

Runoff Rundown

A NEWSLETTER OF THE WATER EDUCATION FOUNDATION

Making Stormwater a Resource, Not a Problem

By SUSAN LAUER

For most of the 20th Century, conventional wisdom of urban development was influenced by the original infrastructure of the oldest cities. The thinking was to get excess water away from development as quickly as possible to prevent flooding. As urban environments grew, soils and natural surfaces that absorbed excess water and filtered pollutants were built over with impermeable surfaces, such as buildings, roads, parking lots and sidewalks.

“Overland flows from streets, rooftops and parking lots ... have nowhere to go because the natural vegetation and soils that could

absorb it have been paved over,” noted a 2006 report by the Natural Resources Defense Council (NRDC) “Rooftops and Rivers.” “Instead it becomes a high-speed high-velocity conduit for pollution into rivers, lakes and coastal waters.”

This alteration of natural water flow characteristics, known as hydromodification, has severe implications. As a facet of the stormwater runoff problem, hydromodification forces water into waterways and causes soil erosion, flooding and habitat loss. One inch of rain falling over a paved area one acre in size produces 27,000 gallons of water. Compound that figure to

cover a large urban area and the effect of the stormwater flow becomes significant.

“Think of the landscape as a sponge in the natural environment. With urban development, the landscape is like a Teflon® cookie sheet. It is that extreme,” said Greg Gearheart, Senior Water Resource Control Engineer with the California State Water Resources Control Board (Water Control Board).

Plus, with no natural filtering, hydromodification sweeps pollutants – everything from oil and pesticides to animal feces and trash - downstream. There pollutants

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Credits

Editors

Rita Schmidt Sudman
Sue McClurg

Writer

Susan Lauer

Editorial Assistance

Robin Richie

Photos

California Academy of Sciences
City of Poway
Northstar at Tahoe
S & J Carrera Construction
Southern Association of California
Governments
USDA, Natural Resources
Conservation Service

Design and Layout

Curt Leipold,
Graphic Communications

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Water Education Foundation

717 K St., Suite 317
Sacramento, CA 95814
(916) 444-6240
Fax (916) 448-7699

e-mail: feedback@watereducation.org

Web page: www.watereducation.org

President

William Mills

Executive Director

Rita Schmidt Sudman



WATER EDUCATION
FOUNDATION

The California Runoff Rundown is published by the Water Education Foundation. The mission of the Water Education Foundation, an impartial, non-profit organization, is to create a better understanding of water issues and help resolve water resource problems through educational programs.

Dear Readers,

Stormwater runoff from streets, rooftops and parking lots is an increasing problem throughout California as flows from paved urban surfaces rush into waterways – causing soil erosion, flooding, habitat loss and pollution.

The alteration of natural flow characteristics – hydromodification – is addressed by the federal Clean Water Act and a permit program overseen by the State Water Resources Quality Control Board and its regional boards. The issue is complicated and controversial. Yet new understanding of hydromodification and, more importantly, emerging technologies mean pollution into rivers, lakes and coastal waters should be reduced. These technologies also offer improved restoration efforts improved in the future.

This issue of *The California Runoff Rundown* looks at the hydromodification situation and what's being done to address the problem, including local case studies.

Other stories in this issue include how dairy producers in the Central Valley are getting outreach assistance to comply with new regulations; a report introducing long-term impacts of mercury contamination from mining operations dating back to the Gold Rush era and the city of Poway's successful efforts to protect its drinking water supply after the 2007 Witch Creek Fire.

Unfortunately, this could be the last issue of *The California Runoff Rundown*. The original federal and state grant through the Clean Water Act that funded our previous three years of publication has expired, and will not be renewed.

We at the Water Education Foundation remain dedicated to finding new sources of funding to continue *The California Runoff Rundown* as an important educational tool. Since we developed the first issue in Spring 2005, our "snail mail" and email lists had grown to more than 7,000 people. Some 93 percent of the readers we surveyed about the publication – readers from agriculture, local government, state and federal agencies, the media and municipal districts – categorized this publication as either "very worthwhile" or "worthwhile." In order to continue this worthwhile publication, we are seeking your financial support in continuing to publish *The California Runoff Rundown*. Please contact me if you have any ideas for potential funding.



Rita Schmidt Sudman

Outreach to Dairies in Face of New Regulations



Facing stringent new environmental water regulations, Central Valley dairy producers are getting some extra help in the form of educational outreach in their efforts to protect the region's water quality.

The new regulations – known as waste discharge requirements – require more than 2,000 dairy producers to produce monthly photographs of retention pond levels and sampling of process wastewater (liquid manure) and solid manure (including slurry), among other reporting actions. The goal is to improve environmental management practices in order to reduce livestock pollutants that can adversely impact water quality.

Improper collection and storage of manure or its improper application to land can pollute surface water with unhealthy levels of ammonia, organic matter and nutrients. The primary concerns for groundwater are salts and nitrates.

