

Zeroing in on Trash in California

David C. Richardson

Wing Tam has always believed the trash pollution problem was something too serious to put off.

Tam, who is director of the Los Angeles Watershed Protection Division (WPD) of the Bureau of Sanitation, says he could describe the scene at the Los Angeles River after a typical rainstorm as “a mass of trash.” When the first total maximum daily load (TMDL) regulations for trash in the nation were issued in 2002 for the city of Los Angeles, the Bureau of Sanitation took it as a call to action. The stringent rules required the city to achieve a major reversal in the amount of trash it discharged into the Los Angeles River and nearby Ballona Creek, effectively setting the allowable limit for trash at zero.

Hungry for Solutions

According to Eric Wu, senior water resources control engineer for the Los Angeles Regional Water Quality Control Board (LARWQCB), there are currently eight TMDLs for trash in effect throughout the Los Angeles region. These regulations cover the Los Angeles River watershed, Ballona Creek watershed, lakes in the upper Santa Clara River—including Machado Lake and Gunlock Lake, and partial reaches of Calleguas Creek and parts of the Malibu Creek watershed. They also cover Ventura River estuary and Saint Gabriel River East Fork. In addition, Wu says, the agency is currently developing a TMDL rule for debris in the Santa Monica Bay that covers trash and plastic pellets.

When the first of these TMDLs were proposed nearly a decade ago, covering more than 80 jurisdictions and municipalities spread out over 450 square miles of the Los Angeles basin, they did not provide specific instructions on how to achieve the required reductions, nor did they provide any guarantee of funding.

Tam says several cities in the area resisted, joining forces to carry their battle to court, resulting in seesaw litigation that went on for several years. However, Tam says Los Angeles took the view that whatever the outcome of the controversy surrounding the regulations, the reality in the background would remain: “You still have to do something about the trash.” Los Angeles, rather than resisting, took a proactive approach to the TMDL requirements, and when the case was finally decided in 2008 in favor of the regulations, the city had a head start in the region towards finding a solution to the trash issue.

Defining Strategy

Most people know trash when they see it. And when they see it floating down a stream, piling up on a shoreline, or blowing across a beach, most people feel its impact lowers the quality of life. It is often interpreted as a sign of an underlying dysfunction in a community, providing a catalyst for a spiral of negative attitudes and behaviors, and it discourages the enjoyment of the outdoors.

Decomposing litter robs water of oxygen, making life difficult for aquatic species. In the Los Angeles region, according

to the LARWQCB 2007 draft TMDL document, there are a number of habitats on the Los Angeles River populated by many species of birds, including “some that feed in the concrete channel, where algae grow in the warm, shallow water, and in the estuary South of Willow Street, including fish-eaters like waders (herons, egrets, occidental bitterns and rails), terns, osprey (a fish-eating hawk), pelicans and cormorants.” The report observes that trash can have a negative impact on the habitat these birds rely upon. Tam adds that trash can also have a negative impact on the animals directly. Among other deleterious effects, Tam says, the animals sometimes “ingest it, and it affects their breeding, affects their growth—some, it just kills off right away.”

He says trash also impacts efforts to manage other water-quality issues. For instance, trash in the water “can harbor bacteria or promote growth of bacteria, so if you deal with the trash you can also reduce bacteria levels.”

For the purposes of the regulation, the LARWQCB defines trash in general terms as anything thrown away that is large enough to be captured by a 5-millimeter mesh, but small enough to be carried through the storm drainage system into receiving waters. And eventually, the agency would like to see it eliminated.

A Multipronged Attack

Reducing any pollutant to zero is by definition difficult, if not practically impossible, and with compliance deadlines of 2015 for Ballona Creek and 2016 for the Los Angeles River, the city of Los Angeles estimated it would cost at least \$1.5 billion to satisfy the tough mandate. Tam says the city needed to take a creative approach if it were to have any prospect of solving the problem in an affordable manner.

The Bureau of Sanitation decided on a two-pronged approach, employing both institutional and structural measures to try to eliminate trash at its source, before it makes its way into the storm drain system. The first step was trying to get a grip on where it was coming from.

Being a nonpoint-source pollutant, trash makes its way into the Los Angeles River by a number of routes. It can be blown by the wind, tossed in directly, or washed in from the streets along with stormwater.

Choosing the Target

“Even before the final TMDL came out in 2002, we went ahead and did a study of the spatial distribution of trash for Ballona Creek and the Los Angeles River watershed to figure out where it’s coming from,” notes Tam.

The department also performed studies to determine the composition of the trash its surveys captured at selected sites in the storm drain system. Paper products and Styrofoam cups topped the list, Tam says, but there were other items found in the mix, including plastic bags from groceries, bottles, and glass. Nonetheless, Tam says that overall, “a lot of it came from fast food,” and simply from “people not picking up after themselves.”

He explains, “When we did the analysis, we came up with three distinct trash-generation areas in the city, and we classified them as low-, medium-, and high-trash-generation areas. What we found out was that the high-trash-generation area was shown to contribute over 60% of the trash within the city.” Tam says he decided, “If that’s the case, maybe we should tackle that first.”

