Public Education and Outreach on Storm Water Impacts

Regulatory Text

You must implement a public education program to distribute educational materials to the community or conduct equivalent outreach activities about the impacts of storm water discharges on water bodies and the steps that the public can take to reduce pollutants in storm water runoff.

Guidance

You may use storm water educational materials provided by your state; tribe; EPA; environmental, public interest, or trade organizations; or other MS4s. The public education program should inform individuals and households about the steps they can take to reduce storm water pollution, such as ensuring proper septic system maintenance, ensuring the proper use and disposal of landscape and garden chemicals including fertilizers and pesticides, protecting and restoring riparian vegetation, and properly disposing of used motor oil and household hazardous wastes. EPA recommends that the program inform individuals and groups how to become involved in local stream and beach restoration activities, as well as activities that are coordinated by youth service and conservation corps or other citizen groups. EPA recommends that the public education program be tailored, using a mix of locally appropriate strategies, to target specific audiences and communities. Examples of strategies include distributing brochures or fact sheets, sponsoring speaking engagements before community groups, providing public service announcements, implementing educational programs targeted at school age children, and conducting community-based projects such as storm drain stenciling and watershed and beach cleanups. In addition, EPA recommends that some of the materials or outreach programs be directed toward targeted groups of commercial, industrial, and institutional entities likely to have significant storm water impacts. For example, providing information to restaurants on the impact of grease clogging storm drains, and to garages on the impact of oil discharges. You are encouraged to tailor your outreach program to address the viewpoints and concerns of all communities, particularly minority and disadvantaged communities, as well as any special concerns relating to children.

BMP Fact Sheets

Public outreach/education for homeowner

Lawn and garden activities

Water conservation practices for homeowners

Proper disposal of household hazardous wastes

Pet waste management

Trash management

Targeting public outreach/education

Education/outreach for commercial activities

Tailoring outreach programs to minority and disadvantaged communities and children

Classroom education on storm water

Storm water educational materials

Public outreach programs for new development

Low impact development

Pollution prevention programs for existing development

Educational displays, pamphlets, booklets, and utility stuffers

Using the media

Promotional giveaways

Pollution prevention for businesses

Public outreach/education for homeowners

Lawn and Garden Activities

Public Education and Outreach on Storm Water Impacts

Description

A typical composting bin (Source: Alameda County Waste Management Authority, 2001)

Lawn and garden activities can result in contamination of storm water through pesticide, soil, and fertilizer runoff. Proper landscape management, however, can effectively reduce water use and contaminant runoff and enhance the aesthetics of a property. Environmentally friendly landscape management can protect the environment through careful planning and design, routine soil analysis, appropriate plant selection, use of practical turf areas, water use efficiency, use of mulches, and appropriate maintenance.

Additional activities that benefit water resources include maintaining healthy plants and lawns and composting lawn wastes. Healthy plants are less susceptible to diseases and insects and therefore require minimal use of pest control measures. To promote healthy plants, it is often beneficial to till composted material into the soil. Recycling of garden wastes by composting is also effective at reducing waste, although compost bins and piles should not be located next to waterways or storm drains because leachate from compost materials can cause contamination.

It is important for municipalities to set a good example for residents. The city of Seattle, Washington, and King County, Washington, voluntarily decided to phase out the use of dozens of pesticides to encourage the use of less-toxic alternatives by municipal crews (Johnson, 1999). This decision followed criticism from local residents because the municipalities were recommending that residents avoid using weed killers or harmful pesticides on yards as a way to help save the chinhook salmon, which was recently listed as an endangered species. While making these recommendations, municipal crews were regularly using herbicides in parks and along roadsides. Based on a study undertaken by the city of Seattle, the municipalities will phase out the use of Tier 1 chemicals, which are deemed most hazardous. There will be exceptions to the phase-out, but only when there are major health and safety concerns from pest outbreaks. Environmental groups support the phase-out and hope to see zero pesticide use in the future. Opposition to the phase-out is mainly by groups representing agriculture, landscaping, and timber interests, who warn that overwhelming weed, mosquito, and rat problems will result from the pesticide phase-out.

Applicability

Many environmentally friendly lawn and garden activities can be implemented for any municipal property. Municipalities can encourage residents to use the same practices in their own yards. These practices include landscape planning; integrated pest management; planting indigenous species; soil testing; and reduction, elimination, or judicious use of fertilizers and pesticides. Planting drought-resistant plants and using water conservation practices can be especially useful in areas of low rainfall. Areas of high rainfall experience more erosion, so protecting exposed soils with vegetation and mulches is of particular importance in these areas.

Implementation

The following guidelines describe ways in which municipalities can promote environmentally friendly landscaping techniques:

General Programs. A public education program such as the Florida Yardstick can help landowners understand the value of good yard practices. The Florida Yardstick was designed as part of the Florida Yards & Neighborhoods Program (University of Florida Cooperative Extension Service, no date). A 19 x 37 poster of a yardstick helps landowners evaluate their yards by gaining credits for various practices (subjects include yard pests, recycling, mulch, fertilizing, wildlife, and selecting the appropriate plants). The credits are in the form of inches, and the best yards will grow to 36 . When the goal of 36 is met, the landowner receives a certificate for their yard. More information about the Florida Yardstick can be found at *www.agen.ufl.edu/~wq/fyn/check.html*.

