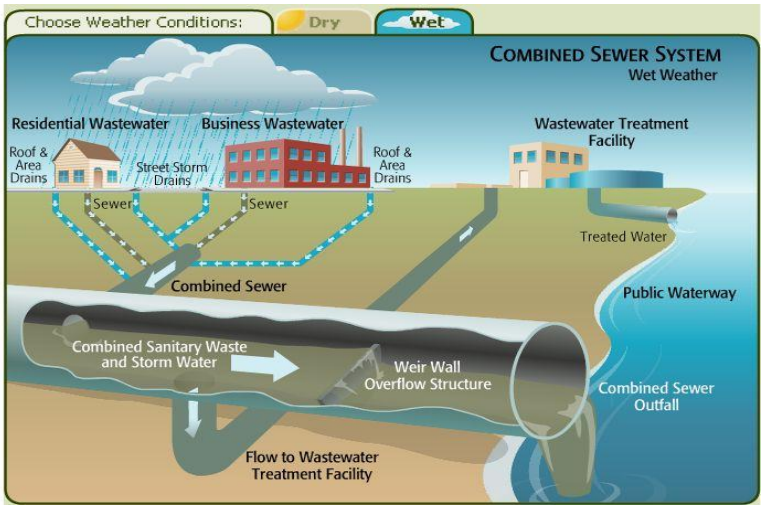
What causes stormwater sewage overflows?
Blockages, inadequate carrying capacity, leaking pipes, and power outages at pumping stations often lead to sewage overflows into nearby streams. Storm sewers carry storm runoff from streets, parking lots, and roofs through pipes and ditches, and eventually into streams.
https://scholarsarchive.byu.edu/cgi/viewcontent.cgi?article=2287&context=iemssconference

What is a Combined Sewer Overflow (CSO)?
A combined sewer system collects rainwater runoff, domestic sewage, and industrial waste. CSOs may be thought of as a type of "urban wet weather" discharge. Both sanitary sewer overflows (SSOs) and storm water discharges flow through the municipality's wastewater conveyance infrastructure.
These overflows, known as combined sewer overflows, contain debris, untreated and/or partially treated human and industrial waste, stormwater and other toxic materials. CSOs pose significant dangers to our waterways — and to public health — if not properly addressed.
https://www.mswmag.com/online_exclusives/2019/04/the-dangers-of-combined-sewer-overflows_sc_003d9

Brief History of CSOs. When combined sewer systems were introduced in 1855, they were hailed as a vast improvement over urban cesspool ditches that ran along city streets and spilled over when it rained. These networks of underground pipes were designed to dry out streets by collecting rainwater runoff, domestic sewage from newly invented flush toilets, and industrial wastewater all in the same pipe. Wastewater and stormwater was then discharged directly into waterways; in the early twentieth century, sewage treatment plants were added to clean the wastewater before it hit streams. Combined sewer systems were—and still are—a great idea, with one catch: when too much stormwater is added to the flow of raw sewage, the result is frequently an overflow. These combined sewer overflows (CSOs) have become the focus of a debate regarding the best techniques to manage growing volumes of sewage and stormwater runoff in many older U.S. communities. The resulting CSO dumps raw sewage into lakes, rivers, and coastal waters, potentially harming public health and the environment. About 40 million people in 32 states live in cities with combined sewer

systems; most of these systems are found in Maine, New York, Pennsylvania, West Virginia, Ohio, Indiana, Michigan, and Illinois.
https://www.mswmag.com/online_exclusives/2019/04/the-dangers-of-combined-sewer-overflows_sc_003d9





Cincinnati is one of the nation's top five combined sewer overflow (CSO) dischargers and is under a federal consent order to reduce its overall discharge. For years, heavy rainfall caused stormwater to back up the city's combined sewers – leading to building damage and water pollution in the city and in the Ohio River. Every year, approximately 14 billion gallons overflow from both sanitary-only sewers and storm and sanitary sewers, contaminating the watershed. On the west side of Cincinnati, the Lick Run Watershed encompasses about 2,900 acres and is home to the Metropolitan Sewer District (MSD) of Greater Cincinnati's largest combined sewer, making this location a priority area for better waste management.

Consent Decree: In February, 2002, The Justice Department and the Environmental Protection Agency together with the State of Ohio Attorney General and the Ohio Environmental Protection Agency announced a partial settlement with the Board of Commissioners of Hamilton County and the City of Cincinnati that will set the Metropolitan Sewer District of Greater Cincinnati (MSD) on a course to eliminate long-standing and significant sewage discharges from the sanitary sewer system.
https://www.epa.gov/enforcement/city-cincinnati-and-hamilton-county-ohio-sewer-overflow-settlement

