

Tobacco Product Waste Reduction Toolkit

April 2013



This publication was developed by the San Diego State University Research Foundation and the Cigarette Butt Pollution Project and made possible with funds from the Tobacco Tax Health Protection Act of 1988 – Prop. 99, through the California Department of Public Health, under Grant No. 10-10230.

Acknowledgements

Thank you to those persons, organizations and agencies that provided information, support and resources for this toolkit:

- California Tobacco Control Program, California Department of Public Health
- Americans for Nonsmokers' Rights
- Cigarette Butt Pollution Project
- California Youth Advocacy Network
- Oxford Outcomes
- Surfrider Foundation, San Diego County Chapter
- The Varda Group

Suggested Citation:

Novotny T. Tobacco Product Waste Reduction Toolkit. California Department of Public Health, California Tobacco Control Program. Sacramento, 2013.

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Preface

The health risks of tobacco use and exposure to secondhand smoke are well known. The leading causes of death in the United States are lung and heart diseases, which are highly associated with tobacco use and exposure. But harm caused by tobacco continues beyond tobacco use and secondhand smoke. While tobacco product waste (TPW) includes packaging, for the purposes of this toolkit the focus will be on cigarette butts, since they are highly present throughout communities, on streets, parks, sidewalks, beaches, and just about anywhere. Most people see a few at a time and maybe ignore the issue, but the accumulation of cigarette butts negatively impacts the environment. Most discarded cigarette butts include filters, which collect toxic and harmful chemicals from when the cigarette was smoked. Additionally, filtered cigarette butts leave behind the non-biodegradable plastic filter that lasts for years in our environment. Recent research shows that cigarette butts leach out harmful chemicals into aquatic environments, are accidentally consumed by animals and children, and degrade our living environments without our recognition. But more importantly, this environmental impact is a social injustice to communities that are already burdened with a higher density of tobacco retailers and targeted tobacco marketing. Populations in low socioeconomic, urban, and rural communities are susceptible to these unfair practices by the tobacco industry. By raising awareness of the burden of TPW, these communities may benefit from stronger tobacco control policies and larger system-change policies that could directly improve the overall health of these communities.

The purpose of this toolkit is to mobilize communities, including tobacco control advocates, environmental groups, businesses, and governments, to address the issue of discarded cigarette butts. Cigarette butts will be referred to as TPW throughout this toolkit. This toolkit is a compilation of experiences and tips from projects and communities who have encountered cigarette butt litter through cleanups, mitigation efforts, and similar efforts for reducing the impact on the environment. By raising public education and awareness, we may be able to change social norms about cigarette butt deposition and continue to de-normalize smoking as well. Cigarette butts are the single-most common item picked up from our beaches and streets, and this toolkit can help reduce the costs, annoyance, and health risk of this unnecessary environmental waste.

Section 1: Introduction and Background

Cigarette butts are dropped on sidewalks in urban neighborhoods, in parks, beaches, and flicked from moving cars. Cigarette butts are the most common debris item collected from beaches and waterways during the annual International Coastal Cleanups, a status that has been maintained since 1986 (Novotny, 2009). In the United States, an estimated 292.8 billion cigarettes were sold in 2011 (CDC, 2012), and in California, approximately 19 billion cigarettes were sold in that year (Orzechowski and Walker, 2013). It is estimated that 1 in every 3 smoked cigarette are discarded as environmental waste (City of Tacoma, Rath 2012). Cigarette butts are more than just unsightly litter and blight. Toxic chemicals are leached from discarded tobacco products and may then contaminate our streams, rivers, beaches, and urban environments (Slaughter et al., 2011). Cigarette butts contain all the carcinogens, heavy metals, pesticides, and nicotine that make tobacco use the leading cause of preventable death worldwide (Moerman, 2011, Sheets, 1991, Hoffman, 1997), yet they are commonly and unconsciously dumped by the trillions into the global environment each year. Discarded cigarette butts have been linked to wildfires, which result in the destruction of wildlife, vegetation and structures (National Fire Protection Agency, 2010).

Cigarette butts are an economic issue with costs of cleanup borne by businesses, taxpayers, and local voluntary groups (Schneider, 2011). Cleanup of this waste has generally been the responsibility of communities, local governments, state agencies, businesses, and volunteer groups. In addition, tobacco product waste is an indicator of businesses who are profiting off smoking behaviors, allowing customers to smoke, but leave the cleanup for local taxpayers and city groups. TPW is thus an **'externality'** of tobacco use: those who use or benefit from the profits of tobacco use do not bear the responsibility for its environmental burden and cleanup costs. To address the problem head on, tobacco control and environmental advocates can partner and collaborate to increase awareness of the TPW issue, encourage smoke-free outdoor spaces, improve enforcement of existing anti-litter laws, and create new partnerships with businesses, restaurants, bars, storm water management, parks/recreation, and environmental groups.

Significant progress has been made to reduce smoking and its health consequences **since the release of the first U.S. Surgeon General's Report** in 1964. Tobacco-use prevention efforts that highlight the negative impact of tobacco use on the environment are another tool to promote a smoke-free social norm and protect the environment. Addressing tobacco waste through regulatory or policy-based approaches has the potential of cross-cutting through many disciplines and tax-funded agencies who are currently involved in cigarette butt mitigation. Any policy-based or regulatory effort must be coupled with public education activities that involve smokers and nonsmokers, the business community, college campuses, local governments, environmental advocacy groups, storm water regulators, enforcement agencies, and tobacco control advocates. Understanding the potential environmental consequences of TPW is critical to creating successful solutions involving tobacco control, environmental groups, and other potential partners.

Overall Objective: Change the Social Norm

An overarching goal of comprehensive tobacco control programs is to change the social norms surrounding tobacco use by creating an environment in which tobacco becomes less desirable, less acceptable, and less accessible. Along this continuum, increasing the awareness that cigarette butts are harmful and a threat to all environments is an extension of changing the social norm around tobacco use.

Cigarette butt flicking contributes to tobacco product waste, which is not a harmless or benign problem. It has a measurable and toxic impact on the environment. Although some smokers dispose of their cigarettes appropriately, most do not (Rath, 2012). Currently, smokers do not expect to be confronted or challenged when flicking their cigarette butts on the ground; therefore this behavior is considered socially acceptable – it is **part of the ‘smoking ritual’ and is perhaps a way of avoiding the ‘incriminating evidence’ of smoking behavior in an increasingly non-smoking society.**

Tobacco control activists can look with some satisfaction at the progress made in assuring smoke-free indoor environments; however, smokers have had to go outdoors to smoke, and this has had an effect on TPW deposition. Changing the social norm regarding this part of the smoking ritual will require several different approaches.

The burden of tobacco waste is a major contributing factor directly affecting **communities’** ability to create safe and healthy environments. Moreover, disparities among vulnerable populations may also be exacerbated in communities where the presence of cigarette litter **influences residents’ perception of decline and disorder** in their surroundings (Florida Litter Study, 1998). Given the higher rates of smoking among those who are from low socioeconomic communities, in both rural and urban settings, addressing the burden of tobacco waste in these places needs to be part of an overall environmental and public health strategy.

Section 2: The Science Behind the Issue – Are cigarette butts just litter?

More than 4,500 chemicals are found in cigarettes (Hoffman, 1997). Many of these may be introduced into the environment from the tobacco remnants of a cigarette butt or from the filters. These include toxins such as ethyl phenol, nicotine, hydrogen cyanide, polycyclic aromatic hydrocarbons, ammonia, acetaldehyde, formaldehyde, benzene, phenol, argon, pyridines and acetone, and Polonium-210. More than 50 of these chemicals are known to be carcinogenic to humans (Hoffman, 1997). We may think of **these as _persistent tobacco product toxicants,** which may contaminate storm water, aquatic environments, beaches, parks, and urban neighborhoods. Many chemicals are also used during the growing tobacco and manufacturing cigarettes, the residues of which may be found in cigarettes (Sheets 1991; LeCours et al. 2012, Novotny 1999). These toxins include pesticides, herbicides, insecticides, fungicides and rodenticides (Glantz 1996).

Using U.S. Environmental Protection Agency standard acute fish bioassay methods, researchers at San Diego State University found that the lethal concentration (LC50) for both freshwater (fathead minnow) and saltwater (topsmelt) fish species exposed for four days was just one cigarette butt in one liter of water (Figure 1). Researchers tested different scenarios: (1) smoked cigarette butts with a small amount of remnant tobacco with the filter; (2) smoked cigarette filters with all remnant tobacco removed and (3) unsmoked cigarette filters without tobacco. The leachate (a **_soup** of chemicals that is produced when cigarette butts are soaked in water) was found to be toxic in all three experiments. These tests showed the most toxic water levels were from smoked cigarette butts with filters and remnant tobacco, and the least toxic levels were for the unsmoked filters. But, filters alone without tobacco, was also toxic at a higher leachate concentration (Figure 2). Click [here](#) to view the full article.

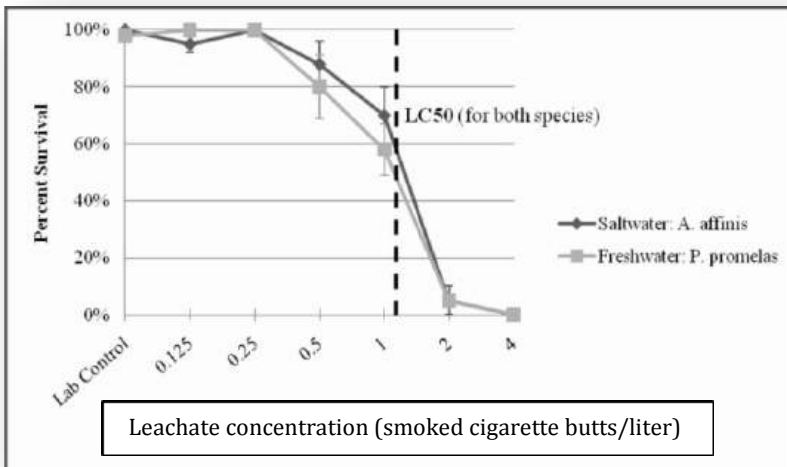


Figure 1: Lethal dose of smoked cigarette butts with some tobacco still attached for both freshwater and saltwater fish. Lethal dose is shown at one smoked cigarette butt per liter of water.

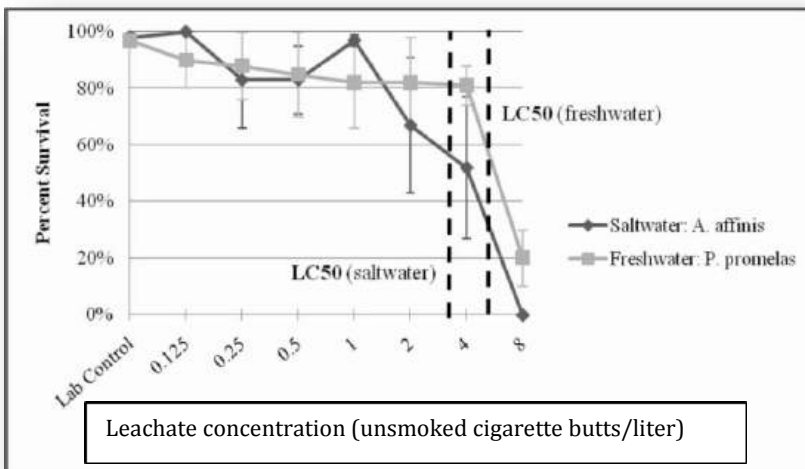


Figure 2: Lethal dose of unsmoked cigarette butt (without tobacco attached) for both freshwater and saltwater fish. Lethal dose is shown at three-to-five cigarette butts per liter of water.

The Problem with Filters

Cigarette filters are made of cellulose acetate, a plastic that is very slow to biodegrade. They contain plasticizers, glue, and other chemicals, and were designed to accumulate small particles and some volatile compounds from the inhaled smoke. However, the U.S. Surgeon General concluded in 1964 that filters do not protect the smoker from the health consequences of smoking (U.S. DHEW, 1964). In fact, filters may make it easier for young people to start smoking and discourage smokers from quitting (Harris, 2011; National Cancer Institute, 2001; Novotny, 2009). Some experts have in fact suggested that filters be removed from cigarettes because the environmental pollution caused by discarded butts (Proctor, 2011). Tobacco companies tried to make marketable, biodegradable filters for many years, and were unsuccessful. These filters, made from food starch and other substances, simply did not act, taste, draw, and look like what the customers were used to and would buy (Novotny, 1999).

In studies of smokers' littering behavior, researchers from the American Legacy Foundation found that among a national sample of 1,000 smokers, a majority (74.1 percent) reported having littered cigarette butts at least once in their life by disposing of them on the ground or throwing them out of a car window. More than half (55.7 percent) reported disposing butts on the ground, in a sewer/gutter, or down a drain in the past month. Those who did not consider cigarette butts to be waste were much more likely to report ever tossing their butts (Rath, 2012).