Planning and Design. It is important to emphasize that property owners develop a landscape plan that utilizes the natural conditions of the property. For example, the regional and climatic conditions of the site, existing vegetation, topography, intended uses of the property, and the grouping of plants by their water needs are all important considerations in designing a site that promotes natural vegetation growth while minimizing water loss and contamination. Residents and municipal crews can partner with local nurseries and irrigation and lawn services to identify the appropriate landscape design for a specific site and to offer environmentally friendly practices to homeowners.

Soil Analysis and Improvements. Residents and municipal crews should be encouraged to test soils every 3 to 4 years to determine the amount of nutrients necessary to maintain a healthy lawn. Municipalities can encourage home and garden centers to market and sell soil test kits so that property owners can perform such tests on their own. Soil analyses can also be performed by a local extension service, and representatives from this agency can then provide suggestions for improving the ability to support specific types of vegetation and retain water at a specific site.

Appropriate Plant Selection. Encourage property owners and municipal crews to choose local or regional plants when developing an environmentally friendly landscape. Indigenous plant species are generally more water efficient and disease resistant. Furthermore, exotic plants can potentially impact local waterways. Local nurseries can assist in choosing appropriate regional plant species.

Practical Turf Areas. Property owners and municipal crews should be encouraged to plant non-turf areas where possible, because lawns require more water and maintenance than wildflowers, shrubs, and trees. If turf is used, it is important to select a type of grass that can withstand drought and that becomes dormant in hot, dry seasons. Local nurseries can provide property owners and municipal crews with assistance when selecting grass types. In addition, when maintaining lawns, the grass should not be cut shorter than 3 to 4 inches in height, and mulched clippings should be left on the lawn as a natural fertilizer.

Efficient Irrigation. Much of the water that is applied to lawns and gardens is not absorbed by the vegetation. When water is applied too quickly, it is lost as runoff along with the top layers of soil. To prevent this, it is important to encourage the use of low-volume watering approaches such as drip-type or sprinkler systems. In addition, encourage property owners and municipal crews to water plants only when needed to enhance plant root growth and avoid runoff problems.

Use of Mulches. Mulches help retain water, reduce weed growth, prevent erosion, and improve the soil for plant growth. Mulches are usually wood bark chips, wood grindings, pine straws, nut shells, small gravel, or shredded landscape clippings. Property owners should be encouraged to use mulches and should be informed of the benefits of these materials. Additionally, municipalities can start a program to collect plant materials from municipal maintenance activities as well as yard waste from property owners. These materials can be converted to mulch and used at municipal properties or redistributed to property owners.

Fertilizers. Property owners and municipal crews should be discouraged from using fertilizers, or if they are used, from over-applying them. Municipalities can recommend less-toxic alternatives to commercial fertilizers, such as composted organic material.

Municipalities can also recommend practices to reduce the amount of fertilizer entering runoff. For example, slow-release organic fertilizers are less likely to enter storm water. Application techniques, such as tilling fertilizers into moist soil to move the chemicals directly into the root zone, reduce the likelihood that the chemicals will be mobilized in storm water. Timing is also important: Warm season grasses should be fertilized in the summer, in frequent and small doses, while cool season grasses should be fertilized in the fall. Also, fertilizer should not be applied on a windy day or immediately before a heavy rain. Municipalities can recommend that property owners apply fertilizer at rates at or below those recommended on the packaging or should apply fertilizer based on the needs of the soil (as determined by a soil test). Safe disposal of excess fertilizer and containers should be encouraged. (See the Proper Disposal of Household Hazardous Waste fact sheet.)

Pesticides. Like fertilizers, pesticides should be used on lawns and gardens only when absolutely necessary. Pesticide use can be avoided entirely by selecting hearty plants that are native to the area and by keeping them healthy. It is also important to identify any potential pests to determine if they are truly harmful to the plant. The pests should always be removed by hand if possible—chemical pest control should be used only if other approaches fail. If it is necessary to use chemical pesticides, the least toxic pesticide that targets the specific pest in question should be chosen (i.e., boric acid, garlic, insects, etc). If a pesticide is labeled with the word "caution," it is less toxic than one labeled "warning," which is, in turn, less toxic than one that is labeled "danger/poison."

It is also important to follow the label directions on the pesticide. Encourage property owners and municipal crews to wear the appropriate protective equipment listed on the label when working with organophosphate insecticides or concentrated sprays or dusts. Also encourage them to read and follow all safety precautions listed on pesticide labels and to wash their hands and face before smoking or eating. Tools or equipment that were used to apply or incorporate pesticides should always be rinsed in a bucket and the rinse water applied as if it were full-strength pesticide. Any unused pesticide can be saved and disposed of at a household hazardous waste collection. (See the Proper Disposal of Household Hazardous Waste fact sheet.)

