

Storm Water Pollution at CSU Stanislaus

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The Issue: Storm Water Pollution

Storm drains are an ever-present part of the urban city structure. The drainage of water from a city is crucial to its functioning. Without proper drainage, areas are subject to flooding, and the collection of water. Stagnant water pools are not only dangerous to motor vehicles that cannot drive through deep puddles of water, but also pose a health threat. Bacteria and other toxins can gather in pools of water and become breeding sites for hazardous germs.

A storm drain's role is to be an entry point for water runoff to enter storm drain tunnels that flow to bodies of water. It is important to understand that water that flows into storm drains does not go to a water treatment plant. All of the pollutants that water picks up as it flows down the street into the drain is carried with it to its destination. Sediment is the number one pollutant in the country¹. Sediment clouds up water and can suffocate aquatic life. It also has the potential to deteriorate fish and plant habitats by settling out of water. In this case the most damaging pollutant is not something that would necessarily be considered a toxin or chemical. Fertilizer is another major pollutant of storm water. Nitrates and phosphates from fertilizers promote algae growth, which can crowd out aquatic life and remove oxygen from water. Fish and other aquatic animals need oxygen to live.

In terms of litter, almost a third of all litter found in storm drains are cigarette butts. Cigarette butts are often thrown on the ground

because that is the easiest way to dispose of them. Oftentimes, appropriate receptacles are simply not present for consumers to utilize. Cigarette butts are damaging when they find their way into an environment and become harmful to inhabitants. Nitrates and other damaging chemicals found in cigarette butts can be absorbed by water. Cigarette filters are made from a type of plastic that does not easily biodegrade. While paper litter soon breaks down, plastic litter remains.

The "Pacific Trash Vortex" is an extreme example of the effects of plastic litter polluting the water. This "vortex" is an accumulation of debris held together by ocean currents. Debris accumulation in this vortex is estimated to be twice the size of the continental United States.² When divers working with the international environmental organization Greenpeace explored the site of the trash vortex, they found bodies of waterfowl, fish and other mammals floating in with the trash. These animals got caught up in the debris of the vortex, most likely when exploring the trash for food. Extreme examples like this should serve as cautionary illustrations of what can happen when water pollution is not properly addressed.

Why Focus on CSU Stanislaus?

Every day there seems to be more talk about the growing issue of pollution in the media, in government, and in the homes of citizens. In almost every industry, greater focus is placed on developing sustainable practices in an attempt to combat pollution. One area with a strong focus on sustainability

¹ Clean Water Education Partnership." - *Why Is Stormwater a Problem?* Clean Water Education Partnership, n.d. Web. 20 Dec. 2013.

² Marks, Kathy, and Daniel Howden. "The World's Rubbish Dump: A Tip That Stretches from Hawaii to Japan." *Environment News Futures* (2012): n. pag. 5 Feb. 2008. Web. 20 Dec. 2013

issues is higher education. Universities often change their practices and implement new programs in order to achieve recognition as a “green” campus. For a 4th consecutive year, California State University (CSU) Stanislaus has been recognized by *The Princeton Review* as one of the nation’s more environmentally responsible campuses.³ In addition to being a focus of the University’s administration, the importance of sustainability is an important priority for the students of the CSU system. The California State Student Association (CSSA) is the official representative for over 400,000 CSU students. Sustainability issues have become among the CSSA’s most pressing priorities. Policies and resolutions have been implemented to establish requirements and recommendations calling on CSU campuses throughout the state to improve their sustainable practices.

The Central Valley provides a very unique environment amongst the various locations of the 23 CSU campuses. The regions served by CSU Stanislaus, Fresno and Bakersfield have agricultural, environmental, and water-related issues unique to the Central Valley. In November 2013, the official student groups representing these three CSUs collaborated at the Central Valley Leadership Conference. At this conference, the goal of a continued and renewed focus on sustainability was collaboratively set for the Central Valley campuses. Clearly there is recognition among campus student leaders of the irreparable harm caused by pollution.

The environmental concern for sustainability on so many levels is one of the main reasons CSU Stanislaus is a great location for this research project. The University also reflects many of the characteristics of city environments overall.

