San Mateo Countywide Water Pollution Prevention Program

Teacher Tool Kit

2017 - 2018

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Introduction

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Welcome To Flows To Bay!

Flows to Bay is an initiative by the San Mateo Countywide Water Pollution Prevention Program (SMCWPPP) to inform the public about stormwater pollution prevention. SMCWPPP has put together a brief resource guide for educators to teach students about key environmental protection tactics in order to protect their local waters.

Upon finishing this guide, students will know more about the environment and how to think critically about eco-friendly practices at their school campuses. An optional post-learning activity is to have students create a proposal for how these “best practices” can improve their campus’s environmental footprint.

Enjoy!

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What is Stormwater Runoff?

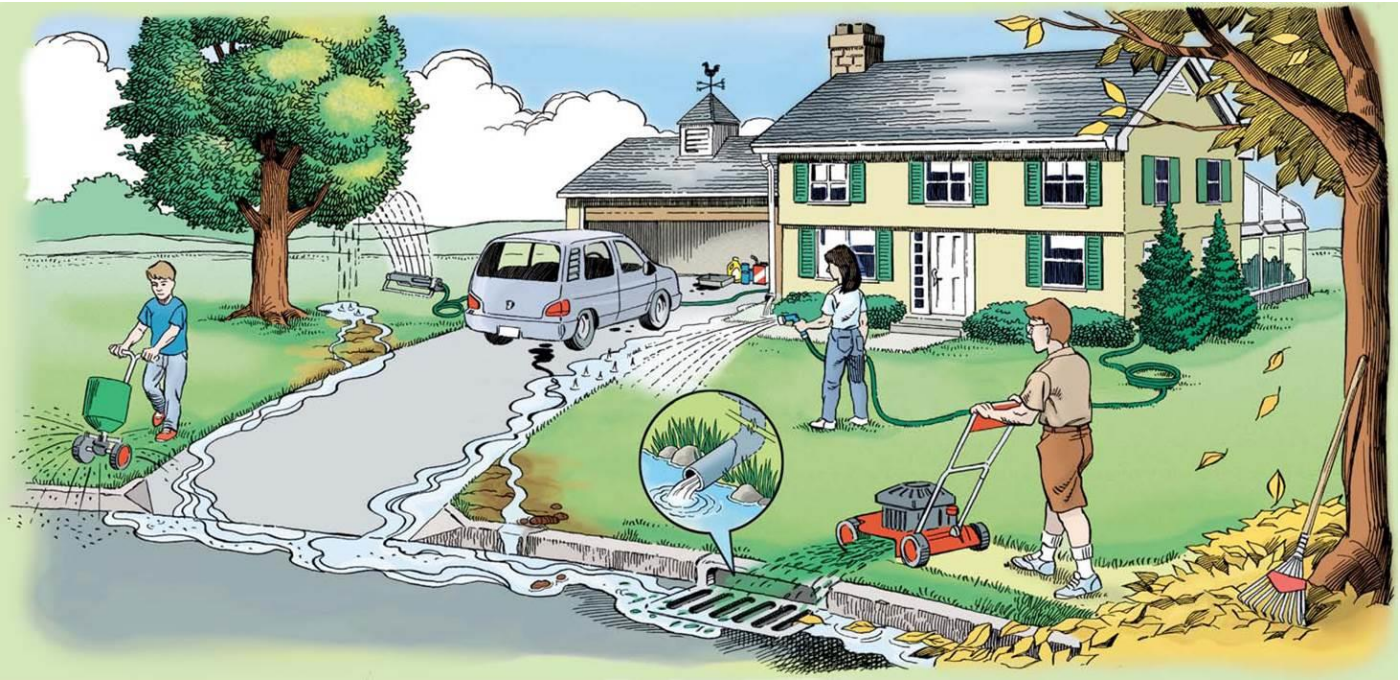

Image adapted from [Collier Township MS4 Stormwater Education Program]

