

# **A SOCIAL MARKETING APPROACH TO URBAN STORMWATER MANAGEMENT: A Case Study on Leaf Litter Collection in Anne Arundel County, MD**

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## **Introduction**

It has long been established that Chesapeake Bay watershed residents are concerned about the Bay's health, and yet they continue to behave in ways harmful to the Bay and its tributaries (McClafferty 2001; Raabe 2011). How might organizations in the watershed address the fissure between concern and action to galvanize behavioral change? The answer is social marketing. Social marketing is a process that maximizes behavior change in a priority audience. Although the process includes elements of marketing and social science, it differs from traditional marketing in that it seeks to improve social well-being rather than simply financial gain.

## **Background**

In 2011 and 2012, the Chesapeake Bay Trust (Trust) worked with a group of graduate students from the University of Michigan to assess the types of outreach programs underway in the Chesapeake Bay watershed. This study demonstrated that the majority of Trust grantees seek to motivate individuals to protect the Bay (97%) and that a significant percentage of program leaders (62%) seek to measurably change behavior in a given target audience as a primary goal of their existing outreach work. The study also sought to quantify the extent to which social science frameworks or social science tools were being employed to achieve behavioral change goals. The Michigan team's research uncovered two key points among others: (1) several Chesapeake Bay organizations are already using social

science tools to tackle known barriers to behavior change and (2) most organizations are applying these tools separately of a social science framework such as social marketing (Kelly et al. 2012). These two outcomes are positive for the Bay community as it means that there is a foundation for social science application, and there is room to improve behavior-change efforts through increased application of social science processes. The challenge for the Bay community, however, will be tackling barriers to the acceptance and use of social science frameworks, including social marketing. Although many organizations are learning to listen to the desires of their priority audiences before building outreach programs, this is sometimes challenging given the passion of program developers for immediate engagement and limited staffing capacity of many non-profit organizations and government programs to invest in research. Consequently, concentrating on the audience and its needs instead of what is “right” has been a challenge. Starting from the audience’s perspective requires that new forms of research and participatory processes be implemented and that evaluation of program strategies be integrated more fully into the programmatic process.

The social marketing framework encompasses many different theories of change; one such theory is Everett Rogers’ Diffusion of Innovations model (Figure 1), which states that there are consistently several categories of people in a given target audience who will adopt new products and/or behaviors at different times. These categories include: innovators and early adopters then early majority and late majority); and finally laggards. Lee (2014) refers to these categories as the “show me”, “help me” and “make me” groups that have a similar distribution to Everett’s model shown in Figure 1.

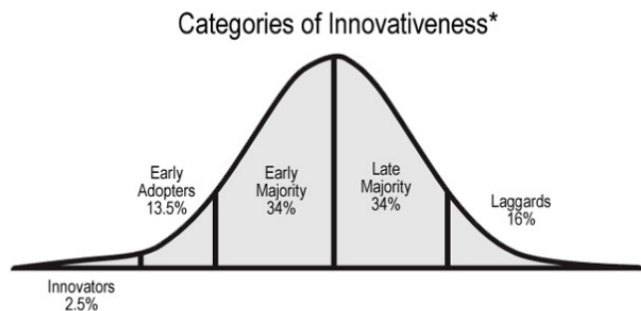


Figure 1. Categories of innovativeness. Source: Rogers (2003)

These categories of individuals (also known as segments) can frequently be found to have consistent motives, some of which are evident in the category names. For example, innovators are often motivated by a need to be different than the majority of the population

(Kotler and Roberto 1989). One of the key implications of this model for behavior-change efforts is that a social marketer would start by targeting the innovators and early adopters and, once that effort was successful, then move on to the early majority and late majority. Once these groups have adopted the targeted behavior, the “make me” group is outnumbered and will follow suit (Kotler and Lee 2011). This approach is contrary to many environmental professionals’ beliefs that it is imperative to change the behavior of the most resistant segment first. Additionally, it is important to note that the “show me” group requires little investment of time and resources to successfully change behavior; often times all that is needed for this group to change its behavior is an increased level of knowledge. Different from the “show me” group, however, is the “help me” group, which often requires a more robust set of strategies that move beyond knowledge building efforts. To affect change in the “help me” group (which composes the majority of the target audience, 68%), social marketers must work to understand their audiences’ perceptions so that they might arrive at new insights that can inform program strategies; this frequently means the development of new products and services. During the past 30 years, the Chesapeake Bay community has already invested a significant amount of time and energy in the education of the “show me” group, which has produced positive results in some cases; however, to reach the majority, it is likely time to shift limited resources to focus on the “help me” groups, which require more than education to change their behavior.

