Citizen Monitoring: The Power of Citizens in Local Watersheds

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Description of Presentation Content:

The Mission of the Clean Water Team (CWT) is to build and support the state's watersheds stewardship through involvement in citizen monitoring to reduce and prevent water pollution. The CWT's primary duty is to help citizen monitors produce data of high quality and known value. The CWT strives to have citizen monitoring data available for Total Maximum Daily Load (TMDL) development, implementation and assessment. A map will highlight citizen monitoring within TMDL waterbodies. Citizen monitoring is defined as any monitoring activity that relies, in whole or in part, on participation by volunteers, students or nonpaid staff. A variety of organizations may be involved in citizen monitoring projects, including but not limited to nonprofit groups, Resource Conservation Districts (RCDs), Coordinated Resource Management and Planning (CRMP) groups, local government agencies and schools.

The CWT supports citizen monitoring groups in many ways. CWT encourages stewardship through community education and awareness events such as restoration projects, stream cleanups, watershed festivals and World Water Monitoring Day. The CWT helps with training and programmatic support through CWT guidance documents, workshops, advisory committees, an equipment library and grant writing. Data collection (chemical, physical, biological) efforts for which the CWT has provided guidance include monthly monitoring, first flush events, snapshot days, National Secchi Dip-In, special studies and annual rapid-bioassessments. Information obtained through citizen monitoring is shared with landowners, local communities, watershed organizations and agencies (local, state and federal).

Surface Water Ambient Monitoring Program (SWAMP)

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Description of Presentation Content:

SWAMP is the State Water Resources Control Board's (SWRCB) program for measuring water quality improvements in the state. The SWAMP staff is coordinating existing water quality monitoring activities of the SWRCB and the Regional Water Quality Control Boards and is integrating these activities with the monitoring programs of others. The SWAMP staff will collect data statewide under well-defined quality assurance/quality control procedures to ensure data comparability throughout the SWRCB's programs and that the data collected is scientifically defendable. Staff will collect chemical, toxicity, and biological data. The program will incorporate the data from the following programs: grants, TMDLs, nonpoint source, stormwater, agricultural waivers, aquatic pesticides and volunteer monitoring. The poster shows the interrelationship between SWAMP and other data collection efforts throughout the state. The SWAMP staff will enter its data into the California Environmental Data Exchange Network (CEDEN).

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Influencing Land-Use Decisions at the Local Level: Positive Changes in Land-Use Planning and Watershed Health through Education and Outreach

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Description of Presentation Content:

The California NEMO Partnership is a collaboration of local, regional, state and federal agencies and organizations and is a part of the National NEMO Network (see http://nemo.uconn.edu/). NEMO provides local planners, elected officials, municipal staff, and developers with the knowledge, understanding, and tools necessary to make decisions that will manage polluted runoff while providing long-term watershed benefits. Natural resource-based planning, site design and best management practices are used to form an effective three-tiered approach to reducing impacts on water quality and aquatic ecosystems at the watershed, regional and individual site levels.

The CA NEMO Partnership is planning pilot workshops in Northern and Southern California to provide outreach and tools to help planners make more informed decisions. An example project is an Impervious Surface Analysis conducted by the Office of Environmental Health Hazard Assessment (OEHHA) (a CA NEMO partner) for the Dry Creek Watershed in Placer County. This project included the development of impervious surface coefficients for different categories of land use and the application of this information to project future buildout in the watershed that is likely to result in detrimental impacts to the aquatic ecosystem. With the tools and resources that NEMO provides, planners can apply alternative design techniques (like Low Impact Development) that would provide watershed benefits, rather than adverse impacts.

Water Quality Impairment from Contaminants on Particles: Size-Dependent Composition in Roadway Runoff

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Description of Presentation Content:

Small particles critically affect water quality. Besides reducing water clarity, sparingly soluble pollutants such as polycyclic aromatic hydrocarbons (PAHs) and some heavy metals are predominantly transported on particles. We have conducted a series of studies on nonpoint source roadway-derived fine particles, defined here as < 63 µm—traditionally the upper limit of *silt* and a size range that is readily suspended in moving water and that settles slowly. At the finest, we have examined the elemental composition of particles in the size range of 0.1 to 0.3 µm, commonly considered *colloidal* - that is, non-settling.

We have examined both resuspended road-surface *dust* that has been collected as a dry material and initially dry-sieved to remove sand-sized particles (> 63 µm) as well as actual highway stormwater. Size separations were done using two methods: traditional Stokes-law settling (for sizes > 2 µm) and by particle sizing and separating in a flow cytometer (for sizes < 1.5 µm). Both techniques reduce the potential artifacts of filtration: analyte sorption/desorption to and from flowing solution and fine particle straining onto larger particles.