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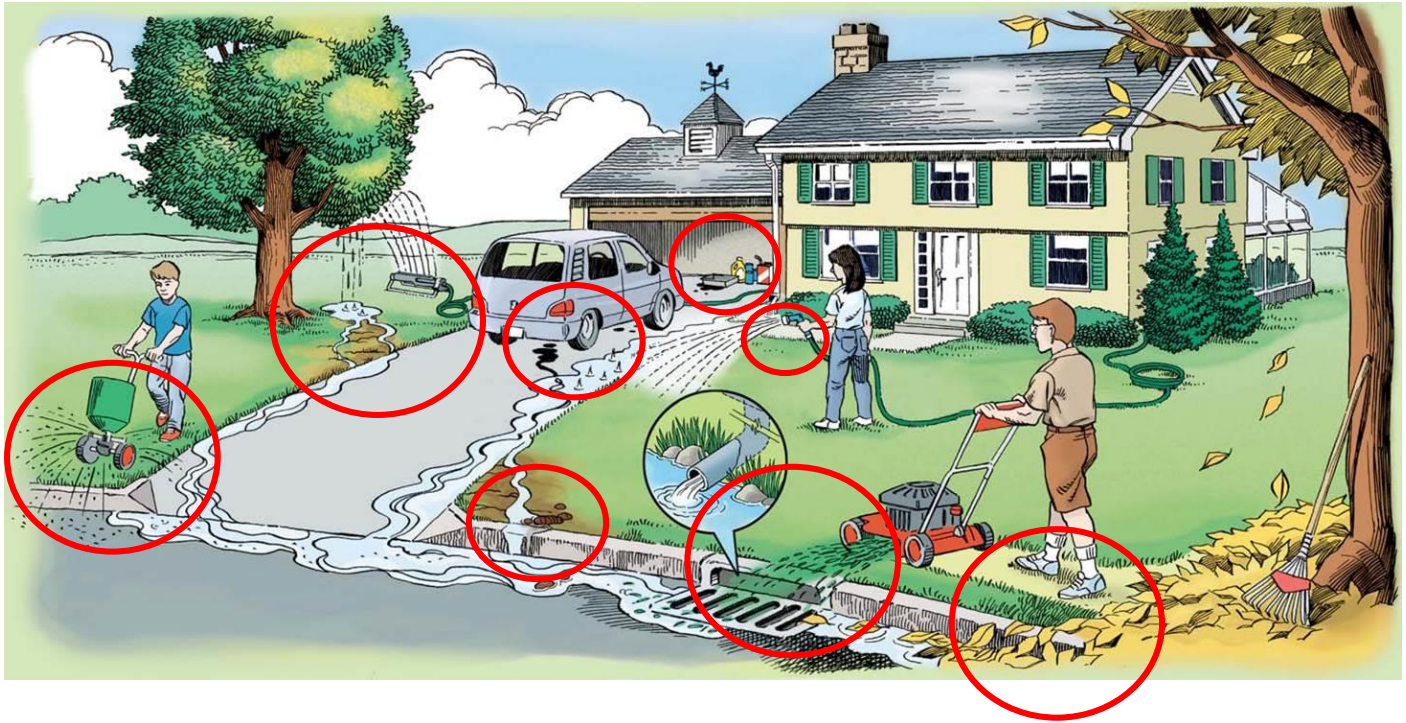
What is Stormwater Runoff?



Stormwater runoff is water that washes off driveways, parking lots, roads, yards, rooftops, and other hard surfaces when it rains. This untreated and contaminated water flows directly into our local waterways.

Image adapted from [Collier Township MS4 Stormwater Education Program]

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How to Prevent Stormwater Pollution

If you care about the future of the environment, there are several ways you can do to 'green up' your school community with sustainable stormwater solutions.

This teacher tool kit will highlight **3 key themes** to teach your students about what they can do with their school campus and community:

- Rain Water as Resource
- Litter Reduction and Removal
- Removing and Replacing Toxics

It's a team effort.

