Monitoring Monday - Let's look at stormwater monitoring.

Join us each Monday as the Clean Water Team shares resources on a water quality monitoring. This Monday is about stormwater monitoring.

Monitoring and tracking stormwater quality helps us understand how well storm water management activities by permittees and/or best management practices are working. Developing the capability to understand the utility and accurately evaluate the water quantity and the benefits of an increasingly diverse number of urban storm water control measures represents a significant challenge that requires new approaches. Innovative partnerships between permittees, community-based organizations, industry can play a role in these approaches.

Activities by citizen water quality monitors and community-based organizations can play a part of ensuring more healthful storm water discharges. These activities can range beyond watershed education and BMP demonstration projects, to include the monitoring of storm water, documenting probable unpermitted and illicit discharges, to assessing green infrastructure performance.

Since storm sewer systems exist to carry storm water runoff, they are generally monitored during rain events. However, without the presence of rain, water flowing from stormwater outfalls or along swales, sometimes called nuisance flow, may also discharge polluted water. Actions taken during these wet and dry weather monitoring events can typically be placed into a few monitoring categories:

1. Sensory data: Documenting visual (heavy foam, suds, oily sheen, trash, gray or discolored water…) and or odor (sewage, chlorine, rotten eggs, detergents) indicators. Data is typically in the form of photographs (geotagged and time-stamped) with an accompanying field data sheet.
2. Physical measurements: Measuring and documenting the physical properties of water (color, turbidity, temperature). Discharge and duration are also useful and much needed information.
3. Water Quality Analysis: Testing stormwater for pH, chemical oxygen demand (COD), total suspended solids (TSS), toxicity, chemicals, such as pesticides and herbicides, oil and grease, metal(loid)s (such as Cd, Cr, Cu, Ni, Pb, and Zn), nutrients such as N and P, or other specific pollutants.
    a. Sample analysis can be performed under a QAPP.
    b. Samples can be analyzed by an ELAP approved laboratory (samples collected under a simple QAPP).

In different parts of the country, the term "first flush" can mean different things. In more humid parts of the country where it can rain almost any day of the year, the term usually refers to the

first few minutes or hours of a storm. The common perception is that during this initial time, the concentration of pollutants in the runoff is greater than during later parts of the storm. The reason for this phenomenon would be the deposition and "build up" between storms of various pollutants on the drainage area land surface, followed by the pollutants' subsequent "wash off" during the storm. This description of first flush generally holds true in more arid parts of the country as well. But in parts of the country like the southwest where there are definite rainy and dry seasons, the first significant rainfall of the year is typically called a “first flush” as it is the first flush phenomena of the rainy season. To sample a first flush event, the sample must be collected after the weather has been dry for 72 hours and typically within the first hour of a storm when the rainfall is greater than 0.1 inch.

Many citizen monitoring / community science programs looking at stormwater have developed storm event (weather responsive) stormwater sampling teams. When it starts to rain, these on-call storm water monitors pull on their rubber boots, put on brightly visible reflective rainwear, and then head out to local rivers, streams, and waterways to collect samples in areas suspected of disproportionately impacts by urban or industrial runoff, above and below water treatment BMPs, and other areas in need of stormwater data/

If your organization or program is unable to create storm event monitoring project, it’s still possible to help storm water management obtain useable data. Most citizen / community water quality monitoring projects typically conduct ambient stream monitoring. The data obtained through this type of monitoring is helpful to augment storm event runoff monitoring and to establish a general baseline for determining impacts to a receiving waterbody. Many have also added biological monitoring (benthic macroinvertebrates, periphyton, algae…) and habitat assessment to their annual ambient water quality monitoring programs. Making this data publicly available through CEDEN.org and working with stormwater partners helps expand the utility of this data set towards better understanding and improving water quality management programs.

For further information we have assembled this short list of storm water monitoring resources. Citizen and community monitoring resources can be obtained from the Clean Water Team, Volunteer Water Monitoring Network and the NWQMC- Volunteer Monitoring Programs.