Ingestion of Cigarette Butts

Cigarette butts are commonly discarded onto beaches, sidewalks, streets, parks, and in other public places where children, domestic animals, and wildlife are exposed to the waste and may accidentally ingest them. Children may also be exposed by ashtrays at home, in cars and elsewhere. Infants, as well as many sea creatures, birds, and pets are indiscriminate eaters, and they may in fact ingest cigarette butts, intentionally or by accident. **Ingested plastic trash, including cigarette butts, can obstruct an animal's digestive system or poison it with toxins.** In fact, reports of accidental ingestion of cigarettes and cigarette butts have occurred among children, especially those under six-years old. Reports of nicotine ingestion in domestic animals are rare; however, this ingestion can cause signs of nicotine poisoning. Symptoms of poisoning include excessive salivation, excitement, tremors, vomiting, lack of coordination, weakness, convulsions, respiratory failure and even death (Vig, 1990; Kaplan, 1968). The sheer number of cigarette butts accumulating in our environment should be a concern for parents, pet owners, environmental activists, and health care providers.

Evidence of Tobacco Industry Strategies

The tobacco industry has long recognized that discarded cigarette butts might eventually become an avenue for advocacy and regulation of tobacco use, and have developed several strategies for dealing with the issue (Smith, 2011). Their response has consisted of distributing hand-held ashtrays, sometimes bearing tobacco company logos for smokers and on placement of cigarette butt receptacles at popular travel destinations. These are unsustainable, short-term approaches to a larger problem. According to research done using tobacco industry documents, the industry seeks to deter responsibility for tobacco waste by shifting responsibility onto the consumer and community. The industry has supported anti-litter programs and environmental advocacy organizations (Smith and McDaniel, 2011). These alliances focus on industry-acceptable solutions, such as volunteer cleanups and cigarette butt receptacles.

The tobacco industry itself has studied littering behavior among its customers (Smith 2011). Industry focus groups of smokers gave various reasons for littering. Tossing a **cigarette butt to the ground and stepping on it was felt by some to be a _natural** extension of the defiant/rebellious smoking ritual. **‘ Interestingly, some smokers _felt guilty‘ about smoking, and thus, they _were interested** in unloading their cigarettes as quickly as possible. ‘ Some may have been aggressive about dumping their cigarette butts because of being forced outside to smoke by clean indoor-air legislation.

A Word of Caution

The tobacco industry has funded some major environmental groups, environmental projects and university projects. When partnering with an organization for addressing TPW, careful assessment of organizational funding, missions, and history should be done before approaching a potential partner. Research the organization and become familiar with prior work. Keep in mind, the organization may be unfamiliar with the industry's strategies and methods in regards to addressing the environmental issues of TPW. Additional research is needed to understand how tobacco industry funding may be influencing environmental groups and the movement against tobacco product waste.

Section 3: Developing Local TPW Reduction Campaigns

This section is intended to help empower local environmental groups, public health advocates, and any community that wants to reduce the presence of tobacco in their neighborhood. Every community faces different priorities, so campaign tactics and activities will vary. These approaches to conducting TPW reduction campaigns have been compiled from many college cleanups, park cleanups, and other mitigation efforts and education for smoke-free environments. These approaches are not exhaustive, and creativity is welcomed when developing strategies to address TPW. If you are starting a TPW reduction campaign, each of the following steps builds on each other. Or if you have already started a campaign, you can start at the most appropriate step for your project.

Step 1 – Planning and Basics

Step 2 – Messaging, Traditional Media, and Social Media

Step 3 – Develop Strategic Partnerships

Step 4 – Engage the Community and Businesses

Step 5 – Cleanups and Survey Protocol

Step 6 – Local Regulation and Evaluation Options



STEP 1 – PLANNING AND BASICS

To have a structured and successful campaign, first develop a mission statement, goals, objectives, activities, and a logic model.

Goal. The goal is an end-point in which to strive. For example:

- TPW reduction efforts will be developed and implemented for sustainable beautification processes, neighborhood improvements, and public awareness

campaigns for pollution reduction in city of X.

Mission Statement. Your goal is then translated into a mission statement that is a message to the public that states the purpose of the campaign specifically for the community. Develop one sentence to a paragraph-long statement that lays the purpose of the campaign. For example:

- The mission of the Toxic Butts Campaign is to raise public awareness about the environmental burden of TPW and to strategically mitigate this waste in city of X, by partnering with agencies and organizations who mitigate TPW for collaboration to measure the problem

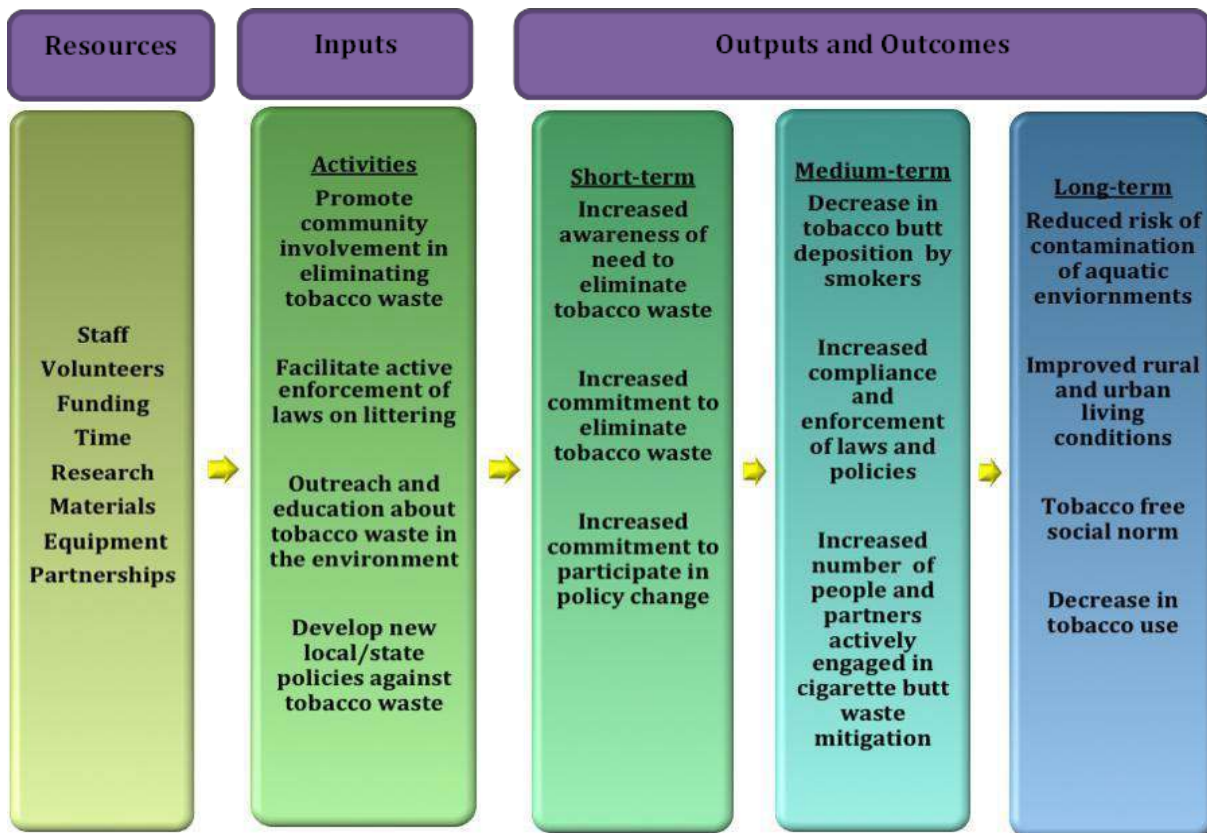
Objectives. Develop specific, measurable, achievable, realistic, and time-based (SMART) objectives. These will vary from community to community or according to the specific environment to be protected. For example:

- By June 30, 2013, city of X will update at least one smoke-free policy to a tobacco-free policy, indicating public messaging and enforcement options as part of the policy.
- By June 30, 2013, reduce TPW by 50 percent in one year through annual neighborhood cleanups and public awareness in neighborhood Y.

Activities. These are the actual processes or procedures (known as *inputs*) used to reach the objectives, in order to fulfill the mission statement and goal. These will form the work plan for the project which should include specifics on who does what, where, and when. Such activities include community-asset mapping, community outreach, engaging new partners, and developing social media. For example:

- Two-thirds of businesses belonging to the neighborhood business association for neighborhood Y will pledge to adopt a –Green Business Model.II.
- Staff will place an advertisement in three newspapers in county Z to acknowledge and thank neighborhood businesses who adopted the –Green Business Model.II
- Staff will work with local print and radio media to promote non-paid advertisement.

Logic model. A logic model is a communication tool for partners, explains the rationale behind program activities as inputs and outputs, and summarizes key program elements. The sample logic model below describes a flow of action, from resource development to the anticipated outcomes of a multi-sectoral campaign.



STEP 2 – MESSAGING, TRADITIONAL MEDIA, AND SOCIAL MEDIA

Effectively framed educational messages are essential in order to raise the level of awareness about TPW. Consider these tips for making your own messages:

- Choose the best media platform to reach the audience you seek. Messages can be sent through traditional media outlets, such as print and radio, or through social media sites, such as Facebook, Twitter, and YouTube.
- Consider having different messages for diverse audiences.
- Frame messages as an environmental concern or a health-equity issue. They should inform individuals and communities about the toxicity of tobacco waste and how it affects quality of life, urban environments, parks and beaches, and aquatic ecosystems.
- Captivate the audience by making messages stand out, such as using humor and/or drama.
- If possible, test the messages with the audience you seek. Take into account feedback and how to make the message better.
- Plan to broadcast or spread the message during peak hours, in places where they may be seen or heard by most people, where TPW pollution is high, and in media outlets that reach diverse communities. Time press releases, media events, and cleanups around key dates. These could include Earth Day in April, World No Tobacco Day in May, the Great American Smoke-out in November, or New Years in January.
- **Incorporate cessation messages but don't victimize smokers.** Messages for smokers should NOT only be about proper disposal of cigarette butts but ALSO where to get help quitting, such as the 1-800-QUIT NOW telephone cessation service, or local cessation classes. Make it easy for smokers to find resources. Tobacco dependence is a chronic disease that often requires repeated intervention and multiple attempts to quit (Fiore MC, 2000). Effective treatments exist, however, that can significantly increase rates of long-term abstinence (Fiore MC, 2000).

The following messages regarding TPW were developed with a team of public health, environmental and marketing experts and can be used in your communications activities:

- Tobacco waste damages the environment and is poisonous to children, pets, and wildlife.
- Cigarette butts are the No. 1 item picked up during beach and roadway cleanups.
- Smoking is bad for you and bad for the environment.

Traditional Media

Using traditional media platforms, such as print, television, and radio are important considerations for a campaign. Low socioeconomic populations and non-English speaking audiences use more traditional media than social media. Below are some things to consider for choosing the best media platform for your campaign regarding tobacco product waste:

- Print media* is still an important source of information for people, policy makers, and communities. For example, opinion-editorials can be helpful in support of legislation or campaign activities. Refer to the Appendix for an example of a published opinion editorial in the *San Diego Union Tribune*.
- Radio and Television Advertisements or Public Service Announcements*. If the project has funds for media spots, you can develop and purchase an advertisement time with local media. But if funds are limited, consider asking for public service announcement times and terms. Be careative and work with your local media to craft a news angle, segment, or article.

Social Media and Web-based Media

Social media, such as Facebook, Twitter, and YouTube are sites and online communities for sharing, discussions, and feedback from the public. At present, approximately 65 percent of adult Internet users utilize a social media site. Of these, women ages 18-to-29 years are the most active and a fast growing group of social media users is people aged 65 years and older.

Developing and maintaining a social media page can be an activity within the work plan, but is more time-intensive and takes more responsibility than a personal profile page. Take the following into consideration as you plan ahead.

