After the Rain: Urban Runoff

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Introduction

Daughter: Mom, why is the river so dirty?
Mother: Well, it's been raining, honey, and the rain washes all kinds of things into the river. We call it pollution.
Daughter: Pollution? What's pollution?
Mother: Oh, all kinds of things that wash off the land and our streets. Things like oil and chemicals, trash, even dirt.
Daughter: Even dirt?
Mother: Yes, even dirt.
Mother: The bad thing about pollution is it can kill fish and insects and plants that live in the river. Sometimes it even ruins it so we can't swim in it or drink it.
Daughter: Oh. Can we stop the pollution?
Mother: Well, we can all start by making changes in our own lives and by helping our friends learn how they can protect our water. We all cause pollution, so we all have to work together to stop it.

Husband: How was your day today?
Wife: Oh, pretty good. Hey, before I forget, we need to take the car into the mechanic. It's leaking oil on the driveway.
Husband: Is it bad, or can it wait?
Wife: Well, it's not horrible, but I would like to get it fixed before the leak gets worse.
Husband: If it's not one thing, it's another...
Wife: Hey, here's the news. I heard they were doing a special report on our drinking water.

News Anchor #1: Good evening everyone. Concerns over the safety of our drinking water are mounting across the nation. America's growing population—and the pollution we create—are taking their toll on our fresh water supplies.
News Anchor #2: This evening we bring you a series of reports that explore the importance of water, the pressures our cities are placing on this precious resource, and the ways we can protect our local drinking water.

The Importance of Water

Reporter #1: We live in a world that depends on water. It is the lifeblood of our planet, including human existence.

For thousands of years, Earth has had the same amount of water that it has today. It is constantly cycling and recycling through Earth's air, water bodies, and land. The water you drink today may once have quenched the thirst of a dinosaur!

All the world's water recycles eventually, but different parts of the supply are renewed at different rates. Water in the atmosphere, rivers, and topsoil may recycle in a matter of days, while deep ocean water may take as long as 37-thousand years.

From afar, it's hard to believe we could ever have a shortage of fresh, clean water. But a closer look reveals some startling facts.

More than 97 percent of all the water on Earth is salt water. That's important for everything that lives in our oceans, but not as useful to those of us who live on land.

We depend on fresh water, which accounts for less than three percent of all the water on Earth. Much of our fresh water is tied up in ice caps, glaciers, and groundwater that's too expensive to reach.

That means less than one percent of our planet's water is available for human needs.

Reporter #1 on camera: Imagine this one-gallon jug holds all the water on Earth. The amount of fresh water available for things like agriculture, industry, commercial businesses, and household use would equal little more than a tablespoon.

Right now, there is enough fresh water for everyone on the planet. The problem is that fresh water doesn't always exist where we need it.

Reporter #1: As our population grows, so does the demand for this limited resource. In recent decades, increased use and pollution of our surface and groundwater supplies have actually reduced the amount of fresh water available for our needs.

The air in our atmosphere also plays a role. As air circulates around the Earth, it creates a variety of weather systems. This determines where, how much, and how often precipitation will fall to the Earth.

In some places, there may be plenty of fresh water. But in others, demand may exceed the supply.

News Anchor #1: As recently as one hundred years ago, almost everyone on Earth lived in the country. As we enter the 21st century, about half the world's population and three-quarters of the United States' population now lives in towns and cities.
News Anchor #2: Growing, developing cities offer jobs, a wide range of goods and services, and variety of social and cultural activities. They also create environmental challenges that need special attention.

Polluted Runoff

Reporter #2: America's fresh water supplies are under siege. When runoff from rain, snow, or irrigation moves across the land or through the ground, it picks up and carries all kinds of pollutants into our rivers, lakes, streams, and groundwater.

Some studies show that up to 80 percent of all the pollution in America's fresh water now comes from runoff.