The following web sites provide education and information regarding safe pesticide use and disposal:

- University of Nebraska's *Pesticide Education Resources* at a href="http://pested.unl.edu">http://pested.unl.edu.
- University of Illinois College of Agricultural, Consumer, and Environmental Sciences' *Pesticide Safety Education* at [http://www.aces.uiuc.edu/~pse/welcome.html.
- Pennsylvania State University Pesticide Education Program's *Pesticide Urban Initiative* at http://urbanpested.cas.psu.edu.
- Washington State University's *Pesticide and Environmental Stewardship* at http://pep.wsu.edu.
- National Coalition Against the Misuse of Pesticides' *Beyond Pesticides* at http://www.beyondpesticides.org.
- Cornell University's *Pesticide Management Education Program* at http://pmep.cce.cornell.edu.
- The Pesticide Education Center's web site at http://www.igc.org/pesticides.

Ordinances. Municipalities can use ordinances as a means of controlling or preventing pesticide usage in the future. For example, the city of Arcata, California, created an ordinance that officially eliminated the use of pesticides on all city properties (Californians for Alternatives to Toxics, 2000). This ordinance followed a 14-year moratorium on pesticides in which the city council and a citizen's task force researched less-toxic alternatives to pesticide use. Municipal workers adapted to the moratorium by devising innovative pest control methods, such as covering the infield dirt in the baseball stadium with tarps between games to prevent weed growth. Other methods that Arcata crews used to prevent weeds included planting local plant species adapted to the city's climate; timely mowing, irrigating, weeding, and thatching lawns; and performing regular street maintenance such as sweeping and crack sealing. The ordinance also mandates the creation of a pest control management plan that will be linked to the city's storm water discharge program and includes a public education component. The text of the ordinance can be found at *www.alternatives2toxics.org*.

Benefits

There are several benefits to environmentally friendly landscape design. First, proper site planning can reduce maintenance requirements by selecting native species and locating plants in areas where conditions are optimal for growth requirements. Soil analysis can prevent overapplication of fertilizers by eliminating uncertainty regarding existing soil fertility. Careful selection of turf can minimize watering and fertilizer requirements by choosing grasses that thrive in a particular climate. Minimizing turf area by replacing it with ground cover, shrubs, and trees reduces mowing requirements, which subsequently reduces air, water, and noise pollution. Efficient watering practices reduce pollutant transport and erosion from runoff of wasted water. Mulches stabilize exposed soils, prevent growth of nuisance vegetation, and improve soil fertility through the slow release of nutrients from decomposition. Finally, the reduction or judicious application of pesticides and fertilizers reduces the probability of contamination, while ensuring that the maintenance requirements of vegetation are being met.

Limitations

There are virtually no limitations associated with implementing environmentally friendly lawn and garden practices. Some practices are more applicable in certain climates (for example, there is little need for irrigation practices in areas of very high rainfall), but in general, all practices are low cost and relatively easy to implement. With guidance from a local environmental agency, extension service, or nursery, proper decisions can be made regarding which practices are best for the site in question.

Effectiveness

Using proper landscaping techniques can effectively increase the value of a property while benefiting the environment. Attractive, water-efficient, low maintenance landscapes can increase property values between 7 and 14 percent (USEPA, 1993). These practices also benefit the environment by reducing water use; decreasing energy use (because less water pumping and treatment is required); minimizing runoff of storm and irrigation water that transports soils, fertilizers, and pesticides; and creating additional habitat for plants and wildlife.

Costs

Proper landscape activities are very cost effective. Promoting the growth of healthy plants that require less fertilizer and pesticide applications minimizes labor and maintenance costs of lawn and garden care. Using water, pesticides, and fertilizers only when necessary and replacing store-bought fertilizers with compost material can increase the savings for a property owner as well as benefit the environment.

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Water Conservation Practices for Homeowners

Public Education, and Outreach on Storm Water Impacts

Description

Fixing a leaky sink can help conserve water (Source: Louisiana USA, 1997)

Water use has soared in recent years. In many parts of the United States, the limited availability of drinking water has made water conservation practices mandatory. With water consumption at an all-time high, the costs of water and sewer services continue to climb. The good news, however, is that widespread reduction in water consumption could limit the need for new or expanded water and sewage treatment plants.

Applicability

According to the Chesapeake Bay Program and the Alliance for the Chesapeake Bay (1993), only about 4 of the estimated 100 gallons of water that each person uses daily is actually necessary. Water usage in the home can easily be reduced by 15 to 20 percent—without major discomfort—by implementing a program to conserve water in the home. Municipalities should establish a public education and outreach program to demonstrate to homeowners that by making minor changes in water use habits, each household can reduce its water consumption while saving money on water and sewage bills.

Implementation

Municipalities can help their homeowners conserve water through community education efforts. For example, a municipality can establish a Check For Leaks program that instructs homeowners how to determine if their plumbing fixtures (faucets, toilets, hoses, and pipes) are leaking. Even a leak as small as a 1/32-inch opening can waste approximately 6,000 gallons of water per month. A continuous drip from a faucet wastes about 20 gallons of water per day. Toilet leaks are usually silent but waste up to 200 gallons of water each day. Recommend that homeowners check water meters when no water is being used. For example, they can record the number on the meter prior to leaving for a trip and then check the meter again upon return. Also, the position of the meter can be marked and checked. If the needle moves or values change, there is a leak present. Municipalities should emphasize to the homeowner the benefits that can be realized from this type of program, such as lower water utility bills and reduced municipal costs for sewers and wastewater treatment. Emphasize that if leaks are detected, it is important for homeowners to repair them immediately. A Check For Leaks program can be advertised in a utility insert, community newsletter, or mass mailing campaign.