The Central Valley Regional Quality Control Water Board (Central Valley Board) approved the regulations in May 2007, and the first monitoring reports were due in

May 2008 while the full regulations being in July 2008. The Board has the charge of ensuring the quality of wastewater and stormwater that can be degraded from dairy production discharges. The more than 2,000 dairies – 75 percent of the dairies in the state – have an average of about 700 cows, and most operators have taken actions to prevent discharges to surface water. Still, with so many cows, the potential for water degradation is a top concern in a region already facing water supply and quality problems.

“Each (milk cow dairy) facility represents a significant source of waste discharge with a potential to affect the quality of the waters of the state,” noted the General Order for the new regulations. “While this Order will impose stringent new requirements, it will still accommodate important economic activities in mostly rural areas of the Central Valley Region, which is considered to be a benefit to the people of the state.”

While no set of waste management practices has proven to be absolutely protective, the new regulations stress monitoring as the

most direct way to determine if dairy management practices are most effective.

The new regulations were delivered to dairy producers in a 128-page packet that detailed their responsibility, and “for a lot of producers the bar is now at a level they did not expect,” said Anne Silva, owner of an 800-cow dairy in the Tracy area and chair of the California Dairy Quality Assurance (CDQA) Program advisory board. “There are questions and concerns, and we simply hope it does clean up the environment.

“When dairy producers got the packet, they were so overwhelmed that they were just looking for some education on how to get through this. Really, they needed someone to take them by the hand,” she added.

That's when the CDQA stepped up to offer training through a partnership among dairy producers, government agencies and university specialists.

The Central Valley Board is allowing producers to implement the permit in stages over the five-

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year life of the permit. "We were relieved when the board implemented the new regulations over a five-year period. It has allowed us to go ahead and do some extraordinary outreach," said Michael Payne, CDQA program director.

Dairy producers have been attending standing-room only workshops since late 2007 in Central Valley counties. The recent efforts are the most intensive outreach programs attempted to date, and the partnership has been a key to success.

"As my mother would say, 'Many hands make light work.' This is not feeling light, but certainly with a joint effort we are able to get out there with intensive outreach," Payne said.

From the dairy producers' perspective, the workshops will make a difference.

"For many dairymen, their days are full enough without the additional work. Having all these people come together and participate in the outreach to help my dairy reach the goal of where the bar has been set is impressive. It gives you hope," Silva said. •

Fast Facts

- ▶ The number of milk cows in California doubled over the last 30 years to almost 1.8 million in 2006, while the number of dairies dropped by nearly half to approximately 1,970.
- ▶ Three-quarters of the state's dairy cows are in the San Joaquin Valley, with approximately 68.5 percent of the milk production from Tulare, Merced, Stanislaus, Kings, and Kern counties.

Stormwater

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accumulate and threaten aquatic and wildlife, as well as create health hazards for people.

"Hydromodification is a major source of impairment for every river, stream and creek in the state. We need to focus on creating sustainable landscapes," said Eric Berntsen, staff environmental scientist with the State Water Resources Control Board in April during a stormwater runoff discussion at Regional Board training workshop organized by the Water Education Foundation.

In order to address riparian damage and also the urban source of runoff, regulators target municipalities and industry to address the problems through landscape architecture and Best Management Practices (BMPs), which aim to remedy a specific problem to recreate predevelopment hydrology to the greatest extent possible.

The Regulations

The federal Clean Water Act (CWA) directly addresses hydromodification under the National Pollutant Discharge Elimination System (NPDES). The State Water Board and nine Regional Water Quality Control Boards grant and oversee permits under Phase I and Phase II of the NPDES.

Begun in the 1990s, Phase I applies to municipalities that have stormwater systems that serve a population of 100,000 or more and any construction activity that involves more than five acres. Phase II, begun in 2003, includes small municipalities and construction sites of one to five acres. It also pertains to smaller sites less than one acre, that are part of "a larger development project."

"This is a complicated program. Different regions are at different stages of addressing hydromodification," Gearheart said. "For example, some municipalities

are on their third permitting cycle while others just coming into the program."

There has been a broad learning curve as the regulators, planners and permittees have grappled with creating effective plans. Ever-advancing technology, modeling, costs, coordination and follow-up have complicated matters and led to litigation.

Progress is being made, however. In San Diego, for example, "the tools are now in place in cities. We can see our path to get there," said Jeremy Haas, environmental scientist of the Municipal Stormwater Program at the San Diego Regional Water Board.

He said the permit program in San Diego has evolved through the years with advancements in technology and a broader understanding of the problems created by hydromodification: "All area municipalities enrolled in Phase I in 1990. In large [part], we were addressing a legacy program, so we started vague with the program. We've had a difficult time with enforcement, and there has been a lack of understanding of the effectiveness of BMPs," Haas said. "Now, we recognize the multifaceted stormwater world. The next step is to focus on quality of effluent and the effects that effluent has on watersheds or the Bay."

The State's Role

California breaks its hydromodification program into two categories – municipal and construction– and allows overlap for projects that fall into both groupings.

Under the municipal program, the state and regional boards are working with 26 permits under NPDES Phase I (addressing storm water discharges from about 300 municipalities) and one statewide general permit that addresses stormwater discharges for 250 entities as part of Phase II, according to Christine Sotelo, environmental scientist with the State

Control the Pollution and Damage

Hydromodification is a facet of the overarching problem of urban stormwater runoff, which can take a serious toll on downstream waterways.