Reporter #2 on camera: For years, industry and inadequate wastewater treatment plants were the primary polluters of our fresh water supplies. They continue to play a role, but it may surprise you to learn that individuals are now the main problem. That's right— you, me, our neighbors, and friends —we are the leading cause of our nation's water quality problems.

Do you drive a car? Have you fertilized your lawn or garden lately? Do you leave pet waste where it can wash into nearby streams, storm drains, or groundwater?

Most people don't realize these kinds of activities can pollute our fresh water supplies, but that's exactly what's happening.

Reporter #2: Growing towns and cities generally change the Earth's natural processes. Pavement, buildings, and rooftops prevent precipitation from soaking into the ground. Instead, it is channeled into storm drains. This polluted runoff does not go to a wastewater treatment plant. It rarely passes through natural filters such as soil and wetlands. The reality is that urban runoff flows directly to nearby surface waters and sometimes seeps into

groundwater supplies.

One-by-one, we are adding to urban runoff. Each individual's contribution may be small, but it adds up. With hundreds, or even thousands of storm drains in a town or city, pollutants from across the landscape have a direct path into our fresh water supplies. In many cases, pollution concentrations in stormwater exceed the limits we've established for industries and wastewater treatment plants.

Reporter #2 on camera: It's hard for most people to get concerned about urban runoff. That's because most of us don't sit around in the rain watching what goes down storm drains. But there are people who monitor the contaminants in urban runoff and their studies have identified a number of common sources that contribute to this type of pollution.

Reporter #2: Sediment is the major pollutant in most urban runoff. It usually comes from eroding soil, but vehicle exhaust, soot from chimneys, and industrial emissions also contribute to sediment pollution.

Nutrients, such as phosphorus and nitrogen, are another concern. They promote weed and algae growth in lakes and streams, which in turn depletes a water body of its life-sustaining oxygen. Common phosphorus and nitrogen sources include fertilizer, leaves, grass clippings, and vehicle exhaust.

Oxygen is also depleted by pet waste, leaves, grass clippings, and litter that end up in urban runoff. As organic matter decays in lakes and streams, it uses oxygen that fish and other aquatic life need to survive.

Bacteria is another pollution source in urban runoff. Waste from pets and urban wildlife, as well as overflows from older wastewater systems, are common sources of bacterial contamination. In many cities, bacteria levels in urban stormwater often exceed public health standards for swimming.

Finally, toxic pollutants come from a wide range of sources. These are substances that may cause death, disease, or birth defects. They also may interfere with reproduction, child development, or disease resistance.

Toxic pollutants most often found in urban runoff can be traced to automobiles, insecticides, weed killers, wood or oil burning stoves, incinerators, and insulators that once were used in electrical transformers and capacitors.

News Anchor #2: Jim, now that we've learned about the seriousness of the problem, I'm sure many of our viewers want to know what they can do, as individuals, to help clean up urban runoff.
News Anchor #1: Kathryn, that's exactly why we put this next report together. It's critical to understand that we, as individuals, can make a difference in our own homes and communities. We don't have to give up all the conveniences of modern life, but we will need to make some changes.

Pollution Solutions

Reporter #3: Most of us who reside in urban areas live quite a ways from the nearest river, lake, or stream. It's hard to imagine how our actions could possibly pollute the local drinking water. But stormwater collection and septic systems now link most everyone's activities to our surface and groundwater supplies.

Reporter #3 on camera: There are many ways we can help reduce polluted urban runoff, but the tips you're about to learn may make the greatest difference. One-by-one, as individuals take action, surface and groundwater supplies can begin to recover.

Reporter #3: Prevent soil erosion.

As we learned earlier, soil erosion is a leading source of polluted runoff in many urban areas. It muddies our waters so fish and other aquatic life have a hard time breathing, finding food, and reproducing. Topsoil often contains a variety of pollutants that still need to break down. When topsoil erodes, it can carry those pollutants into nearby streets, storm drains, and water bodies.