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Using Rainwater as a Resource

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Why Rainwater as a Resource Matters

Rainwater as a resource is exactly what it sounds like: capturing rainwater to use it when you need it. We call this a "Stormwater Best Management Practice," a practice that mitigates the negative impact of water pollution. When we retain rainwater via a rain barrel, cistern, green infrastructure, or tree canopies, we are able to divert rainwater from running off to storm drains and picking up litter and pollutants along the way.

Environmental Benefits:

- Diverts water from stormwater system and reduce the impacts of flooding during a heavy rain
- Effective during dry spells or droughts

School Benefits:

- Saves your school money on water utility bills; the rainwater can be reused around your school campus to water school gardens and even the track and baseball fields

Community Benefits:

- Improves community and campus aesthetics
- More tree canopies provide the opportunity to provide greenery and shade during those hot school days

Consequences of NOT capturing Rainwater

Consequences to not capturing every last raindrop:

Risk 1: Public Health.
When storm drains become clogged with debris, flooding can occur and cause major damage to communities.

Risk 2: Damage to Natural Resources.
Stormwater pollution makes water look bad and smell worse. Polluted stormwater impacts fish health, therefore impacting people who consume fish from the Bay.

Risk 3: Devastates Wildlife.
Polluted runoff can damage streams. Excess nutrients can cause algae blooms and kills fish. Muddy water keeps fish from feeding and breeding, Excess bacteria can harm both wildlife and people.

Urban Tree Canopies in San Mateo County

Trees contribute significantly to the slowing, absorbing, and filtering of rainwater. An averaged size tree can intercept and absorb hundreds of gallons of water a day depending on the tree species and rain conditions. Trees are a great way to use rainwater as a resource.

Energy Benefits: Trees provide natural cooling benefits by evaporating water and providing direct shading of surfaces, especially during those hot and sunny days at school.

Air Quality Benefits: Trees act as natural filters or "lungs" to remove air pollutants, such as ozone, nitrogen oxides, sulfur dioxide, and ammonia.

Economic Benefits: Planting more trees can potentially reduce your school's air cooling costs during warm weather by passive cooling.

Photo Credit: Canopy.org

Urban Tree Canopies in Schools

School with tree canopies

School without tree canopies

Canopy.org, an environmental tree-focused nonprofit in Palo Alto, launched the *Healthy Trees, Healthy Kids!* initiative in 2011 by bringing together eight corporations and 223 volunteers to plant 200 trees at Green Oaks Academy and Cesar Chavez Academy in East Palo Alto. Click here to access the video featured on the right.

Rain Gardens in San Mateo County

A rain garden is a landscape feature that helps collect runoff and allows it to soak into and through the soil. Typically when it rains, the rain should be soaked up by the ground. But because of streets, pavement, and parking lots, especially in cities and the suburbs, rain usually flows across these hard surfaces and into the storm drain picking up litter and pollutants along the way. Rain gardens temporarily hold this runoff and allow for a good solution to preventing stormwater pollution. Rain gardens are a form of green infrastructure, a stormwater best management practice approach to mimic the natural water cycle.

Environmental Benefits:

- Less stormwater runoff pollution and provide habitats for urban wildlife such as birds and butterflies

School Benefits:

- Reduces impact from flooding and could prevent dealing with large puddles during the school day

Community Benefits:

- Enhances aesthetics and provides an extra layer of community safety; creates additional distance from drivers and pedestrians

Example of rain garden in a neighborhood in San Mateo County

Case Study: City of Brisbane City Hall Parking Lot

The landscaped area in the Brisbane City Hall parking lot is an engineered system for treating **stormwater runoff.** This area, called a **rain garden or bioretention area,** collects stormwater runoff from both the parking lot and building roof. Runoff is treated as it filters through the **specially-selected vegetation** and soaks into the ground. Drain lines buried in the rain garden (the underdrain system) collect the treated water and send it through the City's storm drain system to Brisbane Lagoon and out into the Bay.

The underdrain system beneath the rain garden carries treated stormwater runoff to the Brisbane Lagoon and out to the Bay.