Advantages of using social media:

- It is a free method of communication
- It has the ability to get messages out quickly
- It communicates with large numbers of people simultaneously
- It uses multiple methods of communication, such as video, photos, graphics, and weblinks
- It involves active two-way participation by diverse individuals

Common misconceptions about social media:

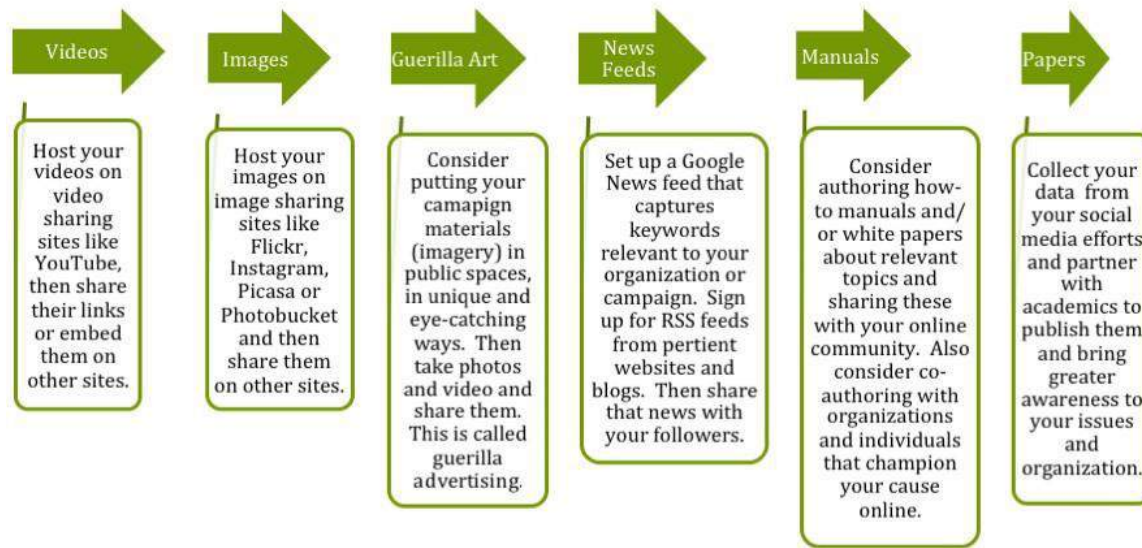
- Easy to learn.** If you are not familiar with it, the learning curve can be steep. Each social media site has its own set of operable functions and community norms; it is a new skill for most adults to learn.
- Not time intensive.** Social media use in campaigns is actually quite time intensive. Dedicated personnel are needed to make sure it stays current, effective, and accurate.
- **Just add information to my personal page.** One needs a carefully thought-out strategy to make it work effectively for a TPW mitigation campaign. It's **crucial to keep your page professional and separate** from personal activities.

Creating an effective social media page **and how to get -liked**

If you choose to start a social media page for the campaign, the following will help you to develop an effective page:

- Decide how much time and resources are available for maintaining a social media site.
- Research possible hosting sites, such as Facebook, Twitter, or YouTube.
- Develop a dissemination plan for information. Refer to Figure 3 for an example of a disseminating messages and publications. To determine the best plan, decide if the project will be using photos or videos? Will the project offer news and scientific information?
- Brand your campaign with a recognizable logo and put it on all of your materials. However, to establish your brand, it is important to create your own video and visual messages.
- Post relevant information, news, and visuals regularly on your social media sites at least once a day to be effective. You can easily set these up to post messages automatically on a specific schedule.
- Monitor and respond back to all pertinent comments; social media is *interactive* communications, and people can rapidly lose interest if they are ignored in this process.
- Finally, it is important to be able to evaluate the reach and effectiveness of your message. Several media resources (free and paid) are available to measure postings, responses, re-tweets, and other data that can indicate how your campaign is being recognized through social media.

Figure 3. Dissemination of Messages and Publications for TPW Campaign



Other resources for social media campaign development and monitoring:

- The U.S. Department of Health and Human Services' *Centers for Disease Control and Prevention* is a leader in science-based health information disseminated through social media: <http://www.cdc.gov/socialmedia/>. They also provide great toolkits to get you started.
- Mashable* is a leading source of social media news: <http://mashable.com/>
- HootSuite* (<http://www.hootsuite.com>) is a social media dashboard that allows you to schedule posts for multiple networks and platforms along with tracking your most popular posts
- Sprout Social* (<http://www.sproutsocial.com>) is a web application that integrates with platforms and offers contact management, competitive insight, analytics and more
- Radian6* (<http://www.radian6.com>) is the premier social media monitoring tool and engagement software, allowing measurement, analysis, and reports on social media efforts

Links to Videos about TPW:

- Toxic Butts Campaign videos: <http://www.youtube.com/user/toxicbutts>
- California Tobacco Control Program offers online media resource for tobacco-related issues. Search the section on *Tobacco's Impact on the Environment*. <http://www.tobaccofreeca.com/resources/>
- The Cigarette Butt Pollution Project (www.Cigwaste.org) is an advocacy and research-focused nonprofit dedicated to the eradication of TPW.
- **Legacy Foundation** has developed the **'Butt Really'** project, including informational materials, a webcast, and research on the problem of TPW. <http://www.legacyforhealth.org/environment.aspx>

STEP 3–DEVELOP STRATEGIC PARTNERSHIPS

New strategic partnerships are essential in TPW reduction campaigns. As previously indicated, TPW negatively impacts the environments of animals, waterways, parks, beaches, and communities. **Partners representing these various ‘consistencies’ can and should be involved in and informed about reducing TPW.** Examining priorities and issues related to waste management in neighborhoods will likely reveal opportunities for collaboration. Currently, the economic crisis suggests that engagement on the costs of cleanup might be important to local governments. Partners in TPW prevention and reduction efforts can collaborate in a number of ways, such as:

- Raise public awareness about the TPW problem across multiple sectors
- Sponsor cleanups and other events to raise awareness
- Provide services, products, or funds to assist campaign efforts
- Establish common goals across multiple sectors
- Help enforce existing and new legislation
- Provide resources such as printed materials, web links, advertising, or incentives

List Potential Partners and Resources - Create a list of potential partners and resources based on the campaign’s needs. Community-asset mapping is one approach for doing this: It is a widely used method for taking an inventory of organizations and resources (i.e. people, materials, media outlets). Once you have taken inventory of the community and mapped/charted the information, then you can develop a strategic plan to approach the organizations you have identified as supportive.

Initiate Contact - Before you make the contact, know exactly what you want from the partner. An easy way to introduce the project or campaign is to write a letter of introduction and then follow-up via calls and emails to sustain interest. Refer to the Appendix for an example Template of a Partnership Letter. If you receive interest from the organization, set up a strategic planning meeting to identify mutual priorities, opportunities, barriers, challenges, and how partners can collectively work toward achieving the goals of the campaign.

Get it in Writing - Attain written commitments or a Memorandum of Understanding from partners, if possible. It should state exactly what the partner has agreed to, what the timeframe is and what the partner will be given in return.

Work Together - Partnership is a two-way street. Make sure expectations and responsibilities are clear. Find ways for resources and time to be combined, in order to maximize efforts.

Thank Everyone - Include methods for acknowledging and thanking your partners’ efforts, and assign someone to ensure the acknowledgement or recognition happens.

Table 1. List of Potential Partners by Type of Organization

	Area of Focus	Potential role	Potential barriers	Common goals/interests
State Agencies	Tobacco Control, Education, Water Board	Tobacco advocacy, regulation, policy development, public health	Funding sources guide program emphasis	Social normative change on smoking and TPW
Government-funded projects	Tobacco control	Advocacy, policy analysis, evaluation, materials	Competing program priorities, Lack of funding	Changing the social norm of tobacco Community engagement Collaboration with diverse partners
Community-based non-profit organizations	Beach, oceans conservancy, environmental stewardship	Environmental advocacy, policy development, monitoring and cleanups	Lack of funding	Health behaviors, community health, social justice, rapport with community members
City and County Departments	Waste disposal, storm water management, health departments, fire prevention, law enforcement	Enforcement of litter laws; regulation of pollutants; public education	Competing priorities Lack of funding	Environmental protection and enforcement, public protection/health
Technical Assistance Providers for Regulations	Storm water coalitions and association	Regulatory advocacy, education, materials	Priorities differ	Enforcement, policy advocacy
Academia	Tobacco control research, social justice, publications	evaluation, economic analysis, policy analysis, Smoke-free campuses	Competing funding priorities	Scientific basis for TPW regulation, litter fees, monitoring and evaluation

STEP 4 – ENGAGE THE COMMUNITY AND BUSINESSES

Identifying and maximizing the community's resources and available organizations for this type of campaign is necessary to initiate and sustain community engagement. However, it is important to recognize the need for engagement of *particularly impacted* communities affected by TPW. These communities could be park users, beach goers, neighborhood businesses, storm water protection agencies, sanitation departments, university grounds keepers, environmental advocates, and ultimately, taxpayers. Community engagement is an art form, grounded in the principles of community organization: fairness, justice, empowerment, participation, and self-determination. The Centers for Disease Control offers a resource titled [Principles of Community Engagement \(Second Edition\)](#) for conducting efficient community engagement. One must physically go to the community partner, establish relationships, build trust, work with the leadership, and seek commitment on a personal basis. The following are activities that can be incorporated in your work plan to ensure engaging diverse communities:

- Educate and provide information** to decision-makers, businesses, youth, and environmental groups about the importance of reducing TPW in their communities. Education can be provided through various ways, such as providing educational packets, attending city council meetings, or have an information table at community events.
- **Place small insert flyer into utility bills** – Your local utility or water provider may already have pollution reduction campaigns, so check how your campaign messages can be added. Or ask for ad space, such as a flyer insert, to be sent to all residents that receive utility bills through the mail
- **Collaborate for cleanups** – Many environmental groups organize events at rivers, watersheds, and beaches and these organizations should be included in strategic partnerships. Partnerships that cross boundaries between tobacco control and the environment movement can be extremely effective in addressing the toxic butt problem.
- **Adopt a park, curbside, or street** – Residents can adopt a public site near their home or business and routinely pick up cigarette butts and other litter. Some groups (such as Surfrider) have provided TPW receptacles on sidewalks and nearby businesses have maintained these as part of a community partnership.
- Place signs** where there is high-pedestrian traffic or at businesses where smoking is allowed. Signage, flyers and brochures can be placed in waiting areas, bathrooms, lounges, and break areas of work places in various communities. Signage can be placed in areas of high-pedestrian traffic and where people are likely to smoke.

Local Businesses

This section focuses on businesses taking responsibility for TPW on their premises to prevent cigarette butts from being discarded on sidewalks and carried away into storm drains. For example, studies show that smoke-free restaurants generally result in an increase in traffic, create a healthier environment for employees and customers, lower maintenance costs, and the property has a higher resale value. There is no evidence that 100-percent smoke free restaurant ordinances have a negative effect on restaurant sales (Glantz S. 1992). City officials and local governments can enact such health and safety requirements to protect patrons and employees in restaurants from secondhand smoke exposure, without the fear of adverse economic consequences (Glantz S. 1992).

Some of this body of evidence is applicable to working with businesses for reducing TPW. Large concentrations of TPW have been found near convenience stores where cigarettes are purchased, around employee smoking areas, and outside of bars and restaurants (Marah and Novotny 2011). Cigarette butts are not always properly disposed into designated receptacles and still end up in the storm drains despite the presence of receptacles. Cigarette butts in front of businesses reflect negatively on the **business' image and** the overall quality of life in the community.

In recent years there has been a movement toward environmentally conscious business models, and consumers often recognize businesses for these efforts. Consider *PRODUCT STEWARDSHIP* as a way to approach businesses about the impact of TPW. Product stewardship is the act of minimizing health, safety, environmental and social impacts, and minimizing economic benefits of a product and its packaging throughout all lifecycle stages. The maker of the product has the greatest ability to minimize adverse impacts, but other stakeholders, such as suppliers, retailers, and consumers, also play a role (<http://www.productstewardship.us/>). The following are ideas and methods for engaging businesses, especially tobacco retailers, restaurants, and bars to become partners:

1. **Educate and provide resources** to local businesses, chambers of commerce, and business associations about TPW and how they can benefit from partnerships. This can be done through flyers, newsletters, or providing Web resources. Packets used to educate the community and decision-makers can also be shared with local business owners. Follow-up with the business later to offer signage, as a way to remind patrons and employees to discard of cigarette butts in ashtrays and how this can help improve the **business' image**.
2. **Conduct surveys** with local businesses, groups, and employers to find out how they currently handle TPW and ask about attitudes and knowledge. Community surveys, such as key informant interviews or Internet-based surveys of business owners can inform your community campaign. See sample data collection form in the Appendix.
3. **Develop a "Green Business Model"** regarding TPW with local businesses and companies. This could take the form of a Green Business Certification Program that includes smoke-free policies and TPW management on their premises.

Green Business Certification Programs are usually supported by partnerships between county departments, colleges, community organizations, business associations, and environmental groups to recognize businesses that have voluntarily made efforts to protect, preserve, and improve the environment. Approaching businesses with a certification program can be framed as an opportunity for businesses to reduce its carbon footprint, generate less waste, and recycle more.

4. **Advocate for smoke-free policies** to restrict smoking on worksites, outdoor dining patios, and storefronts. Encourage employers to adopt No Smoking policies to help reduce TPW.
5. **Provide public recognition** for businesses that effectively prevent TPW deposition; this could take the form of a certification program or media recognition

STEP 5 – CLEANUP SURVEY AND PROTOCOL

Cigarette butt cleanups have been conducted in many places, such as parks, beaches, and college campuses. The principles and steps that follow are very similar across all these places.