For PAHs (especially heavier PAHs), dramatic water quality improvements are achieved only when all but the finest (~ 1 µm) particles are removed. For heavy metals, continuous improvement in water quality is seen as ever smaller particles are removed—all the way into the colloidal (< 0.5 µm) range. The latter result is true for road-surface dust collected from roads with modest traffic counts and from a wide variety of surrounding land uses - whether primarily industrial, residential, agricultural or commercial.

The lessons learned are several impervious surfaces such as roads harbor significant quantities of fine particles—carrying toxic pollutants—regardless of surrounding landuse, even roads without heavy traffic. For water quality improvements, one can measure the amount that will be achieved by management practices designed to remove particles down to a certain size.

Water Quality Monitoring and Data Management

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Description of Presentation Content:

Transport of pesticides by surface runoff during rainfall events is a major process factor contributing to pesticide contamination in rivers. This study presents a statistical model that relates pesticide loading over time in the Sacramento River with the precipitation and pesticide use in the Sacramento River watershed. The model closely simulated the observed pesticide loading in the Sacramento River during 1991–2000 winter storm events, indicating that precipitation and pesticide use are the two major factors affecting dynamics of pesticide transport into the surface water in the watershed. The validity of the model is further proven by the completely independent prediction of diazinon loading in 2001, which matched not only the magnitude, but also the daily long-term trend analysis. The capability of the model to provide time-series estimates on pesticide loading in rivers is unique and may be useful for total maximum daily load assessments.

Bay-Friendly Landscaping: A Program of StopWaste.Org

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Description of Presentation Content:

Bay-Friendly landscaping is a holistic, sustainable approach to the design, construction and maintenance of the landscape.

StopWaste.Org developed the *Bay-Friendly Landscape Guidelines: Sustainable Practices for Landscape Professionals* with input from private and public landscape architects, designers, contractors and as representatives from local public agencies. The Bay-Friendly Landscape guidelines provide these principles and practices for landscape professional to use to create and maintain beautiful and healthy landscapes:

- Landscaping in harmony with the natural conditions of the watershed
- Reducing waste and recycling materials
- Nurturing healthy soils while reducing fertilizer use
- Conserving water, energy and topsoil
- Using integrated pest management to minimize chemical use
- Reducing stormwater runoff
- Creating wildlife habitat

Bay-Friendly Landscaping is a project of StopWaste.Org, a public agency devoted to reducing waste in Alameda County. Bay-Friendly Landscaping recognizes that all Alameda County landscapes, whether they are institutional, commercial, residential or open space, are part of the larger natural ecosystem of the San Francisco Bay watershed. A well-designed and maintained Bay-Friendly Landscape can cost less to maintain in the long run because it requires fewer resources. Bay-Friendly Landscapes also embody community values for health, wildlife and the environment.

Water Quality in Headwater Streams of the Sierra Nevada Forests

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Description of Presentation Content:

The quality of aquatic and riparian ecosystems is a function of their condition and the integrity of adjacent uplands in their watershed. While small streams make up a large proportion of the overall stream network, our knowledge of how they function is still limited. The Kings River Experimental Watershed (KREW) was initiated in 2000 to quantify the variability in characteristics of small stream ecosystems and their associated watersheds in the Sierra Nevada of California. The primary management questions to be answered are the effects of prescribed fire and mechanical harvest on the physical, chemical, and biological conditions of the streams and riparian areas.

Two mixed conifer sites are being developed in the Sierra National Forest within the adaptive management area of the Kings River Project. Data is being gathered for a 4-year reference period that started October 1,2002. After fire and harvest treatments are applied, data will be gathered for at least 5 to 7 years. Each site will have a control watershed that receives no treatments, a watershed that is burned, a watershed that is harvested, and a watershed that is both burned and harvested. The watersheds range in size from 49 to 228 hectares (120 to 562 acres)—a size that can be consistently treated. The goal is to assess the integrated condition of the streams and their associated riparian and watershed areas (i.e., physical, chemical, and biological characteristics). Water quality is a core component of the research and is measured in streams, precipitation, snowmelt water and shallow soil water. KREW is the Forest Service's western location for evaluation of air pollution effects on forests.

KREW is designed to be a collaborative research study area that is ideal for various modeling exercises such as erosion, nutrient fluxes, stream discharge and climate change. New components are frequently added. Current collaborators include University of Nevada, Reno; University of California, Santa Barbara; University of California, Berkeley; California State University, Fresno; Colorado State University, Ft. Collins; U.S. Geological Survey, Sacramento; and Southern California Edison.