Municipalities can encourage good water use habits by making citizens aware of daily activities that consume a large volume of water. Some water conservation practices that can be recommended include:

- Run the dishwasher and laundry machines only with full loads. Use the shortest wash and rinse cycles and the lowest water level setting possible. Avoid the permanent press cycle, which uses an additional 10 to 20 gallons of water.
- When hand-washing dishes, do not let the water run continuously.
- Avoid using garbage disposal systems.
- When buying a new washing machine, choose a suds-saver model.
- In the bathrooms, place two half-gallon plastic bottles filled with water in the toilet tank to reduce the amount of flush water used.
- Take shorter showers and use a water-conserving showerhead (less than 2.5 gallons per minute) rather than taking baths, which use 30 to 50 gallons of water.
- When shaving, brushing teeth, or washing your face, do not let the water run continuously.
- When washing your car, use a bucket, and wash and rinse sections individually. Use a high-pressure, low-volume hose with a nozzle.
- Water the lawn only when absolutely necessary. More water is consumed using sprinkler and irrigation systems than if a hand-held hose is used (International Turf Producers Foundation, no date). (Trickle irrigation systems and soaker hoses are 20 percent more efficient than sprinklers.)
- Water lawns only during the coolest time of day to avoid evaporation of the water.

There are many resources for water conservation information, including the following:

- The Groundwater Foundation is a nonprofit organization dedicated to informing the public about groundwater. One of their education programs, Groundwater Guardian, attempts to encourage communities to begin groundwater awareness and protection activities. When communities participate in this program, the Groundwater Foundation supports the communities in their efforts and recognizes their achievements. Communities that participate form a Groundwater Guardian team, consisting of citizens, business and/or agricultural representatives, educators, and local government officials. This team develops Result-Oriented Activities (education and awareness, pollution prevention, public policy, conservation, and best management practices) to address the community's groundwater protection concerns. An annual conference allows teams from all around the country to exchange success stories and ideas (*www.groundwaterfoundation.org/index.htm*).

- The American Water Resources Association (2001) sponsors *WaterWiser: The Water Efficiency Clearinghouse* (www.waterwiser.org), which provides links to books, articles, and web sites related to water conservation. Topics include conservation tips, drought information, public education, irrigation, landscaping, water reuse/recycling, efficient fixtures/appliances, water savings calculators, water-related organizations and agencies, and links to state and local water conservation web sites.
- The Rocky Mountain Institute (no date) created a resource for household water efficiency that contains guidance for homeowners, utilities, and civic groups. Especially useful for municipalities is the page entitled *Civic Action: Promoting Water Efficiency, Protecting Rivers* (www.rmi.org/sitepages/pid123.asp), which provides links to information that can help watershed groups and municipalities inform the public about ways they can reduce water use in the home.
- The Chesapeake Bay Program (2000) presents information on water conservation practices at a web site called *Ways You Can Help the Bay*, which is located at www.chesapeakebay.net/helpbay.htm.

Benefits

For the citizen, the greatest benefit of water conservation in the home is cost savings. By reducing the amount of water used, monthly water bills are reduced. If homes are served by septic systems, reducing water use reduces the amount of wastewater to be treated, thereby minimizing strain on the system and improving pollutant removal performance. For the municipality, a successful water conservation campaign can help to reduce the frequency of sanitary sewer surcharges, reduce the load on wastewater treatment facilities, and reduce the need to expand the sanitary sewer system.

Limitations

It is sometimes difficult to change the habits of the public. Some people value long showers and strong water pressure. Others might have older appliances and plumbing that are difficult to retrofit with water-saving devices. Still others might be reluctant to change lawn-watering practices because they like the low-effort sprinkler or irrigation systems and don't want to water by hand. However, in many cases, people are not aware that alternative practices and products are available that only minimally impact comfort and convenience, if at all. Education programs should target this latter category of people who may be willing to change their habits when they are made aware of alternatives.

Effectiveness

By following these suggested water conservation measures, water use in the home can be reduced by 15 to 20 percent (Chesapeake Bay Program, 1993). The cumulative effects of using water conservation practices can significantly reduce the burden on water storage, purification, distribution, and treatment facilities.

Cost

Water conservation is not only "environmentally friendly," but it is also very economical. Reducing water use can amount to substantial savings on monthly sewer, energy, and water bills. When hot water use is reduced, less energy is required to heat the water. Consequently, gas and electric bills will be reduced as well.

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Proper Disposal of Household Hazardous Wastes

Public Education and Outreach on Storm Water Impacts

Description

Hazardous household wastes can be disposed of properly by taking them to a local waste collection facility

Many products found in homes contain chemical ingredients that are potentially harmful to people and to the environment. Chemicals such as oven cleaners, paint removers, bug killers, solvents, and drain cleaners are just a few common hazardous products in the home. Over the last 20 years, concern about the disposal of such products has been growing. In 1976, the Resource Conservation and Recovery Act (RCRA) was passed, regulating the procedures governing the generation, storage, transport, treatment, and disposal of hazardous materials. Although this legislation has mitigated some of the problems associated with commercial hazardous material disposal, more efforts need to be made to reduce and properly dispose of hazardous waste in the home.