³ Leonard, James. "CSU Stanislaus a 'Green College' for Fourth Consecutive Year University's Sustainability Efforts Recognized Again by the Princeton Review." *Csustan.edu*. California State

The University experiences a large amount of people travelling through it every day. The foot traffic from students, faculty, employees and visitors simulate the concentrated populations of cities larger than Turlock. The University’s structure is not overly unique to the point that the results of this study could not be applied elsewhere. The combination of many impervious surfaces with grass areas provides for a compromise of environment types.

On the civic level, the city of Turlock addresses issues of storm water pollution on their website. The page outlining preventative suggestions highlights its “*Only Rain Down the Drain*” campaign and identifies the potential pollutants to manage carefully, including motor oil, yard waste, fertilizers and pesticides, and pet waste. They also explain how the water that goes into storm drains does not go through a water treatment plant. It travels directly into the San Joaquin River. Turlock will soon be looking into addressing its storm water drainage plan. With a population that has grown steadily from approximately 13,000 to 70,000 currently in just 40 years,⁴ Turlock continues to embrace its potential for growth. It is important to note that once Turlock reaches a population of 100,000 residents, it will be subject to stricter storm water regulations. Turlock already has issues with flooding during heavy rains. The proper drainage of rainwater will need to be addressed in the near future for the environmental safety of its residents and surrounding region.

Methods

To properly evaluate the storm water pollution on campus, the types and sources of pollution must first be identified. To do this, a visual sweep of campus was conducted to predict potential pollutants. The identified

University, Stanislaus, 18 Apr. 2013. Web. 20 Dec. 2013.

⁴ City of Turlock website:
<http://www.turlock.ca.us/aboutturlock/>

sources of potential pollution include: cigarette butts, fertilizer runoff, litter, bird waste, yard waste, construction debris and gravel and dirt. The cigarette butts and litter are a result of careless and improper disposal. Yard and bird waste are natural debris that, when improperly removed, can flow into drains. The yard waste could also be from lawn mowing and other landscaping (or “softscape”) that has been improperly disposed of. The same issue arises in the course of construction activities. Un-utilized or under-utilized Best Management Practices (BMPs) in the construction or occupancy phases can potentially release debris into storm drains. Fertilizer runoff would be a result of over-fertilizing, over-watering or faulty sprinkler systems that direct water into storm drainage systems. One major issue is that the sprinklers are set to run during off-hours when people are not generally present to notice problems.

To further investigate the issue, an understanding of the master plan of the campus is needed. A discussion with the facilities personnel will reveal the set-up for landscaping and water drainage on campus. This will help determine which pollutants are making their way into gutters, down storm drains, and eventually into the San Joaquin River. A campus plan that adequately targets this issue should have some version of an environmental program or Storm Water Pollution Prevent Plan (SWPPP) in place and detailed maps highlighting the key areas of concern. The plan should also list identified risks of potential pollutions on the campus. Along with these plans, educational resources should be directed to the people who have relevant duties or spheres of responsibility that can impact the university’s environmental practices. Depending on the infrastructure, “end of pipe” or “outfall” testing might reveal the “total output” of pollutants from the

campus property and could also offer a better characterization of the elements comprising campus storm water discharge.

Impact

The impact analysis of this study is projected to show that there are a number of suspended solids in the water that runs to storm drains on campus. Per confirmation from the University facilities department, water that flows to campus storm drains is expected to flow to the same location as Turlock city drains, which flow to the San Joaquin River. The San Joaquin River is home to many different types of wildlife, including geese, riparian woodlands, brush rabbits, eagles, hawks, elk, waterfowl, songbirds, deer and numerous other species. In addition to the risk of damage to the habitat and drinking water for these creatures, there is an agricultural aspect to the San Joaquin River. Water from the river is diverted for agricultural purposes to thousands of farmers throughout the Central Valley. Contaminants in the water will travel with the water into the irrigation systems of farmers across the valley, potentially impacting the quality of the food they produce for us.