Although many variations of the social marketing framework exist, there is a core process that remains consistent among them. The process includes: informed behavior selection; audience segmentation; audience research (often referred to as formative research, undertaken to identify audience perceptions, beliefs, and values); program development; piloting; implementation; and evaluation. This process is not only a behavior-change framework but should also be considered a systematic management process for the strategic allocation of resources to address large-scale social problems (Lefebvre 2013), a model for scaling up effective programs (Lefebvre 2011), and a method for replicating and disseminating evidence-based interventions (Dearing, Maibach, and Buller 2006; Harris et al. 2012). This is of particular importance when considering the breadth of current stormwater management problems and their associated costs. For example, a

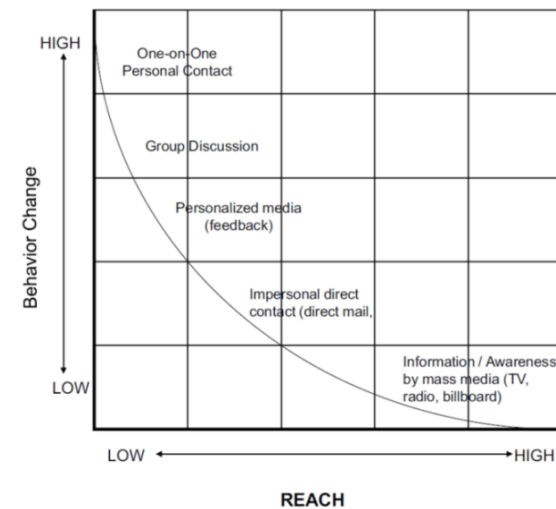
single bio-retention cell can cost upwards of \$50,000 or more for design, permitting, and implementation—a hefty price tag for a single best management practice (BMP). Given the expected nutrient load reduction from a single bio-retention, however, this BMP may be an enticing endeavor for a community. Although many BMPs currently being implemented have significant associated costs associated, there are other BMPs that in aggregate can yield substantial impacts on nutrient and sediment reduction with less financial input. The social marketing framework lends itself well to a high return on investment, particularly because the framework incorporates formative evaluation throughout the process. Though behavior-change programs still require inputs of time and money, changing certain individual behaviors can be accomplished at a relatively low cost in exchange for a potentially high impact to the resource.

As counties regulated by the National Pollutant Discharge Elimination System Municipal Separate Storm Sewer System permits work to address stormwater on both private and public property, it will be imperative to engage watershed residents in the process. Engaging residents will be vital not just because minimum control measures of their permits require it, but because a vast majority of land in the watershed is held in private ownership. Social marketing can play a key role in engaging watershed residents to implement BMPs on privately held land and can do so by facilitating value for individuals' participation, integrating insights from the people the Bay Community seeks to serve, and changing the landscape in which people make stormwater management decisions. Although the framework is fairly new to the majority of non-profits working in the watershed, many groups are already working to apply social science frameworks to increase BMP adoption. To date, the Trust has supported social marketing efforts that seek to encourage rain garden and rain barrel installation, conservation landscaping, septic system upgrades, pet-waste management, demarketing of litter and fertilizer use, and tree planting, among others. One such effort is the Anne Arundel Watershed Stewards Academy's (WSA) incorporation of community-based social marketing into its training curriculum; a description of its most recent effort, a behavior-change campaign to address leaf litter in storm drains, follows.

## A Case Study on Social Marketing for Residential Leaf Litter Collection

The Anne Arundel Watershed Stewards Academy (WSA) is a non-profit organization whose mission is to inspire and facilitate community-level change that positively impacts the rivers in Anne Arundel County and beyond. The primary means of achieving this mission is through the training and support of Master Watershed Stewards (Stewards), community leaders who educate and engage their communities in small- and medium-scale stormwater restoration projects, such as rain gardens and tree buffers, and facilitate behavior changes, including proper pet waste disposal and lawn care. In 2013, the 130 Stewards in Anne Arundel County collectively installed more than 400,000 square feet of restoration, engaged more than 800 volunteers in action to clean waterways, and provided outreach and education to almost 9,000 citizens.