1. Identify a lead group or committee.

- The staff or lead group of the project will be responsible to train volunteers and engage the community to participate. This group will recruit volunteers, provide orientation and information to volunteers, organize data collection and process, and disseminate findings to the campus and surrounding community.
- This group should also establish communication with student body, **Chancellor's office, recreation and health services, campus maintenance** and environment groups in order to inform them and garner support for cleanup activities.

2. Provide an orientation and training for volunteers.

- Volunteers may come from programs/majors/student organizations that are related to public health, environment, or health care;
- Providing an overview of the TPW issue, how it relates to campus quality-of-life, and public health efforts to become a tobacco-free campus are important motivators for the volunteer cleanup teams;
- Incentives may be provided through extra credit for students, food, and gift cards if donors can be recruited, as well.

3. Organize the cleanup.

- Map out the cleanup areas in advance. A campus map gridded out into team areas is useful to assure coverage of the cleanup area.

- Volunteers sign in and sign a liability waiver.
- Cleanup events are typically only one hour long for the actual cleanup time with approximately 30 minutes before for orientation and 30 minutes after for recording.
- Weekends and mornings often work best for cleanups as foot traffic is low.
- Designate a person as the media coordinator to take pictures and video.
- Each volunteer may need multiple pairs of gloves as these often break. Volunteers should count each cigarette butt as it is collected.
- At the end of the hour, have each individual write his or her collected cigarette butt total on their paper bag or sticky note on his or her container with a permanent marker.
- Double-bag the collected butts and dispose of safely into campus dumpsters or use the collected butts as a display to publicize the burden of TPW on campus. This is a great visual for media coverage.

4. Disseminate the results and advocate for policies

- Post the results of the cleanup for participants to see. Use the collected butts as a display in large plastic, transparent containers. These may be placed in prominent places on campus using signage that advocates for making the campus smoke-free. This is an excellent visual for media coverage.
- The final reports and photos should be sent to tobacco control agencies and projects.
- Reports should also be sent to campus administration, campus news services, local papers, and newsletters. Invite media to attend, or send photos or video with news releases or pre-packaged articles.

Expand smoke-free areas!

Since 2003, many beach communities have banned smoking in order to assure clean beaches for tourism and local use. Beach cleanups were used by advocates to demand these local policies. Solana Beach in Southern California led the way in establishing smoke-free beaches across the state, and your cleanup survey can be used for advocating smoke-free policies in the areas that you are trying to reduce TPW. Examples include plazas, shopping malls, outdoor dining patios, parks, bus stops, walkways in front of public buildings, and parking lots. In California, legislation bans smoking within 25 feet of playgrounds and sandboxes (California Health and Safety Code Section 104495, Statutes of 2001) as well as within 20 feet of doorways of government buildings (California Government Code Section, 7597, Statutes of 2003).

Some California communities have enacted more restrictive ordinances: Calabasas, for example, was the first U.S. city to go completely smoke-free (smoking allowed in designated areas only) and smoking is prohibited on Solana Beach, Monterey beach, and other beaches in San Diego and Orange County. Communities also banned nuisances—things that are generally offensive and have potential for harm, such as loud noise, billboards, and public drinking. Depending on the definition of a nuisance in your jurisdiction, this may also be a possible policy approach.

Section 4: Monitoring and Evaluation Strategies

This section provides options for local compliance, enforcement, and evaluation options after a smoke-free policy is adopted in a specified area. **Education is key for successful implementation and compliance.** Promote the policy, educate on the issue, and invite health services to offer cessation programs and strategies to encourage quitting among the community. Promote the availability of free cessation help such as 1-800-QUIT NOW or your state's quitline. There are several methods to monitor and measure TPW in the environment.

Public Awareness

Knowledge, attitudes, and practices about TPW can help inform implementation efforts and compliance. Assessing these will mean conducting observation surveys, public opinion poll surveys, and key informant interviews. Tobacco Control Evaluation Center (<http://tobaccoeval.ucdavis.edu>) has data collection resources and the California Adult Tobacco Survey incorporates questions about attitudes, behaviors, and media exposure regarding TPW. The Legacy Foundation has conducted such research nationally and can provide sample questions (www.legacyforhealth.org) (Rath 2012).

Enforcement Plan

Prepare for non-compliance by developing an enforcement plan. Depending on the jurisdiction and available resources, consider the whether to adopt passive or active enforcement methods.

- Passive enforcement options include self-enforcement and signage.
- Active enforcement includes education materials, applying the Student Code of Conduct/ Employee Personnel Policies, giving fines, community service hours, written citations/warnings, follow-ups, and positive reinforcement.
- For example, a project could provide a combination of up to two written citations, order 40 hours of clean-up on the third citation, and give a small fine on the fourth violation.
- If possible, work with local law enforcement to encourage more vigorous enforcement through citizen actions. These could include cell-phone photo **documentation of 'hot spots' such as traffic intersections**, freeway on ramps, parks, beaches, outdoor eating areas, convenience and liquor store venues, and parking lots near beaches.
- Develop an 800 telephone number that can be called to report and document littering and smoking complaints. Forward these complaints to the appropriate authority, based on the jurisdiction.

Targeted Cleanups

Refer to the section Cleanup and Survey Protocol for using consistent methods. Targeted cleanups are best for areas or jurisdictions that have implemented smoke-free policies, areas with receptacles/ashtrays, or for measuring any expected changes over time. If possible, collect baseline data before any policy adoption or public awareness campaign, in order to measure the change. Conduct a follow-up cleanup using roughly the same number of volunteers, cleanup time, and defined beach area.

Litter Audits

Litter Audits are detailed, quantitative randomized studies of total litter burdens in urban or other environments that can assess the percentage of total litter that is attributable to tobacco products. These are labor-intensive efforts that are probably not needed to assess progress on TPW reduction campaigns, but can be critical elements of evidence to support the implementation of mitigation fees. Litter audit methodology was used in San Francisco to evaluate costs of cleanup. These methods were developed according to MGM Management, in Toronto, Ontario. [Click here](#) for methodology. Litter audits assess **‘accumulated’ litter in randomly selected sites for a given jurisdiction**. These are NOT selected based on any field observations but are selected randomly from gridded areas on a geographic information system (GIS) map of the jurisdiction. The site team then creates an individual site file for each location chosen to be examined in the field. Large and small litter items are assessed according to pre-established categories, and counting is done in a defined area from a starting point in each site. The percentage of total litter that is TPW can then be assessed for the entire jurisdiction.

Technology Approach: Geographic Information Systems (GIS) Summary

This section is a summary of GIS capabilities and instructions. Complete Instructions are located in the Appendix. A GIS tool is a visual that lets you analyze and interpret data spatially and helps reveal relationships, patterns, and trends. GIS is a new method and approach to public health prevention and tracking trends. This method provides a new way of looking at the TPW problem. TPW is not uniformly distributed in the urban environment. Its distribution depends on several factors: density of locations at which cigarettes are consumed, smoking and litter rates, physical aspects of the environment that trap cigarette butts such as cracked and broken sidewalks, and finally the cleanup efforts.

ArcGIS software is recommended to conduct a weighted overlay analysis of TPW in the urban environment. The locations are chosen for their strong positive correlation with the purchase and consumption of cigarettes. **The model’s utility has been repeatedly tested, with litter-audits at more than 120 distinct sample sites. Results show that this tool reliably predicts locations of greater and lesser TPW in the urban environment.**

Step 1: Plan and Assess. It is important to decide on the scope of the project at the beginning. First, how will the results of this project be used? Next, what technology,

software, data or skills do we need? Then, who is our audience for these results? Finally, how will we disseminate results from this analysis?

Stage 2: Build a database of venues where TPW may be concentrated. In this step, a database is created for all zip code, census tract, or other selected areas that are to be evaluated. During Stage one, the area(s) to be examined in the model should have been selected. The specific TPW *venues* variables of interest are: bars, convenience stores, grocery stores, restaurants, gas stations, traffic signals, and bus stops. Refer to the Appendix for websites that provide this information.

Stage 3: Create point maps. After the venue variables are geocoded (assigned spatial coordinates), point maps are created showing their locations on a street-level map. Additionally, the variable databases may be used to identify businesses to be targeted in an outreach campaign.

Stage 4: Create a weighted overlay map. Weighted overlay statistical analysis considers the impact of multiple geographic features on an outcome of interest, in this case TPW. For example, convenience stores are assigned the **greatest –weight** in this model because they typically generate the most TPW, and restaurants the least –weight. The model analyzes a synergistic effect of the variables to predict which locations will have the most TPW.

Stage 5: Conduct litter audit (Optional). Audit the results of the weighted overlay analysis. During an audit a researcher goes to sites predicted to have high or low concentrations of TPW and counts the number of cigarette butts at each location to confirm the accuracy of the GIS map.

Case Study:

University of California San Diego (UCSD)

Smoke-Free College Campus

What was the situation on campus? At the time, UCSD was the only UC campus where tobacco products were still sold on campus (because of a lease with the student co-operative). The co-op resisted any changes to the campus smoking policy. The student newspaper was not accurately reporting on the smoking issue on campus. Campus political organizations avoided the issue for unknown reasons. Supporters included the Assistant Vice Chancellor of Wellness, the Director of Student Health Services, the Director of Health Education at Student Health Services, and the Director of Alcohol, Tobacco, and other Drugs. Student organizations that supported the initiative included the Graduate Student Association, Pre-Health Organizations, the Student Sustainability Center, and many more. Outside support was provided by California Youth Advocacy Network (CYAN), which provided tools and resources for advocacy and mobilization.

BEFORE THE EVENT

- **Lead group/committee** – Two UCSD students affiliated with CYAN led the smoke-free campus initiative at UCSD. These two individuals did most of the document drafting, using materials from CYAN and support from the Assistant Vice-Chancellor of Health, Recreation, and Well-being, along with the Director of Health Education for Student Health Services. An official student organization process was felt to be too bureaucratic during the initial work on this issue.
- **Orientation and trainings/community engagement** – A summer health course for high school students was led in 2010 by two public health doctoral students who **organized a campus cleanup project as a ‘field exercise’ to demonstrate the burden of TPW.** Brief lectures were also provided by the Cigarette Butt Pollution Project to college classes and other high school classes in order to orient the students on the issue. After each presentation, those who were interested in participating were asked for their contact information.

THE DAY OF THE EVENT

- Seventeen high school students volunteered on one Saturday in summer 2010.
- On the day of the event, volunteers signed in, signed a waiver, were given gloves and other tools, were shown how to properly count and where to stay within bounds of the targeted location. They measured cigarette butts by the count per hour.
- In all, about 7,000 cigarette butts were collected in one hour of a limited campus area.

AFTER THE EVENT

- **Disseminate the results and advocate for policies** – The collected data became part of the advocacy approach to the Chancellor to support the smoke-free campus policy. Results of the cleanup were combined with those at SDSU and reported in a journal supplement, *Tobacco Control* in April 2011 (Sawdey et al 2011). Two resolutions on campus smoking policies were drafted by the organizing committee (supported by CYAN) for consideration of support by various student governing organizations. It was important to have provided these organizations with options, making it necessary for them to choose one option to support. One option was to designate permitted smoking areas in parking lots. The second option was to designate smoking areas in parking lots, then transition to a tobacco-free campus after a year had passed.
- **Provide cessation resources** – An important component of enforcement is the availability of evidence-based smoking cessation interventions, including the California Smokers Helpline 1-800-NO-BUTTS, a free telephone-based quit smoking program. Tobacco cessation and resources for students are available through the Health Education/Health Promotion Units at the Student Health Services facility. Faculty and staff receive cessation benefits through UC sponsored health plans and StayWell Health Management. Once support was garnered from the Associated Students, the Graduate Student Association, and other student organizations, a statement of support was presented to the UCSD Chancellor. Since then, the UC system has adopted a statewide smoke-free policy for all campuses and campuses are expected to have implemented a policy by 2014.
- **Enforcement and Evaluation** – Implementation on campus included an educational campaign and conducting cleanup surveys the following years. The UC system enacted a smoke-free policy for all UC campuses, but each campus is responsible to implement the policy by 2014.

Section 5: Estimating the Cost of TPW

The assessment of mitigation fees is a method for financing public expenditures necessary to improve and offset the economic impact of a waste problem. The volume and accumulation of TPW can be counted, simulated, or estimated, depending on the resources available. In California, the 2010 ballot measure Proposition 26 amended the state constitution to redefine fees as taxes, so enactment of a mitigation fee would require a two-thirds majority vote by the affected constituents to establish such fees. Before this law was enacted, the city of San Francisco adopted an abatement fee of \$0.22 per cigarette pack. San Francisco provides a case study for estimating costs and implementation of a mitigation fee.