To that end, California has created a guide of management measures to address what might be done to prevent or minimize nonpoint source pollution caused by uncontrolled and untreated runoff from non-point sources (NPS).

The State Water Board, California Coastal Commission and other state agencies have identified seven management measures to address hydromodification. These fall into four categories: channelization and channel modification; dams, streambank and shoreline erosion, and education and outreach.

Scheduled to be implemented by 2013, the NPS Encyclopedia is designed to give local officials and practitioners the flexibility to choose practices that best deliver given their own circumstances.

Channelization and Channel Modification - Management measures promote the evaluation of channels as a part of the watershed planning and design processes. These include watershed changes from new development in urban areas, agricultural drainage, or forest clearing. The purpose of the evaluation is to determine whether resulting NPS changes to surface water quality or instream and riparian habitat can be expected and whether these changes will be good or bad.

Existing channelization and channel modification projects can be evaluated to determine runoff impacts, as well as benefits associated with the projects. Modifica-

tions to existing site-specific projects can also be evaluated to determine possible improvements.

Dams - These management measures address two problems associated with dam construction: the increase in downstream sediment resulting from construction and operation activities, and chemical spillage from on-point source pollution.

An additional measure addresses downstream surface water quality and instream and riparian habitat impacts of reservoir releases.

Streambank and Shoreline Erosion - A management measure addresses the stabilization of eroding streambanks and shorelines that create a polluted runoff problem. Bioengineering methods such as marsh creation and vegetative bank stabilization are preferred. Streambank and shoreline features that have the potential to reduce polluted runoff should be protected from impacts, including erosion and sedimentation resulting from uses of uplands or adjacent surface waters. This management measure does not imply that all shoreline and streambank erosion must be controlled; the measure applies to eroding shorelines and streambanks that constitute a NPS problem in surface waters.

Education/Outreach - Pollution prevention and education programs for the public and state agency employees impart information and promote projects that reduce runoff pollutants, which retain or reestablish natural hydrologic functions (e.g., channel restoration projects and low impact development projects), and which prevent and remedy adverse effects of hydromodification activities. •

Water Board. "The goal is the same – to comply with the Clean Water Act standard," she said.

To be granted permits, municipalities must provide a stormwater management plan and implement BMPs. Many of the municipalities are also implementing measures to address Total Maximum Daily Loads (TMDLs) – calculations of the maximum amount of pollutants that a waterbody can receive and still meet water quality standards – in their areas as part of the Phase I permits, which makes matters more complicated.

"Often, permittees are given a lot of flexibility to implement their Stormwater Management Plans," Sotelo said. "These are complex and a lot of money is being spent – that is a large issue."

The complications don't ease with Phase II permits. Complexity, legal challenges, integration of storm management plans, compliance issues and the sheer number of permits is putting a burden on state and regional boards.

"... 250 permits under Phase II is a lot of work for regional boards. And there are hundreds yet to be identified," Sotelo said

For the future, Sotelo noted Phase I improvements will be how to better evaluate compliance – with specific, clear provisions. Phase II permits should become easier, because permits will contain specific goals.

On the construction side of the state's program, extra focus is being paid to how to improve performance measurements. "We are looking to adopt a risk-based permit application on the concept that 'not all sites are created equal,'" said Berntsen.

Incentives are high on the list as part of the efforts. Examples may include training permit applicants so they can meet the requirements of their permits to achieve a lower-risk level. Also, fees might be streamlined for low-risk projects.

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Paved-over surfaces cause stormwater to flush into downstream waterways, resulting in soil erosion, increased pollution and flooding.

Putting the Best Practices to Work

As part of the permitting process, BMPs play a vital role to reduce the effects of hydromodification and prevent stormwater pollution. In urban environments, popular BMPs include vegetated swales, grass basins, constructed wetlands on larger sites and stone-filled trenches. These all can be remarkably effective to capture water and serve as natural pollutant filters.

Where open space is tight and impermeable surfaces great, public agencies and private contractors are finding that permeable materials, such as porous asphalt and concrete, allow rainwater to filter through the paved surface into the ground, which can help recharge underground aquifers. The materials can cost 25 percent more than conventional concrete, yet there are savings associated with reduced stormwater management infrastruc-

ture – obtaining land and constructing off-site retention – and the ecological value of using a non-petroleum-based material.

BMPs provide a shopping list to address runoff issues, yet no one approach or even a fixed combination of approaches is a panacea. In other words, BMPs are not “one size fits all.” Agencies drafting stormwater management plans, for example, must first account for the amount of runoff being generated in a specific locale so that proposed mitigation measures are suitable to the task. Some plans are written to address specific concerns, such as the impact of runoff on nearby streams or riparian areas.

“Hydromodification efforts are still in the early stages, and we are trying out different technologies,” said Jill Bicknell, managing water resources engineer at EOA, Inc. in Sunnyvale, where she assists municipalities to implement their

stormwater management plans related to new development and construction activities.