During very heavy storms, runoff ponds up and eventually overflows into the storm drain inlet to prevent flooding.

Rainwater as a Resource Recap

How would you utilize rainwater as a resource on your school campus?

To Get Started: Think about where on your campus would benefit the most from tree canopies, rain barrels, or a rain garden.

Litter Reduction & Removal

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Why Litter Reduction & Removal Matters

With San Mateo County's geographic location near many waterways, much of the litter generated on land is leached into the bodies of water in or near San Mateo County. Reports from the Ocean Conservancy on frequency of debris in waterways reveal that **59%** of litter is from shoreline or recreational activities, **29%** is smoking related, **8%** is from ocean or waterway activity, **3%** is from dumping, and **1%** is from medical or personal hygiene related sources (Ocean Conservancy 2006). So if you see it on the ground, pick it up and throw it into a trash bin. Litter and pollutants left on the ground eventually make their way to the bay and our ocean.

Environmental Benefits:

- Cleaner waterways for wildlife
- Cleaner oceans to visit and swim in during the summer

School Benefits:

- Less maintenance required for cleaning up litter around campus
- Recycling can bring supplementary income for school campuses

Community Benefits:

- Cleaner school campuses and neighborhoods

Consequences of NOT removing litter

Without interception, trash that ends up on the sidewalks, streets, or other outdoor space inevitably makes its way to local creeks, lakes, bays and estuaries, and is eventually transported to the Bay and Ocean.

Risk 1: Public Health

Litter attracts vermin and is a breeding ground for bacteria. Items such as broken glass and syringes can be a health hazard in public places.

Risk 2: Damage to Natural Resources

Litter can be a fire hazard. Accumulated litter and careless discarded cigarette butts are potential fire hazards. Cigarette butts can leach lead, chromium, and arsenic into the water.

Risk 3: Economic Downside

Cleaning up litter cost the US $11.5 billion a year. Money can be used for funding the arts and other public education programs.

Photo by Justin Hofman/Wildlife Photographer of the Year

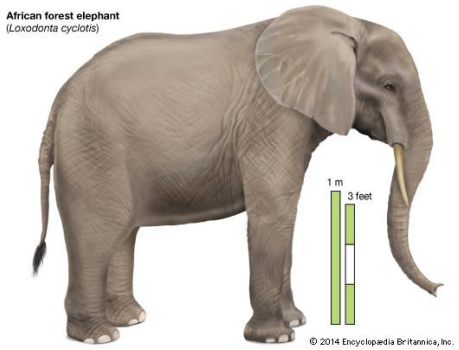
How can you prevent litter from reaching our waterways?

Image adapted from [Santa Clara Valley Urban Runoff Pollution Prevention Program]

Case Study: 2017 CA Coastal Cleanup Day in SMC

During the 2017 California Coastal Cleanup day in San Mateo County, there were:

- **4,447** Volunteers
- **28,706** pounds of trash and recyclables collected (over 14 tons and a 7.6% increase from 2016)
  - Did you know that **14 tons** is equivalent to the **weight of 4 African Forest elephants** or the **weight of 20,363 official NBA basketballs?**



x 4.5

X 20,363

Case Study: 2017 CA Coastal Cleanup Day in SMC

Some of the most commonly found items from 1989-2014 include:

- Cigarettes/Cigarette Filters (6,992,106)
- Food Wrappers/Containers (1,940,013)
- Caps/Lids (1,619,071)
- Bags - paper and plastic (1,462,726)
- Cups/Plates/Utensils (1,014,229)
- Straws/Stirrers (736,595)
- Glass Beverage Bottles (600,871)
- Plastic Beverage Bottles (475,799)
- Beverage Cans (455,433)
- Construction Material (330,711)

Case Study: Alameda Unified School District

Alameda Unified School district started their district wide recycling program in 2009. Through the help of grants and parent support, the school district was able to pilot a food scrap diversion program. After six months of the pilot, the recycling and composting rates had increased from an average of **30%** to nearly **64%.** Students, teachers, and school staff were trained on how to properly dispose of their food scraps. This is a great example of how to prevent trash bin overflow by sorting each piece of food or trash into its proper bin, thus preventing litter on campus.