You can help prevent soil erosion by planting groundcover, shrubs, and trees in erosion-prone areas. Compost or other mulches can help retain and enrich exposed soil. It also helps if you sweep dirt off your driveway and sidewalks, instead of using a hose and washing it into a nearby storm drain.

If you're building a new house—or doing some landscaping—disturb as little soil as possible and make sure you or your contractor use appropriate erosion control techniques. Try to preserve trees, shrubs, and grass; spread mulch over exposed soil; and revegetate the site as soon as the project allows. Use silt fences or straw bales to trap sediment on the downhill side of the construction site. Pile soil away from roads and waterways, cover the piles to keep soil from blowing or washing away, and clean up soil that is tracked onto roadways by vehicles leaving the site.

Reporter #3: Avoid using toxic products.

Everyone benefits when we keep poisons out of our water supply. It helps us avoid serious health problems, provides huge savings in the cost of water treatment, and protects our drinking water for future use.

Inside your home, it helps if you use non-toxic cleaning alternatives such as baking soda, vinegar, or citrus solvent. Baking soda, vinegar, and hot water work well as drain cleaner, while vinegar and hot water work well as an all-purpose cleaner. If you use toxic cleaning products, buy only what you need, use them sparingly, and make sure remaining supplies are stored properly. Never pour paints or solvents down any drain in your house and take unwanted supplies to your local paint recycler or hazardous materials collection center.

In your yard, you can weed by hand, use natural predators, spray your landscape plants with water to get rid of pesky insects, and prune or handpick diseased plant parts.

If you use fertilizer, weed killers, or pesticides, use them sparingly and postpone applications when rain is expected in the next 24 hours. Make sure you keep toxic substances away from open water bodies, groundwater supplies, and paved areas where they can wash into storm drains. And it should go without saying—never dump toxic products anywhere! You should take leftover supplies to your local recycling or collection center.

When it's time to clean your pool or spa, consider the chemicals you've added to the water. If chlorine or bromine are the only chemicals you add to your pool or spa, and the concentrations of those chemicals are low, it's alright to drain the water onto your lawn or into street gutters. You can reduce the chlorine or bromine levels by not adding those chemicals in the days before you drain the water.

If you use chemicals in addition to chlorine or bromine, it's a good idea to check with local pool or spa dealers. They can advise whether it's necessary to drain the old water into a sink in your home, or the "cleanout" valve in your home's wastewater plumbing line.

Use non-toxic cleansers on your pool or spa, and pour wastewater from the cleaning process into a sink or toilet in your home.

Homeowners with septic systems have similar considerations regarding chemicals in their pool or spa water, but they also need to remember that a pool or spa should not be drained into a septic tank or over a septic drainfield. Such a large influx of water can cause a septic system to fail. The best option is to drain the water over land, but away from the drainfield.

Finally, minimize your use of salt to melt ice during the winter. Use sand or gravel, or chip ice off the pavement, when possible. Once the ice and snow melt, make sure you sweep sand and gravel off of paved areas so they won't get into storm drains.

Reporter #3: Maintain your automobiles.

Reporter #3 on camera: Motor vehicles are a major contributor to polluted urban runoff. Their exhaust sends a variety of substances up into the air, which eventually come back to the Earth's surface. Airborne nitrogen is one of these substances.

It causes acid rain and promotes excessive plant and algae growth in our waterways. Some studies suggest as much as one third of all nitrogen pollution in surface waters started out in the atmosphere.

Reporter #3: Automobiles can leak a variety of poisonous fluids, including oil, antifreeze, and brake fluid. These pollutants often spill onto roads and parking lots, wash into storm drains, and end up in our rivers, lakes, and streams.

Regular automobile maintenance can do a lot to help reduce automobile pollution. Your mechanic can check for leaks and make sure the engine is running efficiently. A tune-up can often reduce the amount of exhaust your engine produces.