To address this issue among the institutional measures, the Bureau of Sanitation employs catch basin cleanups, street sweeping, and abandoned trash pickup, and it provides trash receptacles at street corners.

Tam says his department works “to get the public involved, to be able to say ‘You’ve got to pick it up; you’ve got to put it in the trash receptacles.’”

Tam also advocates community cleanup activities, “We actually have events where we involve the community to go out and pick up trash and do public outreach. One of the things we’ve been doing is working with a lot of the businesses to establish business improvement districts, so that they can go out right around the business area and pick up the trash. And of course there is some enforcement—we have that also.”

But it can take a long time to change attitudes and behaviors. To achieve the immediate results demanded by the TMDL, the city began to look into investing in a system of structural best management practices (BMPs) targeting trash.

“We did a lot of research looking for any products or systems out there that could help us meet this trash TMDL; we even invented some ourselves to see how well that would work,” says Tam.

Among the city’s early efforts were trash cages installed at several outfalls to the Los Angeles River. Although these cages captured large amounts of trash during a 2002 study, they often became clogged with debris, and trash sometimes overflowed the cages or escaped through gaps in their framing. A report on their performance suggested modifications, including enlarging the openings in the mesh from 5 millimeters to 1 inch to allow more debris to pass and to prevent back ups. But, the report notes, making that change would obviously be working at cross purposes. It seemed simply fencing in the trash would not do the job effectively.

The TMDL for trash allows for certification of technical compliance based upon the deployment of approved structural BMPs. These BMPs, termed “full-capture devices,” include hydrodynamic separators such as Contech’s CDS units, trash and debris netting systems such as those manufactured by Fresh Creek and PJ Hannah (now owned by Seprotech), and any devices certified to meet the agency’s standard performance specification for capturing trash.

“We worked with the regional board identifying the best way to implement all this, and what they would approve in terms of putting in the appropriate technology,” says Tam. “We came to the conclusion the best approach for us was to implement catch basin inserts and opening screen covers right before you get to the storm drain. That seemed to be the most cost effective, and easier to do in terms of maintenance.”

Following the example set by the California Department of Transportation (Caltrans), the city designed its own catch

basin protection device in-house to be used as part of a system that leverages existing street sweeping and catch basin cleanout programs to achieve full-capture compliance. But, Tam says, “You have to meet certain design criteria. The insert has to have 5-millimeter openings, and they have to be tested hydraulically to make sure they don’t cause any flooding. We actually did a one-year test with the regional board, showing them all the data, before they finally approved it.”

The inlet deflector’s stainless steel 5-millimeter mesh prevents trash from entering into the catch basin during dry weather, keeping the rubbish on the pavement to be picked up by street sweepers during regular runs, which Tam says are scheduled four times each month.

To prevent flooding during storms, the trash-deflecting grates at street level are designed to flip open hydraulically when the catch basin fills with stormwater to a predefined limit, removing any impediment to the flow. Although that would allow any trash that had accumulated during the interval since the last street sweeping to fall into the catch basin, a catch basin insert screen installed inside the basin prevents the trash from entering the storm drain. After heavy rain events, Tam says, the Bureau of Sanitation dispatches Vactor trucks to clean out the catch basins and remove any trash trapped inside, in preparation for the next storm.

As of September 2009, Los Angeles had installed more than 30,000 catch basin inserts and screen opening covers, and Tam says that every year the city “will try to meet the 10% reduction to meet the regional board goal.” To meet the ultimate goal of 100% reduction, he says, the Bureau of Sanitation plans by the 2016 deadline to provide the retrofits to each of the city’s 60,000 catch basins.

Vaikko Allen, regulatory manager for Contech Stormwater Solutions, says the CDS system his company produces can capture 97% of trash passing into it and has the capacity to handle flows up to the one-year storm. He notes that the city of Los Angeles installed a number of CDS units at a confluence of storm drains near the Los Angeles Coliseum.

Tam says the units, which channel large volumes of stormwater through a vortex to separate trash from the flow, provide the advantage that they can capture all of the trash from a wide area in a centralized location.

Allen says from his observations, the CDS systems at the Coliseum often end up capturing trash that gets past upstream non-proprietary systems such as inlet protection devices due to overflows, backups or other malfunctions.

However, Tam believes end-of-pipe solutions can be a challenge to implement in parts of Los Angeles, particularly in congested areas where they would have to be housed in vaults beneath the roadway, requiring heavy equipment and lengthy street closures for installation and maintenance.

Nearby, Santa Monica, CA, for the time being, relies heavily on end-of-pipe systems to satisfy its TMDL requirements. A small proportion of Santa Monica drains into watersheds covered by the current TMDLs for trash. Rick Valte, watershed program manager for Santa Monica, says his city opted for an end-of-pipe solution to meet its TMDL obligations, placing a trash trap at the sole outfall in the city that drains to Ballona Creek.

“The number one issue was maintenance. It takes a little

more maintenance to go to each catch basin and clean it out, whereas for a smaller drainage area like this we just do an annual cleanup of that one location.”