Photo credit: Green Schools National Network

Litter Reduction & Removal Recap

How has litter impacted your school? What is one thing you can do today to put an end to littering?

To Get Started: Take note of the most common type of litter found on your school campus. Where are the reducing, reusing or recycling opportunities at your school?

Removing and Replacing Toxic Chemicals

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Why Proper Toxic Disposal Matters

Hazardous Waste are products that can react, explode, and corrosive under certain circumstances. Products such as paints, cleaners, oils, batteries, and pesticides can contain hazardous ingredients and require special care when you dispose of them. For cleaning materials, toxics should be avoided so your family, school, and community are not exposed to these harmful chemicals. Even improper disposal and accidental spills can cause these chemicals to flow to storm drains and into creeks, the bay, or the Pacific Ocean.

Risk 1: Public Health

The chemicals found in hazardous waste can contaminate groundwater as well as water quality. Even coming into direct contact with toxics can compromise your health. Always read the directions before using.

Risk 2: Economic Cost

When disposed of incorrectly, the water treatment process is expensive and time-consuming. At treatment plants, hazardous waste interferes with the biological treatment process by killing beneficial bacteria and contaminating the effluent, or the liquid waste, that runs into the ocean. Spend less on cleaners and choose environmentally-friendly alternatives.

Do you know where and how to dispose of hazardous waste?

Proper Management of Toxics

Too Toxic to Trash. Our environment has neither the capability nor the appetite to digest harmful chemical compounds. Luckily, there are facilities where you can turn in paint, batteries, pesticides, motor oil and other similar materials for proper disposal. For safety and environmental reasons, it is illegal to dispose these hazardous chemicals in the garbage, sewers or storm drains.

Environmental Benefits of Proper Disposal:

- Protects our bay and ocean

School Benefits of Proper Disposal:

- Schools can find eco-friendly products that may be more affordable options to use on campus. School can create a better and safer storage system of hazardous waste.

Community Benefits of Proper Disposal:

- Reduce the amount of exposure in the school community, where we spend 180 days out of the year

Proper Storage of Hazardous Waste

When graffiti strikes, schools sometimes remove graffiti with a quick paint job. Before removing your hazardous waste, make sure they are being properly stored:

- Always store containers indoors in a covered space
- Store material in original container and **NEVER** remove the label
- **NEVER** store hazardous products in food containers
- If using paint, wash out paint brushes in sinks, **NEVER** outside
- Absorb automotive spills or leaks with kitty litter
- When leftover remains, **NEVER** mix HHWs with other products
- When you no longer have use for your HHWs, take the containers to your nearest HHW collection center

Case Study: Green Purchasing Policy in Sonoma County

According to the Environmental Protection Agency, "Children spend **90%** of their time indoors and much of that time is spent in school. Unhealthy school environments can affect children's health, attendance, concentration and performance, as well as lead to expensive, time-consuming cleanup and remediation activities."

The Sonoma County Board of Education adopted a green purchasing policy to become a leader in waste prevention, recycling efforts, and in sustainable procurement within its programs of oversight. Sonoma County commits to purchasing green janitorial supplies and integrated (non-chemical) pest management practices.

Since 2010, Sonoma County has reused approximately **435** surplus items and donated roughly **255** items to non-profit organizations. This has saved nearly **$70,000** in the past two years and helped reduce waste.

Case Study: Own Your Streets & Recycle Your Oil

Like a good car owner, Jerry enjoys and takes pride in changing his motor oil. At the age of 17, he learned to change his own car oil, including **recycling his used oil and filter,** from his father. It was an easy and simple process that requires little time and lots of rags.

However an important part of changing oil is recycling. Jerry says, "**Recycling is important.** If we think more of the health of the environment and the other species that share it, there would be **less pollution in the world**." He doesn't know many young DIYers that change their oil but he loves teaching his friends that want to learn.