“Various BMPs range from detention basins for storage, underground solutions including tanks and vaults and storing runoff in soil or gravel – anywhere you can store water and hold it back. We are still learning, yet I am confident we are on the right track,” she said.

For the future, David Beckman, senior attorney with the NRDC, says the optimum approach “is not to manage a particular BMP but set performance standards and let the city and developer choose what works. That maintains flexibility. You can do what you want to while meeting the ultimate goals.”

Putting a LID on it

In 2006, the State Water Board determined that the concept of sustainability should be incorporated as a “core value” in all its future activities and programs as a significant step to address the state’s anticipated population of 50 million people by 2025. Low Impact Development (LID) is a relatively new concept in stormwater management began in the 1990s and is an important element of this strategy.

At its core, LID looks to implement methods to infiltrate, filter and store stormwater. Popular techniques include disconnecting roof gutters and paved areas from traditional drainage outlets, so excess runoff doesn’t rush into and overload the system. Also, natural areas that may look like landscaped “park” areas are engineered to direct runoff to plants and soil that trap and treat various contaminants.

Other strategies include the preservation of environmentally sensitive features such as riparian buffers, wetlands, steep slopes, flood plains, woodlands and highly permeable soils.

“LID is green infrastructure. It’s no longer a question of if we do it but how, and how much do we need to do,” said Ken Schiff, deputy

director of the Southern California Coastal Water Research Project, a research institute focusing on the coastal ecosystems of Southern California, from watersheds to the ocean.

Other common LID practices include rooftop gardens, tree planter boxes, and the use of permeable pavement in low traffic areas, parking areas and walking paths.

"To LID, just say yes. It really can be the best BMP. It is real source control. If you don't create new runoff, you have less polluted stormwater to deal with," said Goeff Brosseau, executive director of the California Stormwater Quality Association.

Last year the San Diego Regional Water Board approved a stormwater runoff permit that will require the Port District and the county's 18 cities to increase the testing and monitoring of runoff, street sweeping and sewer-line cleaning.

Significantly, the renewal permit also will require the use of two types of LID. Developers will need to effectively route runoff from paved surfaces and also be required to use permeable materials for segments of low traffic areas. By 2010, all sites larger than one acre will be subject to the requirements. Additional provisions require measures that typically involve the use of large holding basins that detain the increased stormwater runoff resulting from development projects and release the runoff in a pattern similar to the pre-project condition.

Where the county and cities previously had discretion to require LID based on applicability and feasibility, under the new permit, the San Diego Regional Board will have discretion to provide its input.

While developers have accepted LID and are on the forefront of

"LID can transform how we think – from stormwater as waste to an economic value."

- David Beckman, Natural Resources Defense Council

implementing effective technological innovations, the matter of cost and concern that private industry is unfairly bearing the brunt remains an issue. Some developers question whether applying LID

design is a cost-effective endeavor, given the potential higher design and construction costs and the prospect of lengthy project approval.

Mark Grey, director of environmental affairs for the Building Industry Association of Southern California, notes the building industry overall is "supportive of LID and green infrastructure. The building community gets it. The battleground – if you will – is how to do that through permits and the California Environmental Quality Act (CEQA). The folks I represent don't feel discretion should lie with the state and local boards."

Grey added that BIA supports providing developers with incentives to build green and offset hydromodification. "If we want to get developers to integrate stormwater with water supply, we need to look at incentives."

The NRDC's Beckman agrees that incentives can lead to effective measures: "LID can transform how we think – from stormwater as waste to an economic value. Consider the water running off people's lawns as supply. If developers are producing water efficiency – and not producing runoff – they should get a credit. When combined together, LID can address energy costs, water supply, water quality, and there's a wider content of agreement."

Tying Efforts to Funding

Funding is, of course, a key issue for hydromodification efforts. The costs associated with implementing stormwater management plans, including BMPs and LID, can be daunting. While solutions are being sought, the state has made strides to provide some assistance.

Pervious concrete in parking and walking areas is one way to offset the impact of urban runoff.



Practical Lessons at a Lake Tahoe School

What started out as a regulatory obligation transformed into an incredible learning experience for youngsters, teachers and the community at the Tahoe Lake Elementary School in Tahoe City.

The school's playground areas next to buildings were paved to create a wall-to-wall asphalt cover, serving as a funnel for large volumes of polluted water into Lake Tahoe just five blocks away. Lake Tahoe has lost 30 percent of its fabled clarity and color, and lake protection ordinances now require developed properties in the Tahoe basin be retrofitted with measures to protect water quality. That meant the school needed to make over its impermeable schoolyard.

The school partnered with the Natural Resources Conservation



Students at Tahoe Lake Elementary School got a hands-on lesson on how to protect nearby Lake Tahoe from runoff generated from their school pavement.



Service (NRCS) and the Tahoe Resource Conservation District. NRCS furnished materials, technical support and engineering advice, while the teachers developed curriculum and activities for students so they would have a hands-on water quality and environmental lesson.