Hazardous products include the following:

- Cleaning products: oven cleaner, floor wax, furniture polish, drain cleaner, and spot remover
- Car care and maintenance: motor oil, battery acid, gasoline, car wax, engine cleaner, antifreeze, degreaser, radiator flush, and rust preventative
- Home improvement products: paints, preservatives, strippers, brush cleaners, and solvents
- Other products labeled toxic, flammable, or corrosive, or containing lye, phenols, petroleum distillates, or trichlorobenzene

Applicability

Municipal household hazardous waste programs are widely applicable and vary in scope. They can range from simply informing the public about the hazards of some commonly used household chemicals to establishing a household hazardous waste collection facility. More elaborate programs are best suited to larger communities that have existing facilities such as a municipal solid waste collection area. Municipalities with more limited resources can implement a small education campaign and expand the program as resources become available.

Implementation

First and foremost, communities should make their residents aware of the potential impacts of hazardous household materials on water quality and inform residents of ways to properly store, handle, and dispose of the chemicals. Oftentimes, bad habits that lead to water pollution stem from the fact that citizens don't know the chemicals are dangerous to the environment. Once they are informed, they can adjust their behavior to help protect water quality.

Municipalities can also inform residents about less-toxic alternatives to household hazardous wastes. The use of alternative products can be promoted through pamphlets, inserts in utility bills, or workshops. These nontoxic products can offer the same effectiveness as hazardous products with less impact on the environment. Elements of a good community household hazardous waste collection program include providing the public with information on how to dispose of hazardous items in their household, the hours and location of collection facilities, and items that are acceptable or unacceptable at the collection facility. This information can be provided through pamphlets, handbooks, posters, magnets, workshops, or other means. Local scout troops and other service organizations could also be recruited to help distribute door hangings or flyers as part of their projects.

Municipalities should try to partner with the solid waste disposal services in their communities for help with public education. If disposal services make it clear that they do not pick up hazardous materials, then residents will be alerted to the need for alternative disposal. These solid waste collection companies can also provide users with hazardous waste collection site information through their company's web site, newsletter, and billing statements.

In the spring of 1998, four Pennsylvania counties (Lehigh, Northampton, Monroe, and Schuylkill) partnered with two private waste-disposal companies, Safety-Kleen Services and Curbside, Inc., and two volunteer groups, Pennsylvania's Senior Environment Corps and the Environmental Alliance for Senior Involvement (EASI), to launch the first curbside pickup service for household hazardous waste on the East Coast. Known as the Door-to-Door Collection program, this new initiative will allow residents in the four counties to properly dispose of paints, paint thinners, solvents, motor oil, and other substances that should not be disposed of with household garbage. The partnership not only provides a curbside pickup program for household hazardous waste, but also educates citizens on how to prevent the accumulation of chemicals in the home environment. A key element of this service is convenience for area residents. Customers can make a phone call, put their waste in a container, and schedule a pickup.

Information on public outreach documents should include information about storing household hazardous wastes. For example, municipalities can recommend that when residents store paint, they should tightly seal the paint can and store it upside-down so that the paint will form a seal around the lid. Paint should also be kept in dry areas that will not freeze, and away from sparks or flames. Pesticides should be stored in a dry area in their original containers with the labels intact. They should be stored in a separate, locked cabinet or other secure structure, away from children and pets, food, medical supplies, cleaning products, heat, flames, or sparks.

Citizens should also be made aware of the proper use of hazardous materials, especially how much to use and how to avoid releasing materials into the environment. For example, many people who change their own automobile oil might think that draining and filling the oil is the only time that oil might be released. Approximately 420 million oil filters are sold annually, and at least 75 percent are disposed of in landfills. If these used oil filters were recycled, they could yield 17.8 million gallons of oil and 161,500 tons of steel. Furthermore, approximately 850 million gallons of collected used oil is reclaimed for use as a fuel supplement or lubricant (Arner, 1996).

To minimize the disposal of hazardous products, it is important that citizens know that it is best to use only those products that are absolutely necessary and to use nontoxic alternatives whenever possible. For example, it is possible to clean ovens by applying table salt to spills, then scrubbing with soda water. Also, approximately a cup of baking soda combined with a cup of white vinegar and 1 cup of ammonia in a gallon of warm water makes an excellent multipurpose cleaner. (See the alternative products fact sheet for more information about less toxic alternatives.)

Disposal of hazardous products used in the home also requires special attention. When use of hazardous household products is unavoidable, municipalities should emphasize to citizens that household hazardous wastes should not be flushed down the drain because these drains lead to either a home septic system or a municipal treatment plant, neither of which has adequate capability to remove hazardous chemicals from wastewater. Toxic chemicals might also disrupt microbial processes in septic tanks and treatment plants, reducing their effectiveness. Some of the toxins can be removed, but a significant portion of these chemicals passes through treatment processes and ultimately contaminates water resources. They should also be informed that hazardous products used in the home should never be poured on the ground, into gutters, or down storm drains where they will eventually enter storm sewers and be transported into nearby waterbodies untreated.