For several years, WSA has trained Stewards to use the principles of social marketing for behavior change in their communities. Armed with the right tools and methods, Stewards are well positioned to implement social marketing because of their extensive personal contact in communities and the position they hold within those communities. Studies show that people most often change their behavior as a result of personal conversations with someone they know, like, and view as an expert (Shultz 2010) (Figure 2). Stewards are not only members of their target audiences with unique insights into the potential barriers, benefits, motivators, and preferred communication channels, but their title of Master Watershed Steward credits them with expertise in the area of waterway pollution and restoration.



**Figure 2. Instance of behavior changes related to outreach method. Source: Schultz (2010).**

The following case study was a collaboration with four Stewards and a grant from the Chesapeake Bay Trust, with significant in-kind technical assistance provided by OpinionWorks. The case study describes the development of a social marketing plan to develop a leaf litter campaign directed toward homeowners in Anne Arundel County, Maryland. This case study is part of WSA's ongoing effort to create social marketing tools for the growing body of Stewards to effect behavior change for clean water.

*Behavior Selection:* The process of social marketing relies on choosing a single end-state behavior that directly results in reduced pollution. Choosing a single behavior is important in that it allows the marketing campaign to focus on the particular barriers and benefits that the target audience associates with that behavior. An "end-state" behavior is helpful in keeping the focus squarely on the goal, which in this case is reduced pollution. For example, the behavior termed "picking up pet waste" often cannot be considered an end-state behavior. If the pet waste is picked up but not properly disposed of (dumped in a ravine or wooded area), it may still become a pollution source. Alternatively, a behavior described as "disposing of pet waste in the trash can" ensures that this contamination does not enter the waterway. In considering several single end-state behaviors, selection may be accomplished by rating the behaviors based on: (1) the probability of effecting significant pollution reduction, (2) the target audience's willingness to participate in the behavior, and (3) the percentage of the target audience that is not already engaged in the behavior.

The behavior selected for the WSA project was for homeowners to remove and properly dispose of leaves that fall onto hard surfaces on and adjacent to private property. This case study began in Ward One of Annapolis, a community in the historic district of Annapolis, Maryland where there is a large percentage of impervious surface with high tree canopy cover. Much of Ward One is in the critical area, draining directly to Spa Creek of the Severn River. Leaf matter clogging storm drain inlets was identified by Anne Arundel County's former Director of Public Works as a contaminant of concern, and a 2013 study by the Center for Watershed Protection affirms this assertion (Stack, Law, and Drescher 2013).

Additionally, the residents of Ward One are focused on the aesthetic appearance of their community, making it likely that they would engage in the desired behavior. The observed prevalence of leaf matter on the sidewalks and streets led to the belief that a majority of residents are not already addressing leaf matter that falls onto hard surfaces adjacent to their own property.

We selected this behavior because it is both *high impact* (this behavior will keep a significant source of nitrogen and toxins from reaching the waterway in this particular geographic location) and *high probability* (this behavior is simple and free for the target audience to implement). Our experience with past behavior campaigns has taught us that simple, concrete behaviors with visible results can be the gateway to engage citizens in more complex or costly stewardship behaviors. The specific behavior selection was based on the observational assessment that a majority of residents are *not* clearing leaves that fall on the curbs and sidewalks, coupled with the high probability that they *would* be willing to engage in this behavior based on the community's focus on aesthetics and community pride.

*Audience Selection:* WSA, in collaboration with four Steward Candidates, identified residents who make decisions about the care of their properties in Ward One as the target audience for this behavior. Selection of this geographic area was based on three factors: (1) the personal connection Stewards have within that community; (2) high canopy cover, coupled with high percentage of impervious surface; and (3) proximity of the waterway, Spa Creek. An initial application of the Center for Watershed Protection's Neighborhood Source Assessment (Wright et al. 2005) identified leaf and debris as a major pollution source. In preliminary conversations with the City of Annapolis about its leaf collection program, WSA discovered that the city ceased use of leaf vacuums two years prior, following consistent use for several years. We theorized that community members may be used to raking their leaves to the street for collection, contributing to the large amount of leaf matter on the sidewalks and curbs.