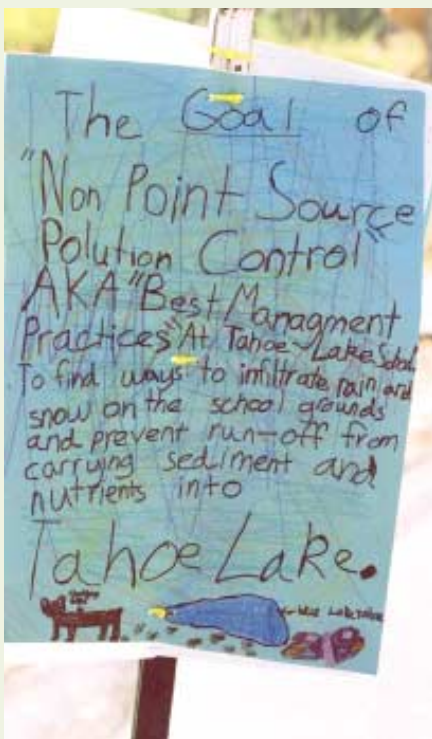
"It's a complete package - a teaching tool, a public demonstration site, students learning stewardship and involving their parents. The retrofit works to protect Lake Tahoe, helps the school meet ordinances, and creates an aesthetic play area for the children," said NRCS District conservationist Jane Schmidt.

The project entailed creating a large drainage basin to infiltrate water into the soil. Planter boxes were engineered to capture roof runoff and move the water under a driveway to the area. Atop the

basin, parents and students built a garden and wildlife area with aspen, native shrubs and wildflowers.

"We're treating the runoff here, 750 cubic feet of water, by creating a sub-watershed on the school site. The planter boxes will catch runoff, provide a place for native plants, and an outdoor classroom space," said Jan Ellis, Sierra Watershed education partnership coordinator.

Parent Johanna Monforte noted the impact the project had on her fourth grade son. "This is the most engaged I've seen him in learning. He's digging in the dirt, learning science, seeing community participation, and developing a real sense of pride in himself and what he can do," she said. "The environment lesson is good; there is no reason why we can't solve multiple problems in an environmentally responsible way." •



Xeriscaping techniques reduce runoff and help conserve water in yards and gardens.

AB 739, approved in 2007, established criteria for the State Water Board and the Department of Water Resources (DWR) to award grants for stormwater management projects. The projects will be funded by a portion of the proceeds of Proposition 1E flood bonds (\$4.1 billion) and Proposition 84 (\$5.4 billion) approved by voters in November 2006.

Prop. 84 funds are designated for \$1.5 billion for water quality projects (mostly through grants to local agencies); \$928 million for projects to protect rivers, lakes, and streams; \$800 million in additional funding beyond Proposition 1E for flood control projects; \$580 million to fund "sustainable communities" and "climate change reduction;" and \$1.5 billion for planning and feasibility studies concerning water supply and flood control.

Shifting the Mindset

While permits and regulations have dictated actions, there is an

increased focus on the need to educate and motivate municipalities, industry and the public to the causes and effects of the devastation done by unmitigated runoff. And most important, how to overcome the challenges.

"Public education is important. Clearly, the public supports clean water. Bureaucrats need to reach out. For example, in Los Angeles, we've gone out and explained why it's important. The challenge is to do it more comprehensively," said Xavier Swamikannu, chief of the stormwater permit program for the Los Angeles Regional Water Board. "As a local politician you care most about what your community wants and less interested in regulations. Municipalities have program demands – transportation, police, fire – and water quality competes with that. We have to better define what the objective is."

"The cost of implementation is also a key factor, he added. "For

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Nonpoint Source News



A Green Roof-Park to Top the Hollywood Freeway

The Hollywood Chamber of Commerce has proposed to build a 44-acre park deck over a portion of the Hollywood Freeway, essentially creating a green roof over one of the busiest freeway systems in America.

Known as the "Hollywood Freeway Central Park," the park would be built in the area between Bronson Avenue and Santa Monica, over a section of U.S. Route 101 that is below street level and in a diverse and densely populated, green space-deficient area of the city. The proposed park deck would help improve air quality for over 80,000 area residents by creating a "cap" over this portion of the freeway, with the necessary ventilation

Court Orders L.A. Regional Board to Revise Regulations

The Los Angeles Regional Water Quality Control Board was ordered by an Orange County Superior Court in July 2008 to revise stormwater quality regulations for the L.A. region's Water Quality Control Plan (Basin Plan). The decision will likely have effects on the regulatory environment for local governments and regulated industries that must comply with stormwater regulations.

The court found that the Basin Plan is in violation of state and federal statutes requiring balancing of economic impact, need for housing, physical and chemical characteristics of stormwater and other considerations.

The court maintains that the Los Angeles Regional Board's approval of the Basin Plan during its most recent 2004 review failed to consider the unique characteristics of stormwater, including the extreme variability of pollutant loads and

concentrations and economic impacts.

The court issued a writ invalidating portions of the Basin Plan and directing review and reconsideration of water quality standards as they apply to stormwater and urban runoff. In addition, the Superior Court ordered the elimination of all "potential" beneficial uses and related water quality objectives, finding that it is contrary to state and federal law.