"Do-it-yourselfers" should use a dropcloth and some sort of container to collect the vehicle's oil, antifreeze, and other fluids. Depending on your location, you may be able to recycle used motor oil and antifreeze along with the rest of your curbside recycling. If not, check with a local mechanic to see if they recycle these substances or take them to a local collection center. Never pour motor oil, antifreeze, or any other toxic substance into your home's wastewater drains, outside storm drains, or onto the ground.

If you discover your automobile is leaking any type of fluid, have a mechanic fix the problem as soon as possible. In the meantime, use a drip pan to catch any additional leaks and use absorbent materials such as cat litter or sawdust to absorb what is already on the ground. Once the absorbent material has done its job, double bag it and throw it away with your trash.

Another way to reduce polluted runoff is to wash your automobile at a car wash that recycles its water. If you decide to do it at home, wash your car over gravel or grass, using a minimum of water and biodegradable, phosphate-free soap.

Soaps with phosphorus promote plant and algae growth in our rivers, lakes, and streams—which, in turn, uses up oxygen that fish and other creatures need to survive. When you're finished washing the car, dump your bucket of soapy water onto a vegetated area, or into a sink or toilet. You should avoid pouring soapy water onto paved areas or into storm drains.

Reporter #3: Reduce automobile use.

When you need to go somewhere, walk, ride a bike, carpool, or use public transportation as often as possible. When you do drive, think about where you need to go and consolidate trips. This will save you money and help clean up urban runoff.

Reporter #3: Conserve water.

This helps ensure that we have enough water when we need it, reduces the amount of wastewater we produce, and saves us money, both in the amount we spend for water and the amount we pay for treatment.

Inside your home, you can fix leaky plumbing, take shorter showers, and turn the water off while brushing your teeth. It also helps to install low-flow showerheads, faucets, and toilets and to wait until you have full loads before running your dishwasher or washing machine.

In your yard, consider landscaping with drought-tolerant grasses, shrubs, and trees. Native plants generally require less water, fertilizer, and pesticides. You can conserve water by reducing the size of your lawn and by installing drip irrigation lines to trees and shrubs. Make sure your sprinkler heads are watering greenery, rather than pavement, and be careful not to overwater your yard. One to one-and-a-half inches of water per week is plenty for most lawns. If you water too much, soil, fertilizer, and other pollutants will begin their journey to the nearest storm drain.

Reporter #3: Clean up after your pet.

Pet waste causes a variety of problems. When it washes into rivers, lakes, or streams, pet waste decays and uses up oxygen in the water. The nutrients in pet waste encourage weed and algae growth, which also uses up oxygen in the water. Finally, pet waste can carry a number of diseases that make our water unsafe for swimming and drinking.

If you're out on a walk, scoop and bag your pet's waste and flush it down the toilet when you get home. In your own yard, clean up pet waste you find on sidewalks or other paved areas, and around wells, storm drains, ditches, and waterways. Always remove pet waste from areas where children play. If the waste is free of debris, such as rocks, sticks,
and cat litter, you can scoop it up and flush it down your toilet. That takes it to a wastewater treatment plant or your septic system.

Another option is to dig a hole, about six inches deep, and bury your pet's waste. Microorganisms in the top layer of soil will break it down and release the nutrients to nearby plants. If you choose to bury pet waste, make sure the hole is away from vegetable gardens, wells, and nearby water bodies.

Reporter #3: Reduce runoff to paved areas.

Reporter #3 on camera: Whether building a new home, or making changes around an existing one, think about limiting the amount of pavement. Consider using gravel, interlocking stones, or brick, instead of concrete or asphalt.

Reporter #3: Think about landscaping with berms and swales, which catch and filter runoff and keep it away from paved surfaces. It's also helpful to direct roof drains or gutter systems onto your lawn, where water can soak safely into the ground. Gutters, downspouts, and copper flashing often shed toxic metals, which should be directed away from paved surfaces. If you have a septic system, you should still direct stormwater onto your lawn, but keep it away from your drainfield.