*Baseline Data Collection:* Forty-one residents from Ward One were surveyed using face-to-face interviews during the winter of 2013. These interviews revealed that more than one-half of the residents view leaves collecting on the street as problematic, primarily due to safety and aesthetics, but 75% had seldom or never cleared leaves from storm drain inlets, and 62% had seldom or never cleared leaves from the street. When asked about whether or not they clear leaves from curbs and sidewalks adjacent to their houses, 63% said that they often engaged in this behavior, indicating a willingness to engage in the target behavior. When asked about whether clearing leaves would make a difference in cleaning up local waterways, 68% said that it would make a big difference. When qualitative data was analyzed from this survey, aesthetics and cleanliness emerged as the clear benefits, along with a sense of neighborliness and duty. The major barrier was a perception that the leaves are the responsibility of the City of Annapolis to remove. Most people surveyed were over 55 years old, and the local newspaper, *The Capital*, emerged as the most relevant news outlet. There is also a Ward One e-mail listserv. About 26% of interviewees considered the neighborhood listserv as the preferred media outlet.

*Tool Creation and Testing:* Based on the survey results, Communication Visual was contracted to create three sets of tools that could be used with this audience. Messages were collaboratively developed to reflect the key barriers and benefits expressed in the survey by the target audience. The contractor created a magnet prompt, a door hanger communication tool with commitment pledge, and a graphic e-mail header with three different messages: (1) *Increase Your Curb Appeal*, to appeal to the sense of aesthetics, cleanliness, and community responsibility; (2) *Don't Let Your Leaves Go to Waste*, to appeal to the older generation who values thrift and usefulness; and (3) *Bag It, Mulch It, Compost It*, a simple, clear, instructional message.

To test the messages and fine-tune the tools, we conducted two focus groups with eight participants each. The first focus group comprised eight individuals from Ward One, Annapolis. The second focus group was comprised of eight individuals from Ben Oaks, a community in Severna Park, Maryland, about 10 miles away. Ben Oaks is a heavily canopied



community situated directly on the Severn River, but is demographically (comprised primarily of families with children) and environmentally (one-quarter- acre residential lots with much a smaller percentage of impervious surface) very different than Ward One. Because one goal of the behavior-change tool and campaign creation is to develop tools that may be customized and used by Stewards in communities across the county, we thought that it was important to test these tools in two different contexts.

Focus group tests were created by OpinionWorks in collaboration with Communication Visual and WSA. Focus group participants were solicited via Stewards and the Ward One community listserv and were screened and approved by OpinionWorks. Focus groups were recorded and analyzed by Opinion Works with some of the key findings summarized below.

The key barrier emerging from the focus groups was a belief that leaves are natural, and they have been falling in the Bay for eons. Participants wondered how they could possibly be causing pollution. Other barriers included the following: (1) a self-assurance that participants are already doing the right thing with organic matter; (2) the feeling that other people/neighbors are the real cause of the problem; (3) a feeling of insult or embarrassment by implying that participants were not taking proper care of their property; (4) lack of time; (5) a belief that there are many other sources of organic matter and participants' own little contribution will not make a difference with the big problem in the Bay; (6) reports that participants never see organic matter on their streets/sidewalks; (7) comments in Ward One only that the street sweeper comes often and takes care of the problem; and (8) the belief that bagging, especially in plastic bags, does not seem environmentally friendly.

The focus groups identified the following motivations: (1) a sense of personal responsibility; (2) removal of a slipping hazard/legal liability; (3) a sense of pride and good taste in their property; (4) stepping up and leading the way (i.e.,

leading by example); (5) a desire to keep things neat and clean; (6) understanding the nutrient impact in waterways; and (8) the impact of learning how much of the neighborhood/county is impervious.

*Materials:* Focus group participants responded most favorably to the “Bag it, Mulch it, Compost it” slogan. It is clear, concise, and tells them what actions to take. To improve it, participants in both groups wanted to add a “why” statement to the slogan.