Some municipalities have started hazardous waste disposal and recycling centers. In fact, many communities have established hazardous waste collection days when hazardous products are collected from homes and taken to an approved facility for disposal. The municipality must make the effort to inform its citizens of the hours and locations of such sites and what materials are accepted there. The city of Austin, Texas, provides information about their household hazardous waste disposal program on the city's web site, located at *www.ci.austin.tx.us/sws/hhw.htm* (City of Austin, Texas, 2001). The site includes background information, the hours and location of the collection facility (with a map), materials accepted at the facility, details about disposing of business waste, hazardous waste recycling opportunities, and chemicals management.

Following is an advertisement for a household hazardous waste collection event created by the Shelby County, Tennessee government for its citizens (Shelby County, Tennessee, no date).

HOUSEHOLD HAZARDOUS WASTE COLLECTION EVENT

Here's your opportunity to dispose of Household Hazardous Waste FREE! Bring your adhesives, household batteries, herbicides, pesticides, oil/fuel additives, paints, and thinners!

When:
Saturday, May 19, 2001
8:30 - 2:30 p.m.

Where:
Shelby Show Place Arena
South Parking Lot
105 S. Germantown Road

Limitations:
100 lbs. per household
Open to residents of Memphis & Shelby County only!

Sponsors:
Shelby County Environmental Improvement Commission
Tennessee Department of Environment & Conservation

Co-sponsored by:
Memphis Light, Gas & Water
Memphis & Shelby County Health Department
Shelby County Roads & Bridges Department

For more information, call the Shelby County Environmental Improvement Commission at 387-5707.

The Shelby County web site (*www.co.shelby.tn.us/county_gov/boards_commissions/SCEIC/waste_disposal/index.htm*) also provides information to citizens on alternatives to toxic household chemicals and options for paint and solvent disposal.

Some communities establish partnerships with service stations to collect hazardous waste. This way, citizens from throughout the community can go to the location that is most convenient to them. The number of collection centers will depend on the size of the population and the resources available to the municipality. A general guideline is to have one collection center for 3,500 to 25,000 residents, two for 25,000 to 100,000 residents, and three for populations of more than 100,000 (Arner, 1996). Hazardous waste collection days should be highly publicized to ensure the message is received. Setting a schedule for collection days, such as the first Monday of every month, will help ensure that citizens know when they can drop off household hazardous wastes.

When materials are collected, they must be managed as hazardous wastes. Therefore, time and resources must be allocated to obtain the services of a registered hazardous waste management firm to safely remove and dispose of chemicals. In many cases, these firms can take over the operation of the collection event to maximize safety and ensure that no spills occur.

The Pennsylvania Department of Environmental Protection (DEP) published an excellent guidance manual for municipalities and other groups to start a household hazardous waste program. The manual includes information about budgeting and funding, restrictions, materials to collect and exclude, estimating collection amounts, suggested timelines, and operational tips. This manual can be downloaded from the Pennsylvania DEP site at *www.dep.state.pa.us/dep/deputate/airwaste/wm/HHW/Documents/TechMan.htm*.

Benefits

Properly disposing of household hazardous wastes ensures that contamination through leaks and spills does not occur. If such wastes are disposed of with regular garbage, the toxic materials could destroy landfill liners or other disposal areas.

Limitations

Municipalities might have limited resources to collect hazardous wastes and to advertise the program. Partnerships with private sanitary services and environmental or service groups can help. Municipalities must make an effort to establish these partnerships at the outset of the program so that the groups can take over a portion of the administrative planning and implementation.

Effectiveness

No matter what the scope of the household hazardous waste program, whether it is an educational campaign or a full-fledged collection program, citizens will have an increased awareness of the problems caused by mishandling and disposal of hazardous chemicals. Municipalities can gauge the effectiveness of their household hazardous waste program by surveying residents about their perceptions and behavior after education materials have been distributed. If a collection program is in place, effectiveness can be measured by the amount of materials collected at amnesty days or on a monthly or yearly basis at full-time collection facilities.

Cost

Costs for household hazardous waste programs can be high, especially if a collection program is selected. In some states, grants are available to assist municipalities with collecting household hazardous wastes. In Pennsylvania the Household Hazardous Waste Funding Act of 1994 reimburses municipalities for 50 percent of the developmental and operational costs associated with HHW collection programs, up to a total of $100,000 per county per year (Pennsylvania DEP, 1999). Any municipality that registers a HHW collection program with DEP is eligible to apply for a grant. Grants are provided on a first-registered, first-conducted basis, prioritized according to criteria laid out in the Act. (Priority is given to existing programs and those operated by counties, multi-county groups, and first and second-class cities.) Additionally, the Small Business and Household Pollution Prevention Act provides 80 percent grants to counties to develop and implement pollution prevention education programs for households and small businesses, even if conducted in the absence of a collection program. Municipalities should check with their state environmental agencies to identify grant programs that can be used for household hazardous waste programs.

To allay the costs of hazardous waste disposal, recycling programs can be established to reuse some of the chemicals. Austin, Texas, offers a hazardous waste recycling program that allows residents to select from new or slightly used chemicals that were dropped off by other residents (City of Austin, Texas, 2001). Instead of incinerating these products at great expense, the facility will give them to anyone who wants them on a first-come, first-served basis. Products may include paint, solvents, automotive fluids, pesticides, fertilizers, cleaning products, or other chemicals. In its first four months of operation, the public reuse center saved $3,207 through reduced disposal costs. There were 300 participants, and 14,562 pounds of hazardous waste were reused.