Preventing Further Pollution

The University can prevent pollution from human sources through educational outreach. By educating those who utilize the CSU Stanislaus campus, faculty, employees, students and local visitors can work to reduce, the contamination from litter. The University can also reevaluate management practices for improvement to encourage more effective prevention of pollutants. The EPA has established *Six Minimum Control Measures*⁵ that the University can appropriate to address storm water pollution on campus. These six measures include:

1. Public education and outreach

⁵ Stormwater Phase II Final Rule Fact Sheet Series." EPA -. N.p., n.d. Web. 20 Dec. 2013. <<http://cfpub.epa.gov/npdes/stormwater/swfinal.cfm>>.

2. Public participation/involvement
3. Detection and elimination of illicit discharge
4. Control measures to manage construction site runoff
5. Control measures to manage post-construction runoff
6. Pollution prevention and good housekeeping practices

By utilizing these six important control measures, the University can enhance its current storm water management plan and improve the quality of water that flows from the campus into the surrounding environment.



Conclusion

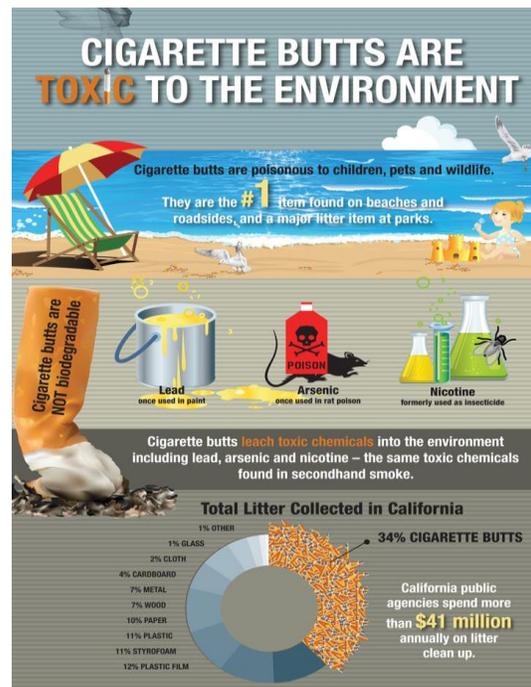
I anticipate deficiencies will be discovered in campus sprinkler systems. Faulty sprinkler systems misdirect water onto streets, often at night when few people are around to notice and report these conditions. Correcting this problem should become a pressing priority for the campus as a critical first step to address runoff issues. Addressing avoidable pollution that mixes with storm water runoff should be the next priority.

While there is often room for steady improvement when it comes to protecting and preserving our environment, in this instance the room for improvement calls for immediate attention. CSU Stanislaus has a special role to

play in addressing issues within its power to solve, in ways that help to educate the region.

The point of this study is not to leave the impression that CSU Stanislaus is negligent in addressing storm water runoff, but to identify significant areas for possible improvement. I predict a more thorough study conducted along the lines outlined here would show that storm water prevention practices at CSU Stanislaus are in line with current regulations, yet still manifest considerable room for improvement.

CSU Stanislaus is clearly an innovative university. But while it remains ahead of the curve in regard to implementing many sustainability practices, the campus continues to fall short of viable standards of sustainable practice in the areas of water runoff and avoidable pollution. By acting more aggressively to meet its own achievable goals, the CSU Stanislaus can provide key leadership for the Central Valley in showing how to address subtle yet far-reaching issues of water pollution impacting the surrounding region and beyond.



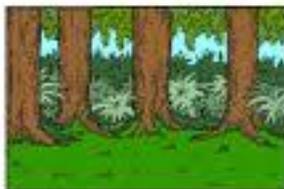


ALL STORMDRAINS LEAD DIRECTLY TO OUR PONDS, RIVERS & BAYS



HOW MUCH STORMWATER RUNOFF DOES ONE INCH OF RAIN PRODUCE?

When it rains, about 5% of the rain water runs off wooded areas and about 95% of the rain water runs off a parking lot. During a one inch rainstorm . . .



1,361 gallons of water runs off a one-acre wooded area



25,800 gallons of water runs off a one-acre parking lot