The injunction had prohibited a number of storm water regulatory activities by the State Water Resources Control Board, including the processing of certain water quality petitions and the adoption or enforcement of certain stormwater permit provisions. However, a new court order in late August allows full implementation of the State Water Board's pre-existing storm water regulatory program. •



system requiring the air to be cleaned before re-circulating it back into the environment, according to the Hollywood Chamber. The park would create a brief tunnel for vehicular traffic while affording a street-level park for pedestrians, easing some of the strains on the community created by the original construction of the freeway through this area of Hollywood.

In addition, by creating a transit-oriented development, accessible by subway stops and various bus lines, the Hollywood Chamber hopes to generate a positive environmental impact and promote a more active, healthy lifestyle for area residents, 26% of which are children. It will take several years, at the earliest, to finish the design – and to identify funding. Currently, several different configurations are being studied. For more information or to find out how you can help, contact Rochelle Silsbee at (323) 469-8311 or via email at info@hollywoodchamber.net.

The Hollywood Central Park Freeway project design sets a 44-acre park atop the freeway.



\$2.75 Million Settlement with Northstar Mountain Properties

Northstar Mountain Properties, LLC has agreed to pay \$2.75 million as part of its settlement with the state of California stemming from water quality violations associated with development at the Northstar resort community near Truckee during the 2006 construction season.

This is the largest settlement ever reached by the Lahontan Regional Water Quality Control Board as a result of an enforcement action related to stormwater compliance activities. An environmental project is currently being developed to offset a portion of this liability amount.

The alleged violations primarily concern construction stormwater control at several NMP development projects in eastern Placer County. The proposed settlement includes an administrative civil liability payment of \$2.75 million, of which \$600,000 in cash would be distrib-

uted between the State Cleanup and Abatement account and the Waste Discharge Permit Fund.

An additional \$2.15 million would go towards a Supplemental Environmental Project (SEP), which will include implementing restoration efforts and watershed improvements on the Waddle Ranch Property, located in Martis Valley and recently acquired by the Truckee Donner Land Trust to establish a conservation easement.

At its July meeting, the Water Board directed staff and Northstar Mountain Properties to modify the SEP to include riparian habitat restoration and forest thinning in the Northstar community, rather than having all of the SEP work occur on the Waddle Ranch property. Water Board staff expects to bring a revised SEP and agreement for the Water Board's consideration in early 2009.

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The green roof atop San Francisco's California Academy of Sciences is an environmental innovation.



Museum's Green Roof is a Sponge for Runoff

While the first roof gardens in Babylon drew enough acclaim to be an ancient Seventh Wonder of the World, a modern day green roof in San Francisco is being heralded as the most environmentally friendly museum in the world - and one of the most accomplished ways to reduce stormwater runoff.

The "living roof" atop the new California Academy of Sciences is expected to prevent about 2 million gallons of rainwater per year from becoming stormwater runoff with the help of 2.5 acres of native species planted on the roof of the museum.

The roof's base is a concrete slab that resembles a thick sandwich: a sheet of waterproofing material, a layer of rigid insulation, a drainage layer of gravel, an "erosion control blanket," three inches of soil and, on top, more than 50,000 biodegradable woven-fiber trays containing soil and plants.

When it rains, the roof will act like a sponge, absorbing much of the water that would otherwise run off. Researchers estimate that three to five inches of the roof's soil will absorb 75 percent of rain deposits that are one-half inch or less.

The museum's roof also will reduce pollution from rainwater through the plants' natural filtering processes that break down and detoxify pollutants, nitrogen and phosphorous. A perk of the green roof is this beneficial process will increase over time as plants and root systems mature.

When it opens this fall, the roof will feature seven domes and steep hillocks to commemorate San Francisco's undulating topography, according to famed architect Renzo Piano. The collected rainwater will be used as gray water throughout the museum, while the rounded hills will draw cool air into the piazza. •

example, some cities are steering away of beach cleanups because they don't know the cost of cleanup."