EVENTS:

Stormwater Awareness Week
September 26-30, 2022
www.stormwaterawareness.org

Celebrating Milestones: Taking the Next Steps for Stormwater
CASQA 2022 Annual Conference
October 24-26 - Palm Springs Convention Center
www.casqa.org/events/annual-conference

2023 Utility Management Conference
Hosted by the Water Environment Federation and American Water Works Association.
March 28-31, 2023 – Sacramento, CA
www.awwa.org/Events-Education/Utility-Management#6801731-attend

RESOURCES:

An Introduction to Stormwater Indicators
Stormwater indicators provide a suite of opportunities to assess different aspects of a stormwater management program, measure the stressors associated with human activity on the land surface, and establish the conditions of aquatic communities in the receiving waters.
www.casqa.org/sites/default/files/effectiveness_assessment/rl-06_cwp_article_141_practice_of_watershed_protection.pdf

Construction Site Monitoring Program Guidance Manual
This manual presents guidance for California Department of Transportation (Caltrans) staff and contractors to use in the planning and implementation of stormwater monitoring programs at construction sites, in compliance with the State of California's Construction General Permit (CGP) issued by the State Water Resources Control Board (SWRCB): State Water Resources Control Board Order No. 2009-0009-DWQ, National Pollutant Discharge Elimination System (NPDES) General Permit No. CAS000002, Waste Discharge Requirements (WDRs) for Discharges of Storm Water Runoff Associated with Construction and Land Disturbance Activities as amended by Order 2010-0014-DWQ and 2012-006-DWQ, herein called the "Construction General Permit (CGP)," especially Sections I.J, I.K, IX, X, XI, and XII.
http://149.136.20.66/hq/construc/stormwater/caltrans_guidance_manual-rev1.pdf

Design of stormwater monitoring programs
Stormwater runoff is now the leading source of water pollution in the United States, and stormwater monitoring programs have only recently been developed. This paper evaluates several stormwater monitoring programs to identify ways of increasing the likelihood of identification of high-risk dischargers and increasing data reliability for assisting in the development of total maximum daily loads.
https://www.sciencedirect.com/science/article/abs/pii/S0043135407003211

Georgia Coastal Stormwater Supplement: Appendix C - Coastal Stormwater Management Practice Monitoring Protocol
This monitoring protocol provides information that can be used to evaluate the performance of green infrastructure and stormwater management practices in coastal Georgia. The protocol presents a simple, yet comprehensive monitoring approach that can be used to accurately evaluate the performance of a wide range of green infrastructure and stormwater management practices.

https://epd.georgia.gov/document/document/stormwater-monitoring-bmp-protocol/download

Industrial Stormwater Monitoring and Sampling Guide
The Industrial Stormwater Monitoring and Sampling Guide ("guide") is a how-to primer for industrial facility operators on how to conduct visual and analytical monitoring of stormwater discharges. The target audience is operators of facilities subject to the U.S. Environmental Protection Agency's (EPA) 2008 Multi-Sector General Permit (2008 MSGP) or a similar State-issued industrial stormwater permit. The information presented will also be useful to anyone interested in industrial stormwater monitoring. The procedures presented in this guide, specifically related to monitoring methodology and quality assurance, will help ensure that stormwater samples yield usable information.
https://www3.epa.gov/npdes/pubs/msgp_monitoring_guide.pdf

Monitoring to Demonstrate Environmental Results: Guidance to Develop Local Stormwater Monitoring Studies Using Six Example Study Designs
The central purpose of this manual is to provide guidance to MS4 communities on developing monitoring studies whose results can help improve their local stormwater programs by getting more pollutant reduction out of the total community stormwater investment.
https://www.epa.gov/sites/production/files/2015-11/documents/monitoring_guidance_full_report.pdf

Regional Stormwater Monitoring and Urban BMP Evaluation (Prop 13)
Nonpoint source pollution has been identified nationally, in the State of California, and in the Bay Area as the leading source of degradation of natural waters. The magnitude of nonpoint source pollution is accentuated in coastal areas where human population is high and where pressures from urban development, industrial and commercial activities, and recreational use are the greatest. San Francisco Bay is listed as an impaired water body for PCBs and mercury under Section 303(d) of the federal Clean Water Act . The RWQCB has recently developed Total Maximum Daily Load (TMDL) reports for the Bay for mercury and PCBs.
https://www.sfei.org/projects/urban-stormwater-bmps-prop-13