Impacts on environmental and human health

Heavy precipitation events such as rainfall or heavy snowmelt can easily overload this system, dumping an overflow of untreated sewage and stormwater into the Ohio River. The combined sewage includes human waste, heavy metals from roads, pharmaceuticals, sewage sludge, and pollutants accumulated on roofs. Contaminated water and poor sanitation are linked to transmission of diseases such as cholera, diarrhoea, dysentery, hepatitis A, typhoid and polio. Absent, inadequate, or inappropriately managed water and sanitation services expose individuals to preventable health risks. CSOs flood waterways with contaminants including microbial pathogens, suspended solids, chemicals, trash, and nutrients that deplete dissolved oxygen. Microbial pathogens and toxics can be present in CSOs at levels that pose risks to human health. CSOs can therefore lead to contamination of drinking water supplies, beaches, and river wildlife.
https://scholar.google.com/scholar?q=Impacts+of+sewage+on+human+%26+environmental+health&hl=en&as_sdt=0&as_vis=1&oi=scholart

Green vs Gray Infrastructure. Some cities such as Boston, Chicago, and Atlanta have built deep storage tunnels to hold stormwater overflows. Building these storage tunnels is a simple process, but it costs hundreds of millions of dollars. Environmentalists call for less costly methods of reducing stormwater runoff and CSOs. Such "green infrastructure methods include better means of trapping stormwater before it reaches sewers and putting it into the ground instead. Installing rain gardens, permeable pavements, roof gardens, or even just grassy swales or ditches along roadways can be beneficial for a number of reasons: soil and vegetation provide filtration, groundwater supplies are replenished, and overland stormwater flows are diminished. **https://albertawater.com/green-vs-grey-infrastructure/**

Basement sewage backups can occur due to the sewer system being inundated with water after a heavy rain downpour flooding, or storms. MSD's Sewer Backup (SBU) Program provides professional cleaning services at no charge to eligible property owners and tenants**.** Residents report that MSD is slow to respond or they dispute the reason for the backup.

Back in Feb. 27, 2002, the Sierra Club filed a lawsuit against Hamilton County, the city of Cincinnati and the Metropolitan Sewer District of Greater Cincinnati over the alleged discharge of raw sewage into county waterways.

Communities affected by recurring sewer backups have been fighting in Cincinnati for aid for years, seeing little help from the city or Hamilton County. *Communities United for Action* (CUFA) appealed to the Environmental Protection Agency for help, asking

the EPA to enforce the consent decree, which the group said will address sewage issues in the hardest hit neighborhoods first. CUFA also demands more affordable sewer rates, repaired sewers in the most heavily impacted neighborhoods first and some form of assistance for victims who have suffered damages as a result of the repeated sewer backups. There is also a proposal for an Imperious Surface Fee for entities with large impervious footprints (like large parking lots or roofs) who pay nothing on a water or sewer bill. They, rather than homeowners with small footprints, should be charged for the runoff into our sewer system.

Landslides. Greater Cincinnati is one of the top landslide hazard areas in the US. Landslides happen in every neighborhood in Cincinnati, including downtown and in the suburbs. Private property owners who experience landslides cannot get financial assistance for repairs, so landslides can wipe out a homeowner's largest lifetime investment. Landslides will only become more frequent with climate change. The Hillside Trust is a non-profit dedicated to preserving our hillsides in our region and educating the public. See documentary film by Laure Quinlivan "Living with Landslides."
https://livingwithlandslides.com/

The Green Cincinnati Plan 2023 includes measures for creating a more resilient city using green infrastructure instead of gray. Let's create a "sponge city" as opposed to the current "funnel city." Green infrastructure will help with stormwater overflows, basement backups, and landslides.

Local Resources

Local impacts of Climate Change, City of Cincinnati, Office of Environment and Sustainability https://www.cincinnati-oh.gov/oes/climate/local-impacts-of-climate-change/#:~:text=Cincinnati%20is%20heating%20up%20and,major%20heat%20waves%20per%20year.

Warren County Stormwater Resources
http://www.wceo.us/stormwater/Default.aspx

Hamilton County Stormwater Resources
http://www.hcswd.org/resources.html
https://www.hamiltoncountyohio.gov/government/departments/stormwater_and_infrastructure

Study Questions:

1. **Have you personally had stormwater problems, e.g. sewer backups, flooding on your street or on your property? How was it handled?**

2. **What can I do to reduce stormwater overflow**?

   Practice water conservation at your home and use green infrastructure. Advocate for a Stormwater Management System using green infrastructure, i.e. capturing, detaining and retaining stormwater. Daylight streams, Reconstruction of ponds and lakes. Bioswales (vegetate horizontal ditches) can be constructed on many properties to retain water for seepage into the ground and to support tree growth. Rain gardens and vegetated roofs on large commercial buildings would help.

3. **How can I help those who suffer from sewer overflows in their basement?**

   Become a member or supporter of CUFA, Communities United for Action. They are also advocating for fair sewer rates. Contribute to the *Consumer Assistance Fund* for homeowners who face large bill as a result of overland flooding when damage comes from upland properties.

4. **How can I learn more about the landslides in our area?**

   See documentary: https://livingwithlandslides.com/

5. **How can I contribute my ideas to the Green Cincinnati Plan 2023? If you don't live in Cincinnati, does your county or jurisdiction have a sustainability plan?**

   The 2023 Plan is currently open to public comment, but this ends on Feb 8. The Sierra Club is sponsoring a final meeting for contributing ideas on Jan 31, 2023 at 7 pm in the Sierra Club office 3rd floor of Mt. Auburn Presbyterian Church.