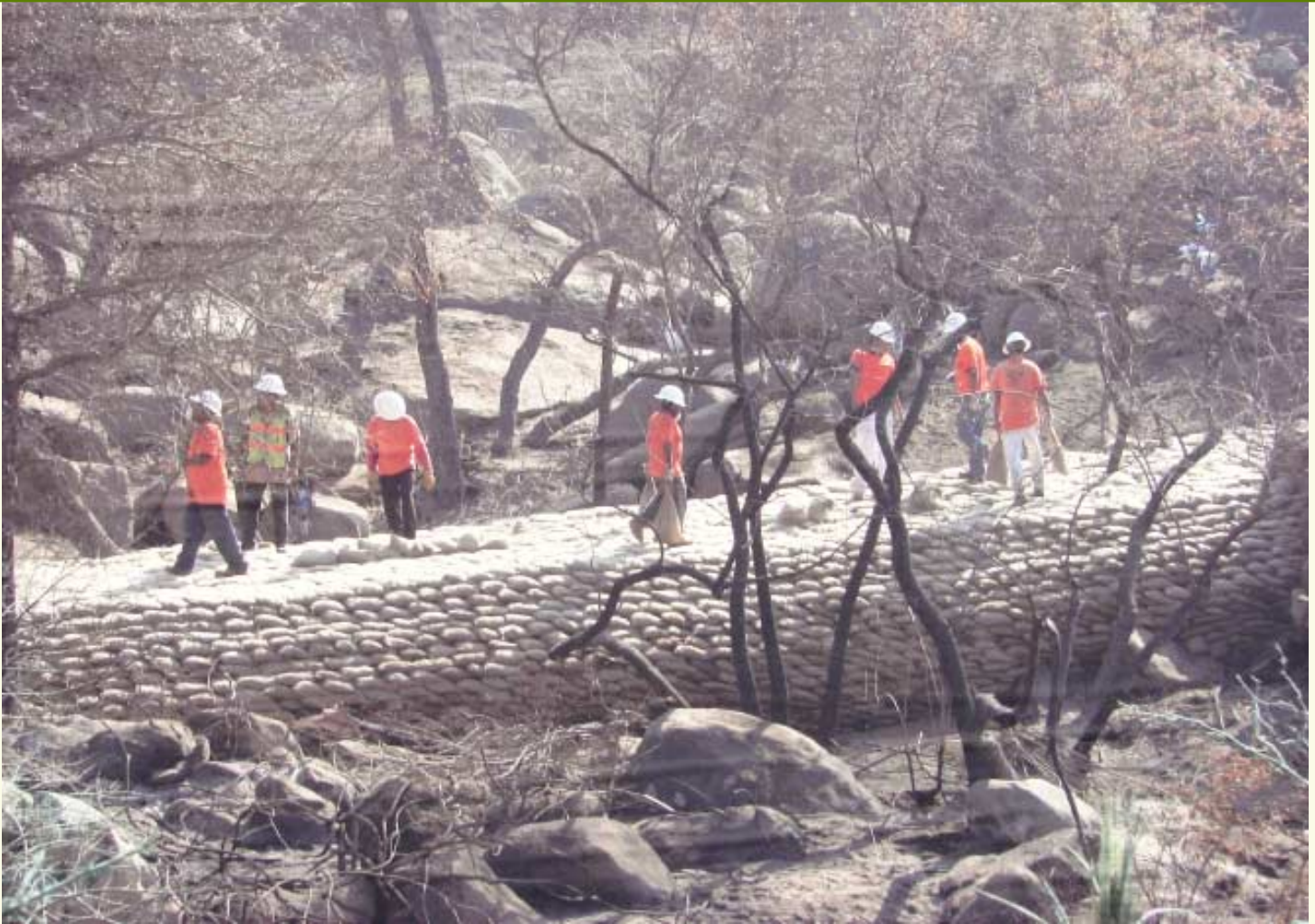
"Think of the landscape as a sponge in the natural environment. With urban development, the landscape is like a Teflon® cookie sheet."

*- Greg Gearheart,
California State Water Resources Control Board*

To assist those on the front lines of addressing hydromodification, CASQA offers BMP handbooks for new development and redevelopment, construction, industrial and commercial and municipal projects. (<http://www.cabmphandbooks.com>). "There are folks with experience in LID, look to the experts. There are hundreds of demonstration sites around the Bay Area. Look to those. Everybody's rolling up their sleeves, and the more information that is available, the better," Brosseau said.

What's at stake is the state's water future: "California is not plumbed to catch rainwater now. If we don't, water will be even more precious than it already is," he added.

For more information about stormwater runoff and hydromodification, check out the Sate Water Board's website at http://www.swrcb.ca.gov/water_issues/programs/stormwater. •



Lake Poway: The City of Poway's Pollution Prevention Success Story

The embers of a 2007 wildfire were still hot in San Diego County when a city's took quick actions to protect its water supply. Its effort paid off less than a year later.

In October 2007, the Witch Creek Fire burned more than 7,000 acres in Poway, known as "The City in the Country" in northeast San Diego County. The fire destroyed natural habitat around Lake Poway, the water supply reservoir for the city's population of 50,500.

Recognizing that runoff of ash, silt and debris from the burned hillsides had the potential to cause great damage to the lake, aquatic

life and the water supply, city staff acted quickly to implement erosion control measures.

While the fire was still smoldering, the city enacted a strategy to protect both the city's water supply and the environment. The strategy called for three types of Best Management Practices (BMPs) to prevent pollution from entering the lake: gravel bag check dams, hydro-seeding and a turbidity curtain.

"This was no longer the rye grass and straw bale approach," said Dave Gibson of the San Diego Regional Water Quality Control Board (San Diego Regional Board). "It was a very effective strategy."

The 3,330 acre-feet reservoir provides more than 10 percent of the community's water and is designated as the 100 percent supply in times of emergency, such as an earthquake.

"The most important issue is water quality for drinking water for the community of Poway and also for wildlife and fish in the lake. It would have been a lake of mud and ash and dead wildlife if we hadn't done this work," said Danis Bechter, engineering inspection supervisor and NPDES coordinator for the City of Poway.

To date, the city of Poway has spent \$1.14 million for erosion

control work. The Federal Emergency Management Agency (FEMA) has approved \$1.04 million for reimbursement. Of that amount, FEMA will pay 75 percent of the cost, the state Office of Emergency Services will pay 18.75 percent and the City is responsible for the remaining 6.25 percent.