Jerry Gutierrez, Los Medanos College Student
Contra Costa County, California

Removing and Replacing Toxic Chemicals Recap

What does removing and replacing toxics at your school look like?

To Get Started: Identify as many items that can be classified as "toxics" at your school. Are there environmentally-friendly alternatives? Locate the nearest HHW facility in your community.

Post-Learning Activity

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Flows to Bay High School Project Proposal

The San Mateo Countywide Water Pollution Prevention Program (SMCWPPP) invites you and your students to take what you have learned about stormwater pollution prevention and propose a project to improve your school campus. This activity invites students to think critically about how to address local water quality issues through innovative green solutions that could be incorporated on campus.

Why Participate?

Teachers

- Opportunity to teach students about pressing environmental issues such as stormwater pollution, the impacts of litter, and toxic chemicals .

Students

- Gain key research skills to be prepared for college,
- Advocate for your project proposal to actually be implemented at your school!

Objective and Criteria

Objective:

Create an environmental project proposal for your high school campus. The project proposal should include a description of the environmental and/or water quality problems addressed by your project, a description of the design or policy, and explanation of why your design or policy was chosen and where or how it would be implemented on your campus, and how your project will benefit your school and community.

You are encouraged to be creative with your group's project proposal format.
Options could include a written proposal, a PowerPoint presentation, a project poster board, or a short video.

Evaluation Criteria Questions:

- **Impact (50%):** How well does the project serve your school and impact important water quality issues? How will it benefit and educate the students and community? What does the end product look like?
- **Design (25%):** How does the project design contribute to environmental and educational outcomes? Is this project possible for your school campus?
- **Presentation (25%):** Does the proposal include helpful pictures, diagrams, design sketches, or other presentation strategies and are references cited properly?

Resources & Works Cited

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Educator Resources

Rainwater as a Resource

BASMAA: Rain Barrel and Cisterns
California Education and Environment Curriculum
CalRecycle - School Gardens and Water Conservation
Canopy.org - Trees in our Urban Environment
Green School Alliance - How to Rainwater Harvest
Green Schoolyards America Resources Library
IOBY: Guide to Environmental Projects in Schools
Rainwater As A Campus Resource - Lane CC
Rainwater Harvesting in the City of Millbrae
Sustainable San Mateo Water & Waste Statistics

Litter and Trash Removal

CalRecycle School Waste Composition Statistics
Educator's Guide to Beach Cleanups
Trash Free School Guidebook
Flows to Bay Restaurant Infographic Poster
Greening Schools - Waste Reduction Resources for Teachers
NAMEPA- An Educator's Guide to Marine Debris
San Mateo Waste Reduction Resources
Teacher Vision Green Activities & Classroom Resources
Watershed Watch Resources - Community Resources

Removing and Replacing Toxic Chemicals

CalRecycle Environmentally Preferable Purchasing for Schools
CalRecycle Proper Disposal of HHW Lesson Plan
CalRecycle School Waste Reduction Model Program
CalRecycle Transportation-related Waste Materials
EPA: How to Set Up a Local Program to Recycle Used Oil
Haz-Ed: Classroom Activities for Understanding Hazardous Waste
Household Hazardous Waste Lessons for the Classroom
Stop Waste - Recycling Used Oil at Home, Work, and School
Zero Waste Lunch Tips & Non-toxic School Supplies

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"Urban Tree Canopy Assessment." Urban Natural Resources Stewardship. United States Department of Agriculture Forest Service, Web. <https://www.nrs.fs.fed.us/urban/utc/>.

"Urban Tree Play a Key Role in Climate Change Mitigation." Canopy Benefit of Trees. Canopy.org, Web. <http://canopy.org/tree-info/benefits-of-trees/urban-trees-and-climate-change/>.

“Never doubt that a small group of thoughtful, committed citizens can change the world; indeed it’s the only thing that ever has.”

- Margaret Mead

Thank You!

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