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Pet Waste Management

Public Education and Outreach on Storm Water Impacts

Description

Encourage pet owners to collect their animal's waste so it will not wash into sewers and streams

When pet waste is not properly disposed of, it can wash into nearby waterbodies or can be carried by runoff into storm drains. Since storm drains do not connect to treatment facilities, but rather drain directly into lakes and streams, untreated animal feces can become a significant source of runoff pollution.

As pet waste decays in a waterbody, it uses up oxygen, sometimes releasing ammonia. Low oxygen levels and ammonia combined with warm temperatures can be detrimental to the health of fish and other aquatic life. Pet waste also contains nutrients that promote weed and algae growth (eutrophication). Eutrophic water becomes cloudy and green, making it unattractive or even prohibitive for swimming and recreation. Pet waste also carries bacteria, viruses, and parasites that can pose risks to human health and threaten wildlife.

Applicability

Pet waste management is applicable to any municipality, since pet owners are a part of every community. Municipalities can do a variety of things to encourage pet owners to collect and properly dispose of their animal's waste. They can produce and distribute educational materials to residents to inform them about the effects of pet wastes on water quality and what they can do to reduce water pollution. Additionally, an ordinance can be enacted to provide a legal basis to enforce proper pet waste disposal with fines.

Implementation

The first step in a pet waste management program is to increase public awareness. Pet waste management programs strive to encourage proper waste disposal by passing local ordinances and launching public education campaigns to educate pet owners on the importance of cleaning up after their pets.

Many communities implement pet waste management programs by posting signs in parks or other pet frequented areas, sending mailings, and making public service announcements. Many communities have "pooper-scooper" laws that govern pet waste cleanup. Some of these laws specifically require anyone who takes an animal off his or her property to carry a bag, shovel, or pooper-scooper. Any waste left by the animal must be cleaned up immediately (Hill and Johnson, 1994). Some of these laws also include fines that can offset some of the program costs.

Sign posting is one of the most common outreach strategies for managing pet wastes. Signs can be used to designate areas where dog walking is prohibited entirely, where waste must be fully recovered, or where dogs can roam freely. Many communities post neighborhood signs asking pet owners to "Curb Your Dog." The rationale behind the request is that dogs walked along the curb are more likely to defecate on the roadside, where the waste can be captured by street sweeping. However, waste deposited in the road is also more likely to be washed down storm drains, so this tactic is not considered nearly as effective as a pooper-scooper ordinance. In addition to postings, many communities have established dog parks. Some communities have also installed "pet waste stations" with waste receptacles as well as a supply of disposal waste collection bags, scoops, and shovels.

In some communities, public works departments or public utilities have developed programs to control pet waste. More than 150 canines showed up at a Southern California pet store to put their paw print on a pledge to make sure their owners clean up their waste. The Los Angeles County Department of Public Works Environmental Programs Division developed a program to control pet waste. By profiling various groups of pet owners, the Division identified the best target for reducing coastal pollution. The program included a multimedia campaign to educate new and existing pet owners about the water quality impacts of pet waste. The program also distributed cleanup kits to owners and installed plastic bag dispensers in parks. The Division established partnerships with local pet stores and pet supply companies to promote the program (Lehner, 1999).

One important issue communities must decide on is whether to encourage residents to dispose of pet waste with regular trash, bury it in their yards, or flush it down the toilet. The city of Columbus, Ohio, recommends that pet owners flush it, or bag it and place it in the trash (*utilities.ci.columbus.oh.us/sewers_drains/stormwater1.htm*). In Lake Orono, Minnesota, pet owners are encouraged to flush waste down the toilet (taking special care not to flush yard debris or cat litter), bury it 5 inches deep in their yard and away from vegetable gardens and waterways, dispose of it in the trash, or to install an underground pet waste digester (similar to a small septic tank). More information about the Lake Orono program can be found at *www.elknet.com/loia/pet.htm*. San Diego County, California, prefers that pet waste be flushed down the drain. Alternatives to flushing include placing pet waste in the trash or burying it at least 3 feet in the ground. (See *www.co.san-diego.ca.us/deh/stormwater/residential.html*.)

Benefits

The benefits of pet waste management include a cleaner neighborhood in both site and smell and improved water quality through a reduction in nutrient inputs to waterbodies. It is also a message that is targeted specifically at pet owners.

Limitations

Because pet waste management is focused toward individual pet owners, the program is dependent on the participation and cooperation of all owners. Many pet owners consider it a nuisance to consider the environmental and aesthetic benefits of pet waste management.

Effectiveness

To be effective, pet waste management programs must be enforced. Neighborhood residents, community organizations, and even the municipality are responsible for ensuring that pet owners are picking up after their pets and properly disposing of the waste. For the program to be fully effective, every pet owner must participate. In the city of Oskosh, Wisconsin, dog owners are required to remove pet waste from any property other than the dog owner's. The penalty for failure to comply is $116.75 in fines and court fees (City of Oshkosh, 2001). In Arlington County, Virginia, the county has established standards for dog exercise areas, including where to site them, how to maintain them, and what the financial obligations of the county are.