Case Study: San Francisco Abatement Fee

First, the city estimated the volume and percent of TPW out of all litter collected by conducting Street Litter Audits in 2007, 2008 and 2009. The San Francisco Department of Environment used consultants to examine 32 sites and observe *all* litter in those sites. TPW was found to represent 22.5 percent of all litter in these sites.

Then, to estimate the total costs of all litter abatement, city departments were asked to report their total direct operating costs attributable to general litter management, collection, and abatement. These costs were reported to be approximately \$25 million in 2009, with the vast majority of costs incurred by the Department of Public Works. Abatement activities already covered under existing fee structures and programs (e.g., Public Utility Commission TPW costs) were excluded.

The city applied the 22.5 percent of TPW from total waste and multiplied it by the total annual litter abatement cost of \$25 million, resulting in a base TPW abatement cost estimate of \$5.6 million. To this amount the city elected to add costs associated with administering the fee and the costs of a public anti-littering campaign, which together raised the annual total costs to approximately \$7 million.

The calculation of per-pack fees involved several steps. First, data on cigarette packs sold per capita in California were retrieved. The **CDC reported California —packs-per capita** of 31.8. To verify, the 2007 California Health Interview Survey data were used to estimate smoking prevalence and the number of cigarettes typically smoked per day in San Francisco. The data showed 31.8 packs per capita was an appropriate estimate.

Finally, in order to convert the packs-per-capita data into a measure of packs purchased in San Francisco per year, the data were adjusted for the influx of daytime commuters and daytime and nighttime visitors and tourists. The result was a net estimate of 30.6 million cigarette packs purchased in San Francisco in 2008 and a total **—recoverable** TPW cost of approximately \$6.5 million. When divided by the estimate of total packs consumed by San Franciscans, a maximum permissible per-pack fee was calculated at approximately \$0.22.

The implementation of the fee has been the subject of considerable debate, including a lawsuit filed on behalf of one large tobacco manufacturer. This lawsuit was rejected by the District Court and the fee has been implemented.

Section 6: Next Steps and Research Needs

This toolkit intends to mobilize interested groups, share common resources for TPW, and continue to change the social norm about tobacco by highlighting the impact of TPW. Currently the full impact of billions of discarded cigarette butts and how it relates to our environment and health outcomes is unknown. Academic institutions, environmental testing companies, and government environmental protection departments can become more involved in these scientific pursuits. The following research questions need further attention:

- What are the specific chemicals in cigarette butts that create toxicity to aquatic organisms?
- What are the chemical biomarkers of cigarette butts and can we detect these in our aquatic, soil, or sand environments?
- Do TPW chemicals bioconcentrate or bioaccumulate in the food chain such that we might have human health consequences of TPW due to environmental exposures?
- How can tobacco products be altered to reduce the environmental impact of TPW?
- How can communities shift the responsibility for mitigating TPW to the tobacco industry or to those who profit from sales of tobacco products?

The following are potential avenues of mitigation and approaches for larger government agencies to consider if appropriate:

Litter laws. Depending on the jurisdiction of the policy, a TPW campaign could involve local or state enforcement agencies. For example, California Penal Code 374.4 makes it unlawful to litter or be the cause of litter on public or private property. Individual persons, firms, and corporations violating the section can be found guilty of an infraction. Violators can be punished by a fine ranging from \$250-1,000 for a first offense, from \$500-1,500 for a second offense, and from \$750-3,000 for a third or subsequent offense. The court may, in addition to the fine imposed upon a conviction, require as a condition of probation that any person convicted of a violation pick up litter at a time and place within the jurisdiction of the court for not less than eight hours.

Environmental regulations. Categorizing TPW as hazardous or toxic waste might place a higher priority on local government bodies. Research is still needed to quantify and categorize toxicity or the hazard of TPW. The impact of a non-point-source pollutant, such as cigarette butts, is difficult to associate to wide-ranging environmental impacts. Today, water systems have identified land-sourced contaminants such as antibiotics and other pharmaceuticals (flushed into toilets or excreted by animals). As previously noted, the lethal concentration (LC50) for both fresh and saltwater fish is only one cigarette butt in one liter of water. Additional research is needed to identify markers of cigarette-butt contamination in the environment.

Today, litter is increasingly being viewed as a water pollution concern. If communities continue to allow TPW in waterways, there may be irreparable damage to waterways, water species, and the ecosystem. In a 2005 CalTRANS study, cigarette butts were by far the most-numerous component of storm drain litter, constituting 34 percent of the total litter items captured in storm drains samples near freeways. TPW campaigns can benefit from partnering with agencies that mitigate urban runoff and may result in innovative approaches on reducing the environmental impact, such as best management practices.

Extended Producer Responsibility and Product Stewardship. There are additional actions that may be taken at multiple levels, including the state, city, county, and neighborhood. These may involve the emerging area of Extended Producer Responsibility (EPR), a policy principle to promote improvements of product systems by extending the responsibilities of the manufacturer of the product to various parts of the entire life cycle of the product, including the take-back, recycling, and final disposal of the product (Lindquist, 2000). [Click here](#) for an article on EPR.



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Additional Resource Links

This is a partial list of organizations that can provide resources and information or that offer opportunities to get involved:

- o http://tobaccocontrol.bmj.com/content/20/Suppl_1.toc contains a special issue of the *Tobacco Control* journal, all about butts. This is peer-reviewed scientific information.
- o Coastal cleanup data can be accessed from the Ocean Conservancy site: <http://www.oceanconservancy.org/our-work/marine-debris/2012-data-release.html>
- o Policy information on tobacco control can be accessed from the Tobacco Control Legal Consortium <http://publichealthlawcenter.org/programs/tobacco-control-legal-consortium>
- o Information on clean indoor and outdoor air policy can be obtained from the Americans for Non-smokers Rights Foundation: <http://www.no-smoke.org/>

Public Health

California Tobacco Control Program: California Department of Public Health Tobacco Control Program: links to programs and publications.

<http://www.cdph.ca.gov/programs/tobacco/Pages/default.aspx>.

Cigarette Butt Pollution Project: Group dedicated to eradication of TPW from the environment. <http://www.cigwaste.org/>.

Americans for Non-smokers Rights: Leading national lobbying organization (501 (c) 4), dedicated to nonsmokers' rights, taking on the tobacco industry at all levels of government, protecting nonsmokers from exposure to secondhand smoke, and preventing tobacco addiction among youth.

<http://www.no-smoke.org/aboutus.php?id=436>.

Cigarette Butt Advisory Group (CBAG): An informal group of experts who provide advice and focus attention on TPW issues regionally and nationally.

<http://www.cigwaste.org/index.php/Cigarette-Butt-Advisory-Group.html>.

Legacy Foundation: The Foundation develops programs that address the health effects of tobacco use. Their focus is on vulnerable populations – youth, low-income Americans, the less educated, and racial, ethnic and cultural minorities – through grants, technical assistance and training, partnerships, youth activism, and counter-marketing and grassroots marketing campaigns.

<http://www.legacyforhealth.org/whoweare.aspx>.

Environmental Groups

California Coastal Commission: The California Coastal Commission's Public Education Program works to increase public knowledge of coastal and marine resources and to engage the public in coastal protection and restoration activities. Sponsor of statewide Coastal Cleanup Day. <http://www.coastal.ca.gov/publiced/aboutpe.html>.

Coastkeeper: San Diego Coastkeeper protects the region's inland and coastal waters for the communities and wildlife that depend on them by blending education, community empowerment and advocacy. They support beach and waterway cleanup days that include collection of data about numbers of cigarette butts found. <http://www.sdcoastkeeper.org/>.

Surfrider Foundation: Dedicated to the protection and enjoyment of the oceans, waves and beaches through a powerful activist network. Organizes beach and waterway cleanups and works on policy. <http://www.surfrider.org/>.

Youth Advocacy

California Youth Action Network: CYAN is dedicated to supporting youth and young adults by advocating for a tobacco-free California. CYAN provides tobacco control professionals and young people with the tools to mobilize a statewide movement among high schools, colleges and universities, military bases, and all levels of the young adult community. <http://cyanonline.org/>.

CYAN has also published a toolkit for campus tobacco free policy development http://ucop.edu/riskmgmt/documents/taking_tobacco_out_of_higher_ed.pdf. CYAN also has print and electronic materials for wide use <http://cyanonline.org/earth-day/>.

Social Advocates for Youth San Diego: SAY San Diego is a local nonprofit organization dedicated to supporting the positive development of young people, their families and communities in San Diego County. <http://www.saysandiego.org/>.

Licensing and Taxation

Atorney Genera l's Ca lifo rnia T ob a cco Directory: Information on brands and products that can legally be sold in California. Related to issues of licensing and contraband products. <http://oag.ca.gov/tobacco/directory>.

California Cigarette and Tobacco Products Licensing Act of 2003: information on licensing requirements for commercial distributors of tobacco products in California. <http://www.boe.ca.gov/sptaxprog/spctlicact03.htm>.

Research on Smoking Behavior

California Adult Tobacco Survey (CATS): The 2008 California Adult Tobacco Survey was the eighth in a series of cross-sectional studies to collect information about tobacco use and behaviors among California adults and teenagers. In 2012, questions in regards to attitudes of smoking behavior and cigarette butts were added.

Research

Center for Tobacco Control Research and Education: The Center for Tobacco Control Research and Education serves as a focal point for a broad range of research, education, and public service activities for 46 faculty in 11 departments and all four schools at UCSF, as well as colleagues at UC Berkeley and UC Merced. It is a World Health Organization Collaborating Center on Tobacco or Health. <http://tobacco.ucsf.edu/>.

Californians Against Waste: Californians Against Waste is dedicated to conserving resources, preventing pollution and protecting California's environment through the

development, promotion and implementation of waste-reduction and recycling policies and programs. <http://www.cawrecycles.org/>.

Health Economics Consulting Group: Estimates of the Costs of Tobacco Litter in San Francisco and Calculations of Maximum Permissible Per Pack Fees: www.sfenvironment.org/.../tobacco_litter_study_hecg_062209.pdf.

National Oceanographic and Atmospheric Administration, National Oceanic Marine Debris Program: Marine Debris Shoreline Survey Field Guide: An 18-page guide on how to survey and share data about marine debris. NOAA website:

<http://marinedebris.noaa.gov/info/japanfaqs.html#monitor> instructs interested individuals to email MDsightings@gmail.com

Syrek, D. B., M. Kayhanian, and S. Meyer. 2003. *A regression model to predict litter in urban freeway outfalls after rainstorms*. Presented at StormCon, Austin, TX, July 2003.

Pollution

Cal EPA: State Agency charged with developing, implementing and enforcing the state's environmental protection laws that ensure clean air, clean water, clean soil, safe pesticides and waste recycling and reduction. <http://www.calepa.ca.gov/>

California Storm Water Quality Association: Assists the State Water Resources Control Board (SWRCB) and municipalities throughout the state of California in implementing the National Pollutant Discharge Elimination System (NPDES) stormwater mandates of the Federal Clean Water Act. <http://www.casqa.org/>

Clean Water Action, California: Advocacy group that organizes strong grassroots groups and coalitions and campaigns to elect environmental candidates and solve environmental and community problems. <http://www.cleanwateraction.org/ca/>

Appendix: Sample Materials and Templates

Sample Business Partnership Letter

Dear [CONTACT]:

Cigarette butts are the most common littered item on our beaches, waterways, and city streets. Pollution from cigarette butts endangers water quality, collects in recreational areas where children play, and may pose a threat to public health and the safety of the community. The California Tobacco Control Program has made reducing tobacco product waste (TPW) a top priority as part of its commitment to a tobacco-free society. Partnering with the Tobacco Waste Reduction Campaign can show your [CUSTOMERS/MEMBERS/EMPLOYEES] that you care about keeping the community and environment clean and healthy! Partnering with our campaign will allow [ORGANIZATION/BUSINESS] to:

1. Show its commitment to a cleaner and healthier community
2. Contribute to preventing environmental degradation due to discarded cigarette butts
3. Support a smoke-free environment for all Californians

Let's work together to educate your customers about the harmful effects of cigarette butts and their impact on our environment. Here are some ways you can show the community you care:

Partner – Collaborate and coordinate with environmental, tobacco control and community groups to educate and provide information on legislation, policies, and enforcement of anti-litter laws to assure a healthy community.

Host a Cigarette Butt Clean Up – Organize, sponsor, and participate in a local cleanup event. Use your social media to *Friend* us (#kickthebutts) and to publicize the cleanup. Beautify a local waterway, park or playground – picking up, disposing of, and publicizing the TPW. Share information on preventing TPW pollution across your community

Be Tobacco Free – Prohibiting smoking in your business will actually increase profits, demonstrate to the community that you care about their health, the environment, and outdoor dining experience. Put up signs to encourage proper disposal of cigarette butts and provide a cessation quitline, such as 1-800-NO-BUTTS. Install waste receptacles.