“Don’t let your leaves go to waste” had a lukewarm reception, and “Increase your curb appeal” was received coldly. Focus group participants stated that they do not need someone else to affirm that their property has good curb appeal, and they do not believe bagging leaves will increase curb appeal.

In light of the findings of the focus groups, the graphic materials were revised, and a clear and compelling “factoid” was added to the communication tool (Figure 3). The most compelling seemed to be a statistic from Strynchuk et al. (2000) that suggests that wet leaf matter initially uses 200% more oxygen when decomposing in water than on land. After 9 days in the water, leaf matter decomposition can use up to 700% more oxygen than leaves decomposing on land. Most people in the focus group were well aware of aquatic organisms’ need for oxygen and seemed to be aware that oxygen debt was a major concern in the health of their local waterway. We included the reference to this study on the back of the door hanger, along with a brief description of WSA and contact information for the individual Stewards who were involved in this project.

To emphasize the fact that *leaves in the water* are the problem (as opposed to those composted



In the water, decaying leaves use

# 200%

more oxygen than on land.\* This robs oxygen from fish and crabs and causes dead zones in our creek.

## Your leaves in the water aren't natural.

Each year, many tons of leaves from our neighborhoods are blown or washed into local streams. They clog storm drains and release harmful nitrogen into the water. You can help reduce pollution in Spa Creek by raking and bagging, mulching or composting all of the leaves that fall on hard surfaces on and around your property.

**BAG IT.  
MULCH IT.  
COMPOST IT.**



I \_\_\_\_\_  
commit to removing leaves  
from the hard surfaces on  
and around my property

**BAG IT.  
MULCH IT.  
COMPOST IT.**

**Figure 3. Example social marketing leaf litter campaign material.**

on land), we revised the photo on the materials to be a picture of wet, decomposing leaves. For Ward One, we chose the phrase “Your leaves in the water aren’t natural” to further emphasize this point and respond to the skeptics’ view that leaves are natural part of the system and have been for many years. The Ben Oaks group decided to use “Your leaves in the water are harmful” to emphasize leaves as a pollution source.

WSA also added the phrase “Did you know?” to the door hanger to alert people to a potentially new pollutant that they may not have been aware of and make the information more palatable to people who think they already know everything there is to know about water pollution.

In addition to the door hanger with commitment card and magnet, several other tools were developed as part of the social marketing campaign. For example, four e-mail messages were created that built on the key barriers identified in the focus groups. WSA selected email to distribute key social marketing messages as the Ward One community email listserv was identified as a popular source of information. The first message introduced the Ward One Stewards and gave residents an overview of the leaf campaign. The second message built on the barrier of people not recognizing leaves as a pollution source by offering specific scientific studies that link leaf material to pollution. The third e-mail message focused on the barrier that the City of Annapolis is responsible for picking up leaves and the misperception that the city uses a vacuum or street sweeper to vacuum leaves. This message gave correct information about the City of Annapolis’ treatment of leaves and confirmed that there is no longer leaf vacuuming service from the city. Concurrent with this program, the City of Annapolis adopted an ordinance prohibiting leaves to be discarded (swept or blown) into the street. Stewards sent leaf materials to the city to be used in outreach efforts on this topic. The final e-mail included a top 10 list with reasons to keep leaves off of hard surfaces and included leaf removal tips. All messages included an online pledge, Steward contact information, upcoming events at which Stewards would be present, and a link to a coupon for leaf bags. In response to the clear media preference for *The Capital* newspaper, an article was sought and written.

WSA also created an incentive tool by making 200 biodegradable paper leaf bags available for homeowners that were donated by a local hardware store; a coupon for additional bags also was obtained and distributed. This tool addressed the barrier of concern for plastic non bio-degradable bags and those who said they did not have supplies.

## **Testing the Leaf Litter Social Marketing Plan: A Mini Pilot**

Four Stewards in the Ward One group performed a mini pilot that included a combination of four weekly e-mail messages timed for leaf fall and several events to reach people with face-to-face communication and distribution of tools.

The first event was a community canvassing day in which 10 volunteers canvassed homes in Ward One of Annapolis to discuss leaf collection and distribute tools. On this day, the volunteers obtained approximately 67 pledges to keep leaves off hard surfaces. The volunteers left door hangers on residences at which no one was home. Those who took the pledge received a magnet, two leaf bags, and a coupon for additional leaf bags.