However, Valte says, the rest of the city is split among 13 different watersheds, with 90% of the area draining to Santa Monica Bay. And he says most of the city will soon come under a new TMDL, nearing final approval, that will cover debris including trash and plastic pellets in Santa Monica Bay.

He says most of the city is already prepared to meet its obligations under the pending TMDL regulations. “All of our storm drain outlets are being diverted to the sanitary sewer for dry-weather flows, and four out of those five have been outfitted with a CDS unit.” But, he says, there is one major storm drain outlet that is not currently protected, “and we have to do something about that.”

He explains, “Pico-Kenter is a huge box culvert, and one or two CDS units is not enough to capture trash from that tributary area. So, we’re looking to do what the city of LA did: to install trash screens at each catch basin within the drainage area.”

Although Los Angeles reports success with its catch basin deflection devices, Valte notes that the devices must be properly maintained if they are going to function as intended: “There is a major maintenance concern with these individual trash screens.” But, he adds, “The option is we either go with an engineering project where we retrofit the Pico-Kenter outlet with something like five CDS units at the end of pipe, and maintain the CDS units, or the alternative, to go into the catch basin and install the screens.”

Valte says the community is acutely aware of stormwater and water-quality issues. “We have public outreach programs where we try to educate the public that anything you put out into the street goes straight out into the ocean.”

He adds, “The beaches are one of our main attractions for tourists; most of our funds come from tourism. If we don’t keep our beaches clean, we won’t be able to attract tourists over the years. That’s why it is a top priority for our city to keep our beaches clean and to comply with the TMDLs that are being issued by the EPA and the regional water board.”

In addition, he says, in Santa Monica, the community has a voice in this decision-making process. The ballot measure that funds stormwater improvement projects using revenue generated from parcel taxes also established a citizens oversight committee, which Valte says is there to “ensure that the funds would be spent as intended.” He says his department worked closely with the oversight committee, presenting a proposal for deploying CDS units for Pico-Kenter as an end-of-pipe solution. However, he says, the committee tended to prefer “low-impact development” approaches to stormwater mitigation “as opposed to huge engineering projects, and that’s why they approved the individual catch basin screens versus the end-of-pipe solution.”

Nonetheless, he says the CDS devices currently installed have been a success.

“Now you hardly see any trash because of the CDS units that we have out there. I think we’ve done a fairly good job at curbing trash at our beaches; the only problem is the Pico-Kenter outlet, which is currently unprotected.”

Valte says, when addressing TMDL regulations, planners should consider both capital costs and maintenance costs.

“If you outfit an eight-square-mile area with catch basin screens, the cost for maintenance can be extremely high. And if you look at the cost benefit for that, you might have been better off installing five CDS units at the end of the pipe.”

He says an agency “needs to ask itself, ‘Do we have the capital costs to pay for it now, or do we have money that will be coming in over a 10-year period that we can use to pay for maintenance?’ So we pay less at the front end, and continue paying maintenance over a number of years.”

He adds, “There is no one size fits all solution to the problem, because each agency has its own unique issues to deal with, whether it’s physical restrictions or financial restrictions or others.”

Valte estimates a catch basin retrofit covering the entire Pico-Kenter watershed will cost about \$1.2 million initially and \$100,000 per year for maintenance, while the cost for a system using CDS units at the end of pipe would amount to about \$7.2 million initially, with \$35,000 per year for maintenance.

Although the upfront cost of the catch basin protection system appears economical, Valte concedes, “When you add in the cost for maintenance, over 20 years we probably will break even with the capital cost of an end-of-pipe solution.”

Beyond Compliance

Tam says end-of-pipe solutions “do have a place in the overall scheme of things.” The Bureau of Sanitation plans to install a trash trapping net in Wilmington Channel, a creek that runs into Machado Lake, that won’t require heavy equipment. Tam says the nets are “great in creeks because you avoid a lot of these maintenance issues.” And he notes that because of Wilmington Channel Creek’s location, “it will be easy to be able to take the nets out and put them back in.”

Furthermore, he says, the creek rated special consideration because it feeds a wetland system. “Wetland systems are sensitive—you can’t have too much trash down there.”

Tam says Los Angeles has modified its projections of “over \$1.5 billion capital cost” to achieve full compliance with the TMDL “After our study to isolate how we are going to go about doing this, using a two-pronged approach and piloting new types of projects, we now project a of cost around \$85 million to achieve compliance.”

He says he’s pleased with progress so far in Los Angeles, “By 2015 to 2016, we anticipate we’ll be in full compliance with the requirements, so we don’t have to deal with it further. Of course, the institutional measures will continue—that’s a forever type of item. The public outreach, the catch basin cleaning, the street sweeping—all those will continue after the compliance date. They have to.”

And Tam also wants to help out his neighbors, “We’re willing to share with anyone all the work we have done to make it easier for them to implement things, because many of the small cities don’t really have the resources to test a lot of things,” he says.

~David C. Richardson is a writer based in Baltimore, MD who writes frequently on environmental topics. This article was reprinted with permission from Stormwater, A Journal for Surface Water Quality Professionals.