We are eager to build a partnership with your company/organization. We will follow up with you in the next few weeks to discuss this opportunity. In the meantime, please feel free to call me at [TELEPHONE NUMBER] with any questions you may have.

Sincerely,

[CONTACT NAME]

[NAME OF ORGANIZATION/BUSINESS, ADDRESS OF ORGANIZATION/BUSINESS]

Sample Business TPW Survey

OBSERVATIONAL QUESTIONS: After a business is selected, conduct a visual observation to determine:

1. Presence of receptacles on or around the property? (if yes, how many?).
2. Presence of litter? (if present, please describe).
3. Presence of any particular litter catchment areas? (e.g. curbs, drains. Please describe).
4. What type of business is this?
5. Does the business have signs asking customers not to litter outside the store?
6. Does the business have garbage cans or ashtrays outside for customers to use? (if yes, please describe condition? (i.e. full, empty, clean and how many?).
7. Do you think litter is a problem in your community?
8. What type of litter is most often found around your business?
 - Food wrappers (candy wrappers, paper bags, clam-shells, etc.)
 - Drink containers (cans, bottles, etc.)
 - Cigarette wrappers and butts
 - Other _____
9. In your opinion, where does this litter primarily come from?
 - From this business
 - From neighboring businesses
 - From illegal dumping
 - From traffic
 - From pedestrians
 - Other _____
10. Do you think your customers might contribute to the litter around your business?
YES → What percentage of the litter?
11. Who, if anyone, should remove the litter around your business?
12. Does your business do anything about the litter around your property?
YES → What do you do?
 - Place in garbage
 - Sweep into street
 - Leave or wash into gutterYES → **Do you think it's effective?**
13. Do customers smoke cigarettes outside or near your business?
14. Does your business sell cigarettes?
15. (IF LITTER PROBLEM →) In your opinion, how could the litter problem in this community be fixed? (IF NO LITTER PROBLEM →) For communities that do have litter problems, how could their litter problems be fixed?
16. Do you think litter has a negative effect on your business?

Tobacco Waste Fact Sheet

1. **Trillions of butts:** There are 5.6 trillion cigarettes sold globally every year; 360 billion sold in the United States.
2. **Butt waste is everywhere:** Ninety percent of the 360 billion cigarettes sold have cellulose acetate (plastic) filters; at least one-third of those – 120 billion – are discarded into the environment. Washed into rivers, lakes and the ocean, and eaten by birds, animals and fish, they are the most littered item in the United States and the world. Smoking-related debris is about one-third of all debris items found on U.S. beaches, rivers, streams, and roadsides.
3. **Butt waste is not biodegradable:** Filters are non-biodegradable, and while ultraviolet rays from the sun will eventually break them into smaller pieces, the toxic material never disappears.
4. **Butt waste is toxic:** Cigarette butts leach organic chemicals and heavy metals into the environment that are toxic to micro-organisms, daphnia, and fresh and salt-water fish. They are poisonous when ingested by children and other living organisms.
5. **Cigarettes kill:** Tobacco use is the No. 1 cause of preventable death globally, taking more than 5 million lives a year, and likely to kill 1 billion people this century (10 times the 20th century toll).
6. **Cigarette butts are dangerous:** Discarded cigarettes can ignite deadly fires. More than 900 people in the United States die each year in fires started by cigarettes, and about 2,500 are injured. Nationally, annual human and property costs of fires caused by careless smoking total about \$6 billion.
7. **Butt waste cleanup is expensive:** Cigarette butt waste cleanup is very costly. A San Francisco study reports the cleanup cost to be more than \$7 million annually. Taxpayers and local authorities currently bear the cost of cleanup, and the tobacco industry takes no responsibility for their product at the end of its life.
8. **Filters don't make cigarettes safer:** Many smokers believe filters provide some protection – that they're **safer than unfiltered cigarettes**. But the U.S. National Cancer Institute asserts there have been no benefits to public health from filters. The tobacco industry knows that filters are a fraud; biodegradable filters are not an option as they would still leach toxic chemicals into the environment.
9. **The tobacco industry blames smokers:** Tobacco companies oppose regulations compelling them to take responsibility for butt waste – despite the widely recognized environmental principle of Extended Producer Responsibility; **instead, they say 'the responsibility for proper disposal' belongs to the smoker.**

Sources: –The Environmental Burden of Cigarette Butts, [Tobacco Control](http://tobaccocontrol.bmj.com/content/20/Supp_1.toc), April 2011, (http://tobaccocontrol.bmj.com/content/20/Supp_1.toc); –The Impact of Tobacco on the Environment, [Legacy Factsheet](http://www.legacyforhealth.org), April 2010 (www.legacyforhealth.org); –Tobacco and the environment, [ASH fact sheet](http://www.ash.org.uk), 2009 (www.ash.org.uk); CA Dept of Public Health's Butt Waste –Toolkit Project, www.toxicbutts.com; –Tobacco Watch, [Framework Convention Alliance](http://www.fctc.org), 2010 (www.fctc.org).

Sample Opinion Editorial

Union Tribune San Diego

Do it for yourself and for the planet: Quit smoking!

By Thomas Novotny and Clifton Curtis

Friday, April 20, 2012

More than 5 trillion cigarettes are sold globally every year, with 20 billion sold in California each year alone. At least one-third of these is discarded carelessly and inexcusably into the environment. Cigarette butt waste is everywhere. Washed into rivers, lakes and the ocean, eaten by birds, animals and fish – this most-littered item in the world can impact all of us.

But they're not just litter. Cigarette butts leach toxic, organic chemicals and heavy metals into the environment. They damage habitat and ecosystems, poison wildlife, pets, children, and ignite destructive, deadly fires. Butt waste cleanup is expensive, too. A recent San Francisco litter audit found that city's cleanup cost to be \$5.6 million annually, resulting in a 20-cent per pack fee that covers those costs. Elsewhere, taxpayers and local agencies bear those costs.

Almost all cigarettes have filters made of cellulose acetate (a plastic) that is non-biodegradable. While ultraviolet sun rays eventually break them into smaller, even microscopic pieces, the toxins still leach into the environment. Many smokers believe filters provide health protection – that they somehow reduce the health effects of smoking – but the U.S. National Cancer Institute publications, among others, affirm that there are no benefits to public health from filters; they just make it easier to sell cigarettes to kids and harder for smokers to quit.

Cleanup and prevention of cigarette butt waste needs to be the responsibility of those who profit from the sale of tobacco products, not the taxpayers. This includes the tobacco industry, distributors and sellers, and not just the smoker. The environmental principle of Extended Producer Responsibility (EPR) should apply to cigarette butts, just as it does to other toxic, harmful waste products such as used computers, batteries and plastic packaging. EPR appropriately places the full cost of cleanup and disposal on the tobacco industry, with costs internalized in the retail price. Local responsibility for cleanup and prevention should also be shared by businesses that profit from tobacco use.

Public awareness of the environmental impact of tobacco use barely registers compared with the attention given to the horrendous human health effects of smoking. Smoking is still the single most important preventable cause of death in the United States, with 20 percent of all deaths attributable to this addiction. More attention and actions on preventing butt waste are needed.

On March 8-9, the California Tobacco Control Program sponsored a **Tobacco Waste Summit** in Sacramento. This dynamic two-day gathering of about 40 national, state and local environmental and tobacco-control experts discussed a variety of innovative interventions and solutions to the butt waste problem. Examples of topics discussed included smoke-free outdoor areas, such as college campuses, restaurant patios, parks and beaches, can support healthy, smoke-free environments that help prevent butt waste deposition. Other actions could include better enforcement of existing litter and pollution violations; labeling cigarettes as toxic waste; raising the visibility of the butt waste environmental impact through various advertisements, **social media and public service announcements; and mandatory take back policies, with the onus placed on the tobacco industry to assure safe disposal of butt waste.** Some communities

have placed more butt waste receptacles on sidewalks, beaches and in parks; this is great as a short-term response, but more upstream solutions are needed.

Individually, **the most effective action means quitting smoking, and there's no better time than now, with Earth Day, on Sunday.** Stopping smoking provides both real and symbolic benefits, reflecting not only concern with the environment but with the health impacts of smoking. California leads the nation in tobacco control and environmental protection; joining these two efforts will further shift the social norm toward a smoke-free, butt-free and waste-free world.

Today, the student volunteers at San Diego State University will conduct a butt-waste cleanup of the campus. The tens of thousands of butts collected from campus and beach cleanups conducted periodically throughout the county demonstrate the need for more effective environmental protection against butt waste.

However, the most important message from these cleanups is: quit smoking now ... for the health of your lungs, your community, and the environment!

Novotny is a professor in the Graduate School of Public Health at San Diego State University. Curtis is a director of The Varda Group, a consulting firm that addresses environmental, health and social welfare issues to benefit people and the planet.

CIGARETTE BUTTS are
the
single
MOST LITTERED item
across
the
ENTIRE GLOBE



Sample Press Release

Press Release – Earth Day Cigarette Butt Cleanup (ORGANIZATION NAME), (College Name)

On (DATE), (COLLEGE NAME) students will conduct a campus-wide cigarette butt waste cleanup. They will be working on behalf of the (ORGANIZATION NAME), whose goals are to reduce the environmental impacts of discarded cigarette butts on our campus.

Last year, according to 2011 The Tax Burden on Tobacco report, Americans purchased more than 287 billion cigarettes. A vast number of those cigarette butts, including the filters, will be flicked into the environment, landing along waterways, parks, beaches and public roads.

In observance of Earth Day on April 22, (INSERT ORGANIZATION NAME) is working to raise awareness about the negative impact cigarette filters and discarded cigarette butts have on the environment. Cigarette butts contain heavy metals that can leach into waterways, posing a lethal threat to aquatic life. They are costly to local communities and to our campus to clean up and dispose of, as well.

According to environmental cleanup reports, nearly 2 million cigarettes or cigarette filters/butts were picked up internationally from beaches and inland waterways as part of the annual International Coastal Cleanup (ICC) in 2010, including more than 1 million from the United States alone. Cigarette butts account for more than three-times the number of any other item found over the past 25 years of ICC cleanups. Research shows that cigarette butts have potentially toxic effects on ecosystems. In one laboratory test, just one cigarette butt soaked in a liter of water was lethal to half of the fish exposed.

Cigarette butts are made mostly of plastic, which can take years to decompose in the marine environment into smaller pieces. While a majority of the respondents surveyed nationally (78 percent) know that cigarette butts are not typically biodegradable and recognize their toxicity (89 percent), tobacco products are still the most-prevalent type of litter collected along U.S. roadways and on beaches. These toxic pieces of trash are only biodegradable under ideal conditions **and in —real worldll conditions**, they merely break up into small particles of plastic.

Cigarette filters/butts have become the last socially acceptable form of littering in the increasingly health and environmentally conscious world. There are a few things that you can do to help raise awareness about this toxic problem:

- Participate in local cleanup events like this one!
- If you see cigarette butt litter, please take a photo and upload it to the Marine Debris tracker: <http://www.marinedebris.engr.uga.edu/>
- Read more information on the environmental impact of cigarettes visit: www.legacyforhealth.org/environment.

Sample Cleanup Event Flyer



SATURDAY

March 10

BUTT CLEAN UP

LETS KICK BUTTS OFF OUR CAMPUS!

Join us on Saturday March 10 for a campus-wide clean up event. Cigarette butts are toxic to people, animals and the environment. These butts are the #1 item littered on our campus! Meet us at the Student Center at 10am and help us advocate for a campus free of tobacco!

Please contact John Smith for more information at _____.

Kick Butts off Campus Annual Cigarette Butt cleanup

Sponsored by (ORG NAME)

A campus wide cigarette butt cleanup will be held on (DATE) starting (WHERE). All (school name) students, faculty, alumni, and community members are invited!

Cigarettes are the most-common item picked up globally. They affect our communities, our parks and beaches, and even our campus. Help prevent these sources of contamination from entering our waterways and the environment as we host our annual cigarette butt cleanup on campus. Help support actions to have our campus become smoke-free.

(Meeting place)

(DATE and TIME)

To RSVP or for more information about the event please contact:

(Name)
(email)
(Address)
(phone)

Sample TPW Campus Cleanup Liability Waiver Form

Campus Cigarette Butt Cleanup Liability Form

{DATE}

ASSUMPTION AND ACKNOWLEDGMENT OF RISKS AND RELEASE OF LIABILITY AGREEMENT

NOTICE: This release form is a contract with legal consequence and applies to the (COLLEGE and YOUR ORGANIZATION (if you have a name) Cigarette Butt Cleanup.)
Read carefully before signing.

Acknowledgement of Risks: I acknowledge risks associated with the cleanup include, but are not restricted to: exposure to toxic chemicals that may be hazardous to your health.