In late October, the group presented at the Ward One residents meeting, obtained additional pledges for leaf removal, and distributed tools. In early November, the group held its first annual “All Hallows Leaves” event at St. Anne’s Church in Ward One. This event included educational displays, many personal conversations, and distribution of tools. As of this event, the total pledges exceeded 100.

*Evaluation:* To create an effective evaluation program, the locations of pledges received in Ward One were mapped to determine streets on which there was a concentration of intention to engage in the target behavior. Four test streets with high concentrations of leaf pledges were selected for evaluation, along with four control streets from a different Annapolis community (outside of Ward One) with similar leaf cover and impervious surface. For four consecutive weeks, Stewards evaluated the leaf cover on these streets. In teams of two, they rated two locations on each street for leaf cover on a 1–5 rating scale, in which 1 indicated sidewalk and road pavement that was fully visible and 5 indicated sidewalk and

pavement that was invisible/covered with leaves. Observations were made each Tuesday afternoon in November because leaf pick up in the area was scheduled for Wednesday. The number of bags filled with leaf debris set out on the curb for collection was also noted. Although a slight percentage decrease in leaf coverage was observed in Ward One versus the control streets, the difference was not statistically significant (30% leaf coverage versus 37%). One possible explanation for this is that there were major wind events on each of the four Tuesdays on which observations were made, increasing leaf cover on Ward One streets. Another possible conclusion is that the length of time of the campaign was too brief to measure a behavior change.

During the outreach events, we were able to anecdotally evaluate the response to some of the tools. Overall, the more affluent residents of Ward One did not respond as favorably to free leaf bag, coupon, or magnet as did those in less affluent areas of Ward One. It was also unclear how many people actually read the e-mails that were distributed via the community listserv, but during the canvas event, more than 50% of the people canvassed knew something about the project, indicating that they had probably read it in the e-mail. The most effective tool seemed to be the face-to-face conversations of Stewards with residents. Through these conversations, more than 95% of the residents made a written commitment to clear leaves from hard surfaces on and adjacent to their private property. In spite of the ambiguous observational evaluation, this social marketing campaign was incredibly successful in raising awareness of and the intention to engage in the targeted behavior among residents who received all tools, including (and especially) the personal conversation with a Steward.

The Stewards who participated in this project were very creative, energetic, and thoughtful in their collaboration to create and implement this community-based social marketing program. The time involved for the four Stewards who piloted the program in Ward One was almost 450 hours (more than 100 hours per person). Much of the time invested by the Ward One group was in the development rather than the piloting of the program. Because this project was a requirement of their

Master Watershed Steward certification, there was a great deal of dedication and follow through exhibited by the Stewards. It is clear that for Stewards to successfully implement behavior-change campaigns, more well-developed programs that can be easily adapted after some initial research of the target audience are necessary. The WSA Board of Directors recently completed its first 5-year strategic plan, in which it identified support of Stewards to implement behavior-change campaigns as a key initiative during the next five years. The WSA Board will be looking for ways to increase the support of Stewards to implement behavior change more successfully. As a next step, WSA will be exploring various incentives for Stewards to commit the time for a more extensive pilot of this program across the county.

Although this study provided valuable insights about the specific leaf disposal behavior, the Ward One audience, and the application of social marketing campaigns implemented through highly educated and committed volunteer corps (such as Stewards), additional studies are warranted to increase the efficacy of the campaigns. Future campaigns could test the effectiveness of each tool type or explore various distribution and communication channels. Because the personal conversation seemed to be the most effective means of gaining a behavior commitment, future campaigns could focus on methods to increase the number of personal conversations. Related leaf and yard debris behaviors, motivators, and barriers may also be explored. Many of these residents seemed to indicate that they already collect their leaf debris, but many wanted to explore and understand links to water pollution. Many did not realize that the city no longer vacuumed leaves. In a few areas, organic debris was being dumped in ravines leading to the waterway. Although Stewards tried to discourage this behavior, some residents did not seem to be inclined to alter their behavior based on this conversation. The same occurrence has been noted anecdotally by several Stewards in other parts of the county, leading us to conclude that there is a need for a separate campaign to specifically target this behavior.