Gravel Bag Check Dams

Crews installed 50 gravel bag check dams at various locations to keep debris, sediment and other pollutants from entering the lake. More than 100,000 burlap bags were filled with gravel and used to construct the dams. The dams were then covered with a reinforced silt fence to hold the bags in place against the force of rushing water, which occurred during rain events.

Hydroseeding

A bonded fiber matrix was sprayed across 20 acres of the lower hillside around the lake. This mulch-like material contained an adhesive and a seed mix. It helped hold the soil on the hillside until native plants, including those in the seed mix, could grow sufficiently to create a biofilter around the lake.

Turbidity Curtain

The third step was to install a turbidity curtain in the lake, as the last line of defense to ensure water quality. The curtain is roughly a mile long and consists of plastic sheeting held up by a flotation device at the top and weighted at the bottom. The turbidity curtain creates a wall in the water that restricts pollution from entering into the main body of the lake.

Results

These efforts were extremely effective. Lake visitors can now see signs of life returning to the hill-sides. Green grasses and colorful wildflowers cover the slopes, providing stability and filtering rain-



A turbidity curtain holds back sediment washed from fire-ravaged slopes into the Poway Reservoir after a rainfall.

water as it runs toward the lake. The amount of debris caught by the check dams during each rain event continues to decrease.

After the first heavy rains, the check dams were largely filled with debris. Whatever debris got past the check dams was captured by the turbidity curtain. The turbidity curtain drew a distinct line around the lake, holding the debris near the shore - the water was notably cleaner on the other side.

Crews have continued to clear debris and maintain the turbidity curtain and check dams. The stock-piles of debris that were removed have been covered with plastic and surrounded by straw wattles to protect them from rain and wind erosion, until final disposition. Care was taken during debris removal to disturb as small an area as possible

and much of the work was done by hand.

Once these devices are no longer needed to protect the lake, they will be removed, and the area will be restored to its original state.

The Lake Poway Recreation Area, in the hills of Poway amid groves of Eucalyptus and chaparral, is also an important community recreation area since 1972.

The reservoir is habitat for several species of fish including trout, bass, catfish, sunfish and bluegill. And the recreation area is surrounded by the 400-acre Clyde E. Rexrode Wilderness Area.

Trails connect to a 65-mile trail system and provide scenic lake overlooks and treks through chaparral, which is quickly recovering from the Witch Creek Fire. •

Mining's Toxic Legacy

Report Focuses on Mercury Contamination

The California Gold Rush elicits romanticized images of optimists and adventurous independence, yet a new report by the Sierra Fund points to a legacy of long-term impacts to the environment and the health of residents.

The "Mining's Toxic Legacy" report, released in March 2008, is the first comprehensive look at the long-term impacts of the Gold Rush on the environment, human health and cultural aspects. It presents environmental impacts of historic mining techniques, such as using hydraulic canons to wash away sides of mountains and hard rock mines that dug hundreds of miles of tunnels. Mercury used for gold mining and naturally occurring toxic minerals, arsenic and asbestos, are present in mine tailings that were crushed and redistributed throughout the region and in the watershed.

The report was two years in the making with the Sierra Fund working with researchers at California State University, Chico, tribal representatives, government scientists, conservation leaders and medical professionals.

"All Californians should take note of The Sierra Fund's findings. This issue affects the fish we eat, the water we drink and the air we breathe. And we are only just beginning to appreciate the magnitude of the problem," said Assemblywoman Lois Wolk (D-Davis), who chairs the Assembly Water, Parks, and Wildlife Committee.

Wolk noted while more than a dozen state and federal agencies are working to resolve the existing risks to public safety and the environment inherited from the Gold Rush era, only 5 percent of the state's abandoned mine sites have been inventoried at this point.

Based on the report's findings, the Sierra Fund has called for an assessment of state-owned lands for mining toxins, a remediation plan and the development of a working group with university and state agency scientists and other stakeholders to learn more about health

impacts and solutions to mining toxins, as well as reform of current suction dredging regulations. •

Findings at a Glance

- Reservoirs in the Sierra Nevada foothills that form the headwaters of California's water projects are contaminated with mercury left over from gold mining. Scientists estimate that 13 million pounds of mercury were left in the land and water from historic gold mining in California.
- New studies indicate that suction dredging for gold mining spreads mercury in the environment. Regulations governing suction dredging are dated.



If you would like to receive this newsletter electronically, please send your email address to: rrichie@watereducation.org

Keep Getting the Word Out

Nonpoint source pollution control and stormwater is a hot-button issue throughout the state, and *The California Runoff Rundown* is an important forum to share ideas that have successfully reduced runoff. Unfortunately, this could be the last edition as the original federal and state grant has expired. If you know of funding sources or have a story to share, please contact Susan Lauer, Water Education Foundation, at (916) 444-6240, or send an email to slauer@watereducation.org.



WATER EDUCATION
FOUNDATION

717 K Street, Suite 317
Sacramento, CA 95814
Phone: (916) 444-6240
Fax: (916) 448-7699
www.watereducation.org

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