Express Assumption of Risks and Responsibility. I assume responsibility for all the risks associated with the cleanup event. My participation in the activity is purely voluntary. I assume full responsibility for myself and of any of my minor children for whom I am responsible, for any injuries, loss of personal property and expenses thereof, as a result of any accident which may occur.

Loss of Volunteer Personal Property: I hereby release (COLLEGE and YOUR ORGANIZATION) and its partners, in which this cleanup takes place from liability, for any loss or damage of personal property while participating in the cleanup event.

Release: I hereby release (COLLEGE and YOUR ORGANIZATION) and its partners in which this cleanup takes place, FROM ANY AND ALL LIABILITY OF ANY NATURE FOR ANY AND ALL INJURY OR DAMAGE, as a result of my participation in the cleanup.

Photo and Media Release: I give to the (COLLEGE/ORGANIZATION), its designees and agents, unlimited permission to use, publish and republish in any form or media, and reproductions of my likeness (photographic or otherwise) with or without identification of me by name.

I have read this Assumption and Acknowledgement of Risks and Release of Liability Agreement. I understand that by signing this document, I am waiving valuable legal rights including any and all right I may have against (COLLEGE) in which the cleanup takes place.

Sample TPW Research Protocol

Research Title: Businesses and Product Stewardship on Cigarette Butt Waste

Statement of Purpose and Background: The purpose of this research is to better understand businesses' and employers' attitudes towards cigarette butt waste in order to aid policy development. Cigarette butt waste has met the criteria for toxic waste (Slaughter 2011). Yet an extremely large percentage of cigarette butts are not disposed of properly (Schneider 2011). Well-designed policies to reduce butt waste can help reduce butt waste in the environment (Novotny 2009). However, these policies will only be successful if they account for the attitudes of businesses towards cigarette butt waste control. This study will expand our understanding of both the perceived barriers and the opportunities to control cigarette butt waste in our communities.

Subject Characteristics: Key informants for this study will be conducted by [INSERT NAME HERE] and his/her team of researchers being funded through the [INSERT FUNDING SOURCE NAME HERE]. The interviews will be conducted in [INSERT NAME(S) OF AREA(S) HERE]. The interviewees will be:

1. Adults (over 18 years old)
2. Male and Female
3. Business association leaders (preferred)
4. County department of environmental or public health employees
5. Restaurant and bar owners
6. Owners and employees of convenience stores

Selection Criteria: The selection of subjects for this research will be limited to individuals who could have an impact on business generated cigarette butt waste. County environmental and public health departments can share information on current, or potential, policies for monitoring or regulating cigarette butt waste at the businesses under their jurisdiction. Owners and employees of convenience stores, restaurants, and bars can provide information about opportunities and obstacles to controlling cigarette butt waste near their businesses.

Recruitment Methods: Referrals from key informants, online research for key business leaders, and snowball sampling.

Informed Consent Process: All potential interviewees will be asked to participate in a short interview about tobacco waste near their place of business. If the potential interviewee declines to participate any attempt to recruit them will end. If they agree to be interviewed they will be told the basics of the interview, assured of anonymity, and provided with an informed consent document. They will also be told who will be interviewing them and given the contact information for that person and the principal investigator who they may contact with any additional questions or concerns.

Permission: No permissions beyond consent of the subject to be interviewed are needed for data collection for this research.

Research Design: Two groups of people associated with businesses that generate tobacco waste will be interviewed. The first group is key informants who include people in leadership positions in business associations. The second group will be the employees

and owners of convenience stores, bars, and restaurants. The qualitative data gathered in these interviews will be analyzed to better understand businesses' perceptions of and actions towards tobacco waste mitigation that might be their responsibility.

Hypothesis: Business owners will perceive tobacco waste as outside of their responsibilities and will not associate smoking and littering behavior of their employees or customers with their management responsibilities.

Questions to be answered:

- Do they perceive of cigarette butts as toxic waste?
- Who should be responsible for cleaning up cigarette butts?
- Are they currently doing anything to cleanup or prevent deposition of cigarette butts?
- What actions do they believe would be effective in reducing cigarette butt waste?
- What actions could they take to reduce cigarette butt waste?
- Are they interested in partnering with the Toxic Butts project to address cigarette butt waste in the community?

Subject Involvement: Subject involvement will be limited to answering the survey questions during the interview. Interviews should take approximately 15 minutes to complete. The surveys will be recorded via digital voice recorder and later transcribed. No other special procedures will be used involving the subjects.

Study Location: The study will take place [INSERT NAME(S) HERE]. Data collection will take place in the subject's usual place of work during their usual working hours. Interviews will be conducted during times that are appropriate to the subject's work schedule and approved by the subject.

Potential Problems: Potential problems may include difficulty in scheduling interviews with owners or employees. It is likely that people who have a stronger interest in controlling tobacco waste will be more likely to consent to an interview, while people who do not perceive it as a problem will be less likely to be interviewed.

Potential Benefits: Potential benefits may include increased knowledge about best management practices for controlling tobacco waste.

Risks Identification, Assessment and Management: Any risks involved with this research will be very minimal. The only requirement of the subjects will be to answer questions during the interview process. There will be no physical risk or harm associated with this research. In addition, there will be no risks anticipated that could be associated with legal, social, or economic harm. All information collected will be anonymous. There will be no psychological harm to subjects simply due to invoking feelings about their responsibility for tobacco waste.

Confidentiality: To maintain confidentiality all data collected will be anonymous. All collected data will be coded and stored with the principal investigator. No personal information will be linked to the subjects' responses.

Costs: Subjects will not incur any costs by participating in the study.

Compensation and Incentives: No compensation or incentive will be offered to participants.

Investigator Experience: [INSERT INFORMATION HERE]

Conflict of Interest: There is no conflict of interest or financial interests of the investigator.

References:

Novotny TE, Lum K, Smith E, *et al.* Cigarette butts and the case for an environmental policy on hazardous cigarette waste. *Int J Environ Res Public Health.* 2009;**6**:1691-705

Schneider JE, Peterson NA, Kiss N, *et al.* Tobacco liter costs and public policy: a framework and methodology for considering the use of fees to offset abatement costs. *Tobacco Control* 2011;20(Suppl 1):i36-i41.

Slaughter E, Gersberg RM, Watanabe K, *et al.* Toxicity of cigarette butts and their chemical components to marine and freshwater fish. *Tobacco Control* 2011;20(Suppl 1):i24-i29.

APPENDIX:

A How-to Guide for Using a Geographic Information System Tool

This step-by-step guide on the use of a geographic information system (GIS) model will help assess the tobacco butt waste burden in communities. The model can be adapted to any size community. The information generated can help advocate for stronger tobacco control policies.

Introduction

A GIS model lets us visualize, analyze, interpret, and understand site-specific data to reveal relationships, patterns, and trends in disease burdens or environmental problems. GIS tools can be used to help address cigarette butt and other tobacco-waste in urban communities. To help determine the costs of cleaning up cigarette butt waste in the urban environment, GIS can be used to determine where such waste is concentrated. Since tobacco waste is not uniformly distributed in the urban environment, we can use GIS to identify and map locations where larger amounts of tobacco waste are likely to be found and where intervention efforts may be directed.

The distribution of tobacco waste depends on several factors:

- Density of locations where cigarettes may be purchased.
- Density of locations where cigarettes may be consumed.
- Smoking prevalence and littering practices in certain communities.
- Physical aspects of the environment that trap cigarette butts such as cracked and broken sidewalks, untended underbrush, and alleyways.
- Community cleanup activities that may include cigarette butts.

Once identified, specific areas of high cigarette butt waste concentrations can be targeted for interventions and monitoring and evaluation (M&E) of mitigation programs. This model is designed to be used by those already somewhat proficient in the use of GIS tools. It will incorporate community-specific data sources in order to meet the needs of each individual project or community. While the simplest way to use this tool is at the zip code level, it is possible to modify it for different geographic levels such as census tracts or blocks and perhaps even 'Health Vulnerability' areas.

This guide will cover the following **five stages** of the GIS tool:

1. **Assessing goals and planning**
2. **Building a database**
3. **Creating point maps**
4. **Producing weighted overlay maps**
5. **Conducting cigarette butt waste surveys**

The data used for the example in this guide were retrieved from the California Department of Public Health Nutrition Network Viewer and the California Department of Alcoholic Beverage Control's website of liquor distributors. For area or zip code/census tract level comparisons, data are derived from the US Census Bureau website, *American Factfinder*.

Stage 1: Assessing Goals and Planning

This GIS model can be flexible and used according to a project's goals and needs. The following questions may guide you through the assessment and planning process and help you decide how best to use this tool:

1. How will the results of this project be used to support/guide my organization's work?
2. How many of the stages of this model do we need to complete to support our goals?
3. Which parts of this model do we have the technical capacity and time to undertake?
4. How will we disseminate the results from this analysis?
5. Who is the audience?

Larger target areas (e.g., states or counties) involve use of more complex databases and will be more time-consuming in terms of analyses. However, data sources for smaller areas (e.g. neighborhoods), will be more difficult to find. It will be important to balance project goals with the amount of work necessary to implement the GIS model.

Stage 2: Building a Database

This stage has two Steps:

1. **Building a database** of venues where tobacco waste may be concentrated.
2. **Comparing and ranking geographic areas** for butt waste burdens across different communities. (Optional)

In this part, you will build a database for all zip code, census tract, or other selected area variables that may be linked to locations where high concentrations of tobacco waste are found. During Stage one, the area(s) to be examined in the model should be selected. If only one zip code or area is to be examined, ranking the target areas is not necessary. The venue variables of interest are:

- 1) Bars
- 2) Convenience stores
- 3) Grocery stores
- 4) Restaurants
- 5) Gas stations
- 6) Traffic signals
- 7) Bus stops

The **first four** venue variables (bars, convenience stores, grocery stores, and restaurants) can be obtained online from the California Nutrition Network (CNN) Viewer and the California Department of Alcoholic Beverage Control (ABC) websites. To obtain these data, proceed as follows:

- 1) First, go to the CNN website (<http://www.cnngis.org/viewer.aspx>). Instructions on how to download the data from the site can be found at http://www.cnngis.org/Tutorial/TUTORIAL_V04.pdf.
- 2) **Under the –layer List on the right hand side, click on –Retail Food Channels by zip code and then download data from these categories (venues):**
 - a. General grocery;
 - b. Convenience group;
 - c. Single category and other;
 - d. Restaurants;
 - e. Fast food, pizza, sandwiches;
 - f. Other eating place.
- 3) Next, go to the ABC website (<http://www.abc.ca.gov/datport/SubscrMenu.asp>); on **the –license Query System – Reports page, select –Ad-Hoc reports (select the appropriate geographical areas for your specific project) and then select –Active Retail Licenses (On-Sale and Off-Sale).** A table with locations for your selected area(s) will be generated.
- 4) Combine the data from the CNN and ABC websites into a database using a spreadsheet (such as *MS Excel*) that can be geocoded (i.e., labeled in terms that a GIS program such as *ARC GIS* can understand – such as latitude and longitude). Be sure to use the same level of data for each analysis (i.e., zip code or census tract).
NOTE: These files will need to be cleaned so that each file only represents data from the geographic area of interest and so that duplicate records are removed. To identify duplicate records, sort by address and delete duplicate addresses from the database.
- 5) Access to the **last three** venue variables (gas stations, traffic signals, and bus stops) varies by city, county, or state. If you do not already have access to these variables, check to see if the city or county makes them publicly available. While including as many venues as possible in your model will return a more robust set of results, working with only the first four venue variables will still yield very useful information. A good example of a countywide database for the last three venue variables can be found at www.sangis.org (Figure 1).
NOTE: If you identify a list of gas stations, make sure to check for duplicate records against the CNN –convenience group venues and ABC data on liquor outlets.

Figure 1. Example of map view on the CNN website with appropriate variables selected.

- 6) After the data have been entered into an Excel file (or another database management program) and checked for duplicates, several venue categories may need to be recoded:
 - a. ReCode ~~single category and other,~~ ~~fast food, pizza, sandwiches,~~ and ~~other eating place,~~ to ~~Restaurants;~~
 - b. Recode ABC data into appropriate venue categories (Bars, Convenience group, Restaurant, General Grocery).