University of California at Santa Cruz—Stormwater and Drainage Master Planning: Measurement of Channel Modification and Consideration of Source Control for Capital Projects Planning

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Description of Presentation Content:

In 2003, University of California at Santa Cruz prepared an update to their Stormwater and Drainage Master Plan. The objective of updating the plan was to identify capital improvements that are necessary for stormwater management and water quality improvement on campus. The UCSC campus geology is unusual in California in that it was constructed over karst topography that is characterized by sinkholes and other dissolution features. The natural drainage channels that route runoff to the sinkholes generally have a steep gradient. That, combined with increasing unit runoff and high rainfall in a redwood forest environment, has resulted in notable erosion potential of these channels and presents significant challenges for management of these systems. The sinkholes and natural channel features play a critical role in stormwater management because they function as the stormwater and drainage conveyance system for much of the campus. The project included documentation of changes to the sinkholes and drainage channels including storm-specific measurements of site-specific precipitation, sinkhole infiltration and channel erosion. The poster will provide

- an overview of unique campus conditions
- a measurement of parameters that document hydromodification evaluation
- a description of site-specific best management practices and upstream source control measures to reduce the impacts of hydromodification

Measuring Sediment in Jack London's Streams: Historical Land Uses, Today's Roads, and the Sonoma Creek TMDL

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Description of Presentation Content:

In 2002, with 600 acres added to the existing 800-acre Jack London State Historic Park (JLSHP) from the adjacent Sonoma Developmental Center, the California Department of Parks and Recreation also inherited a complex network of old and new forest and ranch roads. The JLSHP roads potentially cause sedimentation to salmonid-bearing headwaters of Sonoma Creek due to wet-season runoff from roads with poor alignment, infrequent maintenance, undersized culverts and uncontrolled drainage. Many of the roads must be retained because they are also important culturally: they were constructed as a support network for Jack London's Beauty Ranch; they are required for the current park water system and emergency access; and they are of interest to the public as a year-round multiuse trail system.

The Sonoma Ecology Center (SEC) is a nonprofit group working toward a condition of sustainable ecological health in the Sonoma Valley. SEC is monitoring turbidity and suspended sediment exposures for aquatic organisms in streams draining portions of JLSHP with (1) old, untreated roads and trails and (2) newly rehabilitated roads and trails. The majority of JLSHP land is drained by Asbury, Mill, and Graham Creeks, which are all tributaries to perennial Sonoma Creek. During winter storms, heavy runoff carries sediment to these streams, increasing suspended sediment levels and turbidity. Highly turbid waters have been observed to reduce growth rates and impair the ability of aquatic species to feed including endangered steelhead trout.

Four years of continuous and grab sampling of suspended sediment and turbidity in major tributaries, as well as assessment of mainstem loading, have yielded preliminary results that indicate (1) suspended sediment concentrations (SSC) pose a moderate impact to over-wintering fish during wet storms, and (2) the magnitude and duration of SSC are severe enough to cause major physiological stress, but not direct mortality, during monitored events. SEC's water quality monitoring is being supplemented by methods of sediment production analysis, such as modeling using the Revised Universal Soil Loss Equation, to inform SEC staff as it develops a sediment budget for Sonoma Valley in support of the Sonoma Creek Sediment TMDL.

Featured NPS projects: Recontouring, Revegetating and Narrowing Roads and Trails in Jack London State Historic Park (319[h], 2004), Reducing Sediment Pollution in Sonoma Creek Watershed (Proposition 13, 2003), Jack London State Historic Park Watershed Assessment and Planning (DFG, 2003 and PSMFC, 2003), Effects of Management Practices on Peak Flows and Sediment Loading (319[h], 2001), Sonoma Creek Watershed Conservancy (CALFED, 2001).

California's Critical Coastal Areas Program: Partnering to Protect Our Coastal Waters from Polluted Runoff

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Description of Presentation Content:

California's Critical Coastal Areas (CCA) Program is an innovative program to foster collaboration among local stakeholders and government agencies to better coordinate efforts to protect critical coastal watersheds from polluted runoff. Through the cooperative efforts of 15 state agencies plus the Ocean Conservancy, the CCA Program has identified an initial list of 101 CCAs, which are coastal watersheds where nonpoint source pollution may threaten marine or estuarine areas of high resource value. The CCA Program's goal is to ensure that effective long-term management measures are implemented to protect or restore water quality in these areas.