Southern California Stormwater Monitoring Coalition
The Southern California Stormwater Monitoring Coalition (SMC) is a collaboration of more than a dozen public agencies responsible for managing discharges of stormwater and urban runoff into streams and storm drain infrastructure across coastal Southern California. The SMC pools resources and shares knowledge to improve water quality in these systems. SCCWRP, as an SMC member, facilitates the design and execution of numerous SMC studies and programs.
www.sccwrp.org/about/research-areas/regional-monitoring/southern-california-stormwater-monitoring-coalition/

Stormwater Monitoring Guide - 6 Steps to Consider
Stormwater monitoring doesn't have to be a headache for your organization, with proper site, sensor, equipment selection and standardizing on a real-time data acquisition

and control system you can be up and running within your compliance or organizational strategy requirements in a relatively short time period.
www.ysi.com/ysi-blog/water-blogged-blog/2015/08/stormwater-monitoring-guide-6-steps-to-consider

SWRCB Division of Financial Assistance (DFA) Developing a Project Assessment and Evaluation Plan (PAEP)
www.waterboards.ca.gov/water_issues/programs/grants_loans/paep/

The Stormwater Manager's Resource Center
The Stormwater Manager's Resource Center is designed specifically for stormwater practitioners, local government officials and others that need technical assistance on stormwater management issues. Created and maintained by the Center for Watershed Protection.
www.stormwatercenter.net/

Urban Stormwater BMP Performance Monitoring
This Manual provides guidance for all stages of BMP monitoring programs ranging from the early stages of study design to the end stages of data interpretation and reporting. Guidance is provided for monitoring a broad range of individual BMPs as well as overall site monitoring with multiple distributed BMPs, such as is the case with LID sites. This Manual focuses primarily on the collection, reporting, and analysis of water quantity and quality measurements at the heart of quantitative BMP efficiency projects. It does not address in detail sediment sampling methods and techniques, biological assessment, monitoring of receiving waters, monitoring of groundwater, streambank erosion, channel instability, channel morphology, or other activities that in many circumstances may be as, or more, Executive Summary Urban Stormwater BMP Performance Monitoring Manual Executive Summary October 2009 Page ES-2 useful for measuring and monitoring water quality for assessing BMP efficiency. In some cases, references for additional information on these subjects have been provided.
www.bmpdatabase.org/Docs/2009%20Stormwater%20BMP%20Monitoring%20Manual.pdf,

U.S. EPA Industrial Stormwater Monitoring and Sampling Guide (EPA 832-B-09-003)
The Industrial Stormwater Monitoring and Sampling Guide ("guide") is a how-to primer for industrial facility operators on how to conduct visual and analytical monitoring of stormwater discharges. The target audience is operators of facilities subject to the U.S. Environmental Protection Agency's (EPA) 2008 Multi-Sector General Permit (2008 MSGP) or a similar State-issued industrial stormwater permit. The information presented will also be useful to anyone interested in industrial stormwater monitoring. The procedures presented in this guide, specifically related to monitoring methodology and quality assurance, will help ensure that stormwater samples yield usable information.
www3.epa.gov/npdes/pubs/msgp_monitoring_guide.pdf

U.S. EPA Urban Stormwater BMP Performance Monitoring
This manual provides targeted practical assistance in conducting water quality monitoring and reporting data that are useful for assessing effectiveness of stormwater best management practices (BMPs).
www3.epa.gov/npdes/pubs/montcomplete.pdf

Erick Burres
Citizen Monitoring Coordinator
Clean Water Team @ State Water Resources Control Board
erick.burres@waterboards.ca.gov
213 712 6862 mobile
www.waterboards.ca.gov/water_issues/programs/swamp/cwt_general_mon.html
www.waterboards.ca.gov/water_issues/programs/swamp/cwt_volunteer.html
E-mail Subscription Mailing List
Water Quality - [X] Citizen Monitoring Program / Clean Water Team
www.waterboards.ca.gov/resources/email_subscriptions/swrcb_subscribe.html