Stage 2 (Step 2 Optional) - Comparing and ranking geographic areas

Research shows that for decades, tobacco companies have targeted advertising and sales to minority and low-income communities. In addition, there are a disproportionate number of bars, convenience stores, and tobacco retailers in low-income and minority neighborhoods compared to higher-income and predominately white communities. Thus, we may assume that there will be higher concentrations of tobacco waste in communities where tobacco sales and convenience stores are more common. This step will allow a comparison of zip codes or census tracts according to a vulnerability score that can predict areas with higher overall butt waste burdens. An example is provided for a zip code-based comparison in San Francisco. Such comparisons may guide area-specific policy interventions against tobacco waste based on the results of the GIS model. To develop comparison models:

- 1) First, identify all of the zip codes or census tracts that are within the boundaries of the area of interest (city, county, state). NOTE: Check to see if the city or county has a list of zip codes that fall within its boundaries or if the jurisdiction websites provide publicly accessible *ESRI Shapefiles* that contain zip code or census tract files. Additionally, US Census Bureau data usually bundle zip codes by city and county.
- 2) Next, build the ranking table for zip codes or census tracts. The variables for this **example are adapted from the Environmental Protection Agency's Toolkit for Assessing Allegations of Environmental Injustice** (<http://www.epa.gov/environmentaljustice/resources/policy/ej-toolkit.pdf>). You may choose to use a different set of variables based on your project objectives, but it is important to provide a rationale for specific variables that are selected. From the census website *American Factfinder* (<http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml>), find and download the following variables for all zip codes or census tracts within the area of interest:
 - a. Percent of population below federal poverty level;
 - b. Percent of population identified as non-white minority;
 - c. Percent of population ≥ 25 years old without a high school diploma;
 - d. Percent of population with limited English proficiency.NOTE: Some cleaning will be necessary to obtain calculate percentages for some variables.

- 3) To rank the zip codes or census tracts:
- a. Sort by percentage. For each of the four variables, sort from highest to lowest percentage, keeping each zip code or census tract attached to the variable.
 - b. Create a RANK column. In a new column, rank the zip codes or census tracts in based on their percentages for the all variables **except** *percent of population identified as non-white*. If you have 25 zip codes or census tracts **the one with the lowest percentage will be given a -11 and the zip code with the highest percentage will receive a -25.** For the variable *percent of population identified as non-white*, rank the lowest percentage as -25 and the highest percentage as -1. (See Table 1 for example.)
 - c. Keeping each zip code attached to its variable and rankings, do another sort by zip code or census tract from highest to lowest. Each variable should now be ordered by its zip code or census tract, and the zip codes or census tracts should be the same across the columns.
 - d. Calculate the sum of the RANK columns. Across columns add the ranking numbers together. For example, the four individual rank scores for each variable for zip code -XYZI will be added together to obtain XYZ's final rank score.
 - e. Sort by final ranked scores, keeping the zip codes or census tracts attached.
 - f. Select the zip codes or census tracts with the five lowest numbers as the Lower Vulnerability (LV) areas and the five zip codes or census tracts with the highest final ranked score as the Greater Vulnerability (GV) areas. (See Table 1.)

Table 1. TPW Vulnerability Rankings by Zip Code, San Francisco.

Zip codes with their associated percentages and ranks										LV = Green GV = Red	
Zip	% poverty	poverty Rank	% minority	minority Rank	% not HS grad	not HS grad Rank	% limited English	limited English Rank	Sum of Ranks	Sorted Sum of Ranks	Zip
94104	35.2	18	24.2	16	60.2	18	55.7	18	70	8	94123
94107	15.7	13	63.8	8	12	7	7.5	7	35	13	94114
94108	16.1	14	35.9	14	36.9	17	34.4	17	62	19	94131
94109	12.3	11	62.3	9	15.4	10	13.2	9	39	21	94129
94111	8.5	7	64.2	7	12.7	8	12.4	8	30	23	94117
94112	8.1	6	24.9	15	29.5	13	19.2	14	48	27	94130
94114	6.5	4	85.6	2	4.6	4	1.8	3	13	30	94111
94116	6.2	3	41.7	12	17.8	12	14.5	10	37	35	94107
94117	10.5	9	74.4	4	6.1	5	2.5	5	23	37	94116
94121	7	5	48.4	10	16.2	11	15.3	13	39	39	94109
94122	8.9	8	46.6	11	15.3	9	14.5	11	39	39	94121
94123	3.6	1	87.2	1	3.7	2	2.1	4	8	39	94122
94124	21.7	16	6.5	18	36.4	16	14.9	12	62	48	94112
94129	17.3	15	79.3	3	0.8	1	1.5	2	21	55	94133
94130	26.3	17	68.8	6	4.3	3	1	1	27	57	94134
94131	5.1	2	71.2	5	7.4	6	3.3	6	19	62	94108
94133	14.3	12	39.3	13	34.2	14	31.7	16	55	62	94124
94134	11.1	10	15.3	17	36.3	15	21.6	15	57	70	94104

Stage 3: Creating Point Maps

Geocoding the data from Stage 2 and creating point maps from the resulting Shapefiles can be done using a variety of software programs. ArcMap software² is commonly used in county health departments, but a free online option is ArcGIS Explorer (<http://www.esri.com/software/arcgis/explorer>).

Stage 3, Step 1. Geocode your data

- 1) First, for each zip code, geocode the street addresses from the databases that you created in Stage 2, above.
- 2) All of the variables derived from the CNN and ABC online sources can then be put in one Shapefile for each zip code or census tract.
- 3) Bus stops, traffic signals, and gas stations should remain in separate Shapefiles because these three variables may already come in Shapefiles from the city or county of interest. However, it may be necessary to adjust their projections at different points in the GIS model development.

Stage 3, Step 2. Create a point map

- 1) First, adjust mapping symbology to represent the different venue variables;
- 2) Second, insert a legend, scale bar, and a label for the zip code or census tract to be displayed in the map;
- 3) Third, if the point maps of the data by zip code are the final product, be sure to insert additional appropriate information such as data sources, name and contact information for the person who prepared the maps, and the date the maps were produced.

Stage 3, Step 3: Reclassify the raster files using the "Reclassify" tool.

Reclassifying the raster files creates a common scale among them, making it possible to combine them for analysis in the Weighted Overlay tool. The Reclassify tool will automatically create 10 value levels. **However, be sure to select —Reverse New Values** so that the locations closest to the cigarette butt venue variables are given a higher score than locations further away.

Stage 4: Produce weighted overlay maps.

- 1) Set **—% Influence**. As discussed in Stage Two (database construction), it may not be possible to obtain gas station, traffic signal, or bus stop data for the zip code or census tract under consideration. **The —% Influence values vary according to the venue variables you are able to obtain.** Therefore, you may be working with a model that contains all 7 data categories or only the 4 key data categories. Thus, **the —% Influence values will need to vary according to the venue variables you are able to obtain.** Based on current tobacco waste field research, a table of influence (%) values has been developed (Table 2) for use in building the weighted overlay model. Use this table to set your values by finding the column, which contains the venue variables with which you are working.
- 2) The Weighted Overlay Model will then produce a map showing areas at which greater and lesser concentrations of tobacco waste are likely to be found (Figure 4.).
 - a. In general, only the highest concentration venues will be of interest for interventions. Therefore, color scheme and number of values displayed may be adjusted in the symbology dialogue box.
 - b. Label the maps as discussed in the point map section (legend, data sources, etc.).

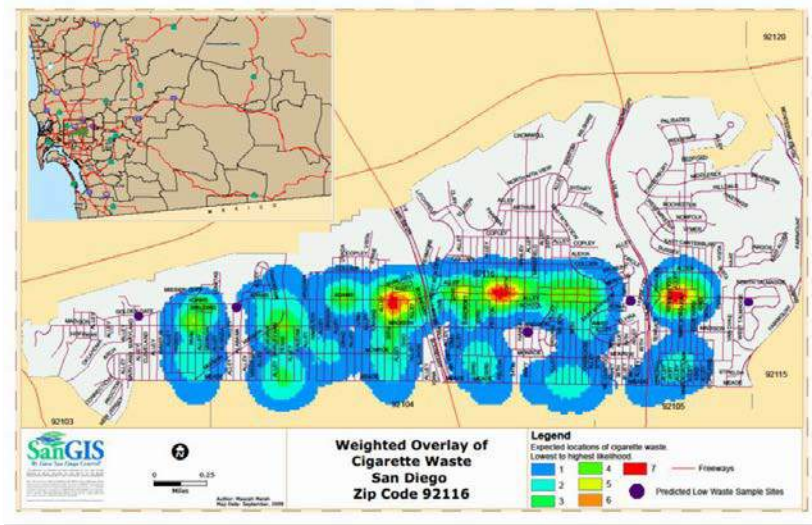


Figure 3: Weighted overlay map

Table 2. Weighting levels for % Influence for the Range of Possible Venue Variable Combinations

Variable	% Influence	% Influence	% Influence	% Influence	% Influence	% Influence	% Influence	% Influence
Bars	20	20	20	20	20	25	25	25
Convenience	25	25	25	25	30	30	30	30
Grocery	15	20	20	20	20	25	25	25
Restaurants	10	15	10	10	10	10	10	20
Gas Stations	20	n/a	20	20	20	n/a	n/a	n/a
Bus Stops	5	10	n/a	5	n/a	10	n/a	n/a
Traffic Signals	5	10	5	n/a	n/a	n/a	10	n/a

NOTE: The weights above have been developed as a result of field observations only, not validated with quantitative methods. The weights in each cell vary according to venues included in that column. All columns must add to 100 percent.

Stage 5: Conducting Tobacco Product Waste Surveys

In this stage, the number of cigarette butts found at predicted high or low tobacco waste sites are physically counted is an optional step; however, it will validate the model developed and assist in identifying locations being selected for targeted interventions.

Stage 5, Step 1: Identifying sample locations

- 1) Number of sampling sites. An equal number of high- and low-tobacco waste concentration sampling areas should be randomly selected in each zip code (or census tract, etc.). For example, if doing a full-city survey of 10 zip codes (5 GV and 5 LV), five high and five low tobacco waste sampling sites should be selected in each, for a total of 100 individual sampling sites. If sampling only one zip code it is best to sample as many points as possible. Theoretically, a sample size calculation should be done to assure sufficient numbers of sampling sites to be able to differentiate community butt waste burdens by zip code or census tract. However, for this exercise, the tobacco waste counts are used to validate the weighted overlay model and not to determine differences in zip code concentrations. For simplicity's sake, however, we recommend at least five predicted low-burden sites and five predicted high-burden sites be sampled in each area to be assessed.
- 2) Identifying sampling sites. Use the weighted overlay maps to identify high and low butt waste sample locations.

In Figure 4, the high-waste values have been labeled —most cigarette butt waste to —least cigarette butt waste. (See legend on weighted overlay map to match terms to images.) In some zip codes, the weighted overlay map will not yield five clear high or low waste sites; therefore the following algorithm is suggested:

- a. Enumerate and then randomly choose five sites in the weighted overlay map in the highest ranked areas. Choose as many high waste sample sites as possible, in descending order of density if needed (i.e., if there are not enough in the —most tobacco wastell categories).
- b. Enumerate and then randomly choose the five sites in the —least cigarette butt wastell categories, and if insufficient number in that single category, chose more from higher ranked areas. In Figure 4, low waste sample sites would be chosen from the areas colored white or green.

Stage 5, Step 2: Analyzing the data/testing the Model

- 1) Reporting on the results of cigarette butt counts should be more than just enumeration of butts counted. If multiple zip codes or census tracks are sampled, statistical analyses may be possible to compare of the mean butt counts in each zip

code or census track. If only one zip code or census track is surveyed, a comparison of the means for high and low waste sites may be useful. However, collecting some qualitative information may also be helpful; this information can include photos of —worst sites, **and documentation of the presence of nearby —no smoking signs or tobacco waste receptacles, and observations of smokers’ littering behavior.**

- 2) This tool was tested in San Diego and San Francisco, California, and demonstrated reasonable correlations between actual cigarette butt counts and predictions of higher or lesser cigarette butt waste concentrations. The tool was tested in 20 different zip codes with over 200 unique sample sites.
- 3) In each city, all zip codes were also assigned a vulnerability ranking (see Stage Two above). The five zip codes ranked as being most vulnerable according to the variables shown in Table 1 were designated as Greater Vulnerability (GV) while the five zip codes ranked as being least vulnerable were designated as Lower Vulnerability (LV). These variables were **then used to test this model’s strength** in predicting tobacco waste concentrations and their associations with GV or LV zip codes. The model accurately predicted tobacco waste concentrations according to these vulnerability categories (Table 3).

Table 3. Predicted tobacco waste concentrations according to zip code vulnerability categories, San Francisco

	Zip codes with greater vulnerability (GV)	Zip codes with lower vulnerability (LV)	Significance (t-test)
High predicted amount of butt waste	Mean # cigarette butts 79	Mean # butts 38	p<0.001* (difference in mean cigarette butt counts in high tobacco waste sites between GV & LV zip codes)
Low predicted amount of butt waste	Mean # cigarette butts 15	Mean # cigarette butts 6	p<0.001* (difference in mean cigarette butt counts between in low waste sites between GV& LV zip codes)
Significance (t-test)	p<0.001* (difference in mean cigarette butt counts between high and low waste sites in GHV communities)	p<0.001* (difference in mean cigarette butt counts between high and low waste sites in LHV communities)	

*there is less than a 0.1% probability that the difference between the two types of sites is the result of random chance, and a 99.99% chance that the two types are indeed different.