Although many organizations and agencies are beginning to implement the principles of social marketing to reduce pollutants entering local waterways in the Chesapeake region, it will be important moving forward to improve evaluation of

these efforts and, where possible, document both the social and environmental impacts of these programs on targeted impairments. To increase the effectiveness of these efforts in applying this unique and cutting-edge BMP, the Chesapeake Bay Trust has created a corps of Technical Assistance Providers (TAPs). In 2013, the Trust selected 19 professionals from the Chesapeake Bay watershed for an intensive social marketing training program delivered by Nancy Lee. These TAPs are available for consultation on the design and implementation of social marketing projects. Please contact Kacey Wetzel at 410-974-2941, extension 104, for more information or a connection to a TAP near you. Additional resources and case studies are available on the Trust website:

[http://www.cbtrust.org/site/c.miJPKXPCJnH/b.5457571/k.50A7/Additional\\_Resources.htm](http://www.cbtrust.org/site/c.miJPKXPCJnH/b.5457571/k.50A7/Additional_Resources.htm)

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## References

*Dearing, J. W., E.W. Maibach, and D.B. Buller. 2006. A convergent diffusion and social marketing approach for disseminating proven approaches to physical activity promotion. American Journal of Preventative Medicine 31: S11–S23.*

*Harris, J. R., A. Cheadle, P. A. Hannon, M. Forehand, P. Lichiello, E. Mahoney, S. Snyder, and J. Yarrow. 2012. A framework for disseminating evidence-based health promotion practices. Preventing Chronic Disease 9:110081. doi: <http://dx.doi.org/10.5888/pcd9.110081>.*

Kelly, M., S. Little, K. Phelps, and C. Roble. 2012. Watershed outreach professionals' behavior change practices, challenges, and needs. *Applied Environmental Education & Communication*, 11:35-52.

Kotler, P. and N. Lee. 2011. *Social marketing: Influencing behaviors for good (fourth ed.)*. Thousand Oaks, CA: SAGE Publications Ltd.

Kotler, P. and E. L. Roberto. 1989. *Social marketing*. New York: The Free Press.

Lee, R. L. 2014. *Introduction to Social Marketing [PowerPoint slides]*. Retrieved from River Network: <http://www.rivernetnetwork.org/resource-library/wcpln-resources>.

Lefebvre, R. C. 2011. *Social models for social marketing: Social diffusion, social networks, social capital, social determinants and social franchising*. In: *The SAGE handbook of social marketing*, ed. G. Hastings, K. Angus, and B. Bryant, 32–43. Thousand Oaks, CA: SAGE Publications Ltd.

Lefebvre, R. C. 2013. *Social marketing and social change: Strategies and tools for improving health, well-being, and the environment*. San Francisco, CA: Jossey-Bass.

McClafferty, J.A. 2001. *A survey of Chesapeake Bay watershed residents: Knowledge, attitudes and behaviors towards Chesapeake Bay watershed water quality issues*. Annapolis, MD: Chesapeake Bay Program.

Raabe, S. 2011. *Memorandum: Marylanders' attitudes about environmental stewardship: Results from our statewide survey*. Retrieved from <http://www.cbtrust.org/atf/cf/%7BEB2A714E-8219-45E8-8C3D-50EBE1847CB8%7D/Survey%20Full%20Summary-FINAL.pdf>.

Rogers, E. M. 2003. *Diffusion of innovations*. New York: Free Press.

Stack, W., N. Law, and S. Drescher. 2013. *Gross solids characterization in the Tred Avon watershed*. Ellicott City, MD: Center for Watershed Protection.

Schultz, P.W. 2010. *Social marketing: A community-based approach*. Presented at the US Environmental Protection Agency Resource Conservation Challenge Web Academy, May 20.



*Strynchuk, J., J. Royal and G. England. 2000. Grass and Leaf Decomposition and Nutrient Release Study Under Wet Conditions. Viera, Florida. Brevard County Surface Water Improvement.*

*Wright, T., C. Swann, K. Cappiella, and T. Schueler. 2005. Urban subwatershed restoration manual series manual 11: Unified subwatershed and site reconnaissance: A user's manual version 2.0. Ellicott City, MD: Center for Watershed Protection.*