Another way to reduce runoff from the landscape is to plant grasses, shrubs, and trees. Vegetation helps slow the runoff, prevents soil erosion, and increases water absorption. This is especially important for people who live next to water bodies. A buffer strip of dense, natural vegetation along the water's edge will filter pollutants and stabilize the bank or shoreline.

Keep lawn and yard trimmings out of streets and storm drains, so they don't end up in a stream. Mow your lawn often enough so you can leave grass clippings on the lawn. This helps recycle nutrients, allows your lawn to absorb more water, and helps filter sediments. Start a compost pile—away from the street, storm drains, or nearby water bodies—for any excess lawn trimmings, leaves, and kitchen scraps. Compost is good for your garden or planting beds and is an excellent alternative to chemical fertilizers.

In the fall, keep your gutters clean so that runoff doesn't spill onto paved areas and keep leaves out of nearby streets and storm drains. If your city provides curbside pickup for leaves or yard trimmings, put them out for pickup just before your collection day and keep them away from the storm gutter. After pickup, sweep up any leftover residue and put it in your compost pile or trash.

Reporter #3: Maintain your septic system.

Inspect your septic system annually and have it pumped out every two to five years by a professional septic service company. Regular pumping is

cheaper than having to rebuild a clogged drainfield.

You can often prevent clogged drainfields and reduce polluted runoff by paying attention to the amount and type of materials you put through the septic system. Conserve water, reduce solids and grease in the system by not using a garbage disposal, and use only non-toxic cleaning products. Avoid using septic tank cleaning compounds. They can impair the tank's efficiency and damage the drainfield.

You can also protect the integrity of your drainfield by keeping vehicles and other heavy objects off of it, by planting trees or shrubs away from the drainfield where roots won't damage or plug the pipes, and by diverting runoff away from the drainfield.

Reporter #3: Reduce, reuse, recycle.

The best way to keep trash and litter out of our waterways is to buy re-usable products with little or no packaging. If you can reuse the product or packaging, do so. If not, recycle it. Composting is another alternative for many kitchen scraps that commonly end up in the garbage.

If you must buy products or packaging that are not recyclable, make sure you dispose of
them properly. Put them in your garbage can and make sure the lid is secure. Pick up trash around your property and don't litter when you're away from home.

Reporter #3: Be a responsible boater.

Install and use an on-board holding tank for sewage and empty it only at approved pump-out stations or marinas. Stow your trash carefully to prevent it from going overboard. To avoid fuel and oil leaks, it's important to keep your boat motor well maintained and tuned.

Consider installing a 4-stroke engine, or an electric engine, which are less polluting than the 2-stroke variety. Remember to conduct all major maintenance chores on land and recycle your used motor oil.

Finally, use biodegradable, phosphate-free cleaners on the inside and outside of your
boat.

Reporter #3: Get involved!

Participate in groups, projects, and events that promote water conservation, waterfront recreation, or shoreline clean-ups.

Let elected officials at the federal, state, and local levels know about your interest in cleaning up local waters. Ask them to initiate or support laws that help protect local surface and groundwater supplies and reinforce the importance of dedicating resources to enforce these laws.

Contact your local public works department to learn more about stormwater management practices in your area. If a comprehensive stormwater management plan does not exist, encourage your local officials to develop one.

Finally, help your family and friends understand how they can prevent polluted urban runoff. Share videos or publications on the subject, organize a neighborhood meeting, or simply share some of the tips you've learned when opportunities present themselves. Many cities can use your help stenciling storm drains, monitoring pollution levels in urban streams, or distributing educational materials.

Husband: Hello
Child: Hi. I'd like to share this with you so we can make sure our water stays safe to drink.
Husband: Thank you!
Wife: You know, we just got done watching a TV show that taught us how important it is to keep our water clean. We'd be happy to read your flyer.
Husband: Thanks a lot!
Child: Thank you.
Husband: And good luck!
Wife: Bye bye!