A series of public forums was held along the coast in spring 2005 to gather stakeholder input on NPS issues in CCA watersheds. With this input, four Pilot CCAs have been chosen, one in each of four regions of the coast—North Coast, San Francisco Bay, Central Coast, and South Coast. The CCA Program is now forming teams of local stakeholders (watershed groups, special interest organizations and community members) and government agencies (state, federal and local) to develop community-based NPS Assessment and Action Plans for addressing polluted runoff that may threaten coastal resources within these Pilot CCA watersheds.

The NPS Assessment and Action Plan will integrate and build on existing local watershed protection and restoration efforts, identify needs and available resources, focus the attention of responsible agencies and coordinate with other relevant water quality protection programs. The lessons learned from these pilot projects will be applied to CCAs throughout the coast. The *State of the Critical Coastal Areas* report, which describes the NPS issues at each of the 101 CCAs and the efforts underway to address these issues, is available on the CCA Program web site at http://www.coastal.ca.gov/nps/cca-nps.html.

An Overview of the California Monitoring a 22nd Assessment Program (CMAP) for Perennial Streams

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Description of Presentation Content:

The State Water Board's Nonpoint Source (NPS) and Surface Water Ambient Monitoring Program (SWAMP), in cooperation with the U.S. Environmental Protection Agency (EPA) and the California Department of Fish and Game initiated the California Monitoring and Assessment Program (CMAP). This program builds on EPA's Environmental Monitoring and Assessment Program (EMAP) and will be used to (1) provide a framework for producing valid condition assessments for perennial streams in California and (2) develop tools to facilitate these assessments. Historic EMAP data will be analyzed to produce assessments of the condition of streams in different study areas. In addition, a monitoring study will be continued to assess aquatic life beneficial use protection in streams. The study uses a probabilistic monitoring design and incorporates a core suite of indicators. Results from CMAP will provide information to help address questions applying to statewide status, trends and the extent and types of nonpoint source impairments.

The City of Chico: Designing a Structural Stormwater BMP Efficiency Evaluation Monitoring Program that Complies with the CRWQB Surface Water Ambient Monitoring Program and the USEPA/ASCE National Stormwater BMP Database Project

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Description of Presentation Content:

The program emphasizes designing a meaningful Best Management Practices efficiency monitoring program that meets U.S. Environmental Protection Agency/American Society of Civil Engineers National Stormwater BMP Database Project recommendations and SWAMP requirements, including:

- Selecting sampling locations (a function of current and future land uses and BMP technologies that will be implemented)
- Determining the number of samples needed (to obtain statistical significance between influent and effluent quality, according to BMP Database Project)
- Selecting the constituents for monitoring (on the basis of existing water quality standards and recommendations by the BMP Database Project)
- Monitoring methods (automated samplers to collect both first flush and flow-weighted samples of a storm event, grab samples, field measurements and sediment sampling)

The Natural Resource Projects Inventory (NRPI)

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Description of Presentation Content:

The Natural Resource Projects Inventory (NRPI) began as a collaborative effort between UC Davis Information Center for the Environment (ICE) and the California Biodiversity Council (CBC) in 1995. Today, NRPI has over 5,400 projects counting assessment, planning, acquisition, capacity building and restoration efforts throughout California. These all can be queried and viewed online at www.ice.ucdavis.edu/nrpi.

In 2001, the State Water Board added the nonpoint source section to NRPI to track the 6 NPS Management Categories, 61 Management Measures and the TMDL water quality constituents. All grant recipients are now required to complete an online NRPI form for all State Water Board NPS grants. These include federal CWA 319(h) grants and Proposition Bonds 13, 40 and 50 state funded grants. Other sections in NRPI include the project description, publicly available data, spatial information, goals, monitoring, contact information, habitat and much more. These, combined with the NPS section, provide information to resource managers and educate the public about ongoing efforts to improve water quality in California.

Impervious Surface Analysis: a Technique for Monitoring a Watershed Stressor

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Description of Presentation Content:

Impervious surfaces (IS), covering the landscape with hard surfaces, alter the hydrology in a watershed and causes habitat and water quality degradation. Quantifying the extent of IS is an important tool in managing their potentially adverse impacts. We developed IS coefficients for the Sacramento Area Council of Government's general land use categories (GLUC) for use in the Dry Creek watershed. Coefficients were developed using aerial photos and land use layers in a Global Information System. These coefficients ranged from 5 percent for rural residential areas to 35 percent for low-density residential up to 85 percent for office and professional land uses. These coefficients were then used to analyze total impervious area within the watershed. Presently, the percent imperviousness in each of 5 sub-watersheds is being compared to habitat and water quality measurements using EPA's stressor identification process.