Costs

The cost of a pet waste management campaign will vary depending on several factors, including the materials produced (signs, ads, clean-up stations). The cost of signs will depend on the material used; plastics can be just as durable as and possibly cheaper than metal. In Sausalito, California, the Remington Dog Park was established in 1991. Since then, more than $36,000 has been spent in park improvements. Most of the money has been raised by user donations (Dogpark.com, 2000). At the Mary Jane Roe Dog Park in the town of Clifton Park, New York, $700 was spent to install a 500-gallon sealed underground septic tank for pet waste. Each pet owner is charged $20 for a permit to use the dog park. Funds from the permit fees will be used to help offset the costs of the septic system (Kemper, 2000). In Poway, California, the city council raised $25,000 to pay for fencing, gates, signs, irrigation, modifications, and retired fire hydrants (City of Poway, no date).

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Trash Management

Public Education, and Outreach on Storm Water Impacts

Description

Trash collected from storm water using continuous deflection separation (Source: City of Santa Monica, 2000)

Trash and floating debris in waterways have become significant pollutants, especially in areas where a large volume of trash is generated in a concentrated area. Trash in waterbodies contributes to visual pollution and detracts from the aesthetic qualities of the landscape. It also poses a threat to wildlife and human health (e.g., choking hazards to wildlife and bacteria to humans). Additionally, trash and debris can clog the intake valves on boat engines, which results in expensive repairs.

Applicability

When developing control strategies for trash, municipalities should consider the following points:

- Implement a control structure designed to target the most prevalent types of trash and identify the source or sources of the trash.
- Evaluate the costs for each control. Develop a budget that takes into consideration what services and facilities are already available and can be utilized at the lowest cost.
- Regular cleaning and maintenance are necessary to prevent the accumulating trash at control structures from being hazardous itself.
- Control strategies should not just transport trash to another waterbody, but should reduce the quantity of trash in the water as a whole.

Implementation

Citizen awareness is key to a successful trash management program. Citizens should be informed about the environmental consequences of littering. Pictures are especially effective at describing the problem. To make the relationship between its young citizens and garbage collectors more personal, the public works department in Kenosha, Wisconsin, started a baseball card collection. Each card contains a full-color picture of a garbage collector, including his/her hobbies and interests, number of lifetime stops, and total pounds of garbage collected (Runoff Report, 1998).

There are two main methods of trash control: source control and structural control. There are four main techniques for source control: community education, improved infrastructure, waste reduction, and cleanup campaigns.

Community education, such as informing residents about their options for recycling and waste disposal, as well as the consequences of littering, can instill a sense of citizen responsibility. Flyers, door hangers, magnets, and bumper stickers are some of the ways to educate the public. These materials can be distributed through the mail, at public places (e.g., libraries, town halls), in schools, and at local businesses.

Improved infrastructure includes optimizing the location, number, and size of trash receptacles, recycling bins, and cigarette butt receptacles based on expected need. Communities that allow private trash disposal companies to serve the public should work with these companies to ensure that the community's trash management goals are reached.

Waste reduction includes encouraging the purchase of products with less disposable packaging as well as encouraging manufacturers to reduce the amount of packaging they use. Again, some methods of distilling this information include flyers, magnets, and using the community's web page.

Cleanup campaigns are an effective way to reduce trash. There have been many successful cleanup programs at beaches, along rivers, and in parks. By keeping track of what is being collected, the sources of the trash can be quantified and targeted for improved source reduction. Municipal projects such as street sweeping, receptacle servicing, and using cleanup crews along roadsides can also be effective in preventing trash from accumulating and entering waterways. Finally, specially designed boats are effective at removing floating trash and other debris from rivers, lakes, beachfronts, bays, and harbors.

The second method of trash control, structural control, includes physical filtering structures and centrifugal separation. Physical filtering structures, such as trash racks, mesh nets, bar screens, and trash booms, concentrate diffuse, floating debris and trash and prevent it from traveling downstream. Centrifugal separation targets trash in storm water during and after heavy precipitation events and involves physical separation of solids and floatables from water in combined sewer outflows by increasing the settling time of trash and particles.

In developing and implementing their trash management programs, municipalities need to consider short-term and long-term issues. One of the most important things to consider is where the trash will be deposited (e.g., landfill, incinerator). What are the capacity and life expectancy of that area? What will be used once capacity is met?

Benefits

The benefits of trash removal are vast. Better trash management increases the aesthetic quality of the landscape and decreases health and safety threats to both wildlife and humans. In addition, less litter from individuals can save the community money in terms of structural-runoff control maintenance. Effective recycling programs can reduce the quantity of waste being disposed of in landfills and allows for the reuse of raw materials.

Limitations

Without a well-rounded trash removal approach that includes both source and structural controls, noticeable reductions may not occur. It is important to implement several of the aforementioned techniques together to obtain a trash-free waterbody.

Effectiveness

It is important to clean and maintain the structural controls to keep them fully functional. In addition, ongoing source control efforts should be continuously implemented in order to achieve effective trash removal. Municipalities can measure the effectiveness of their trash management program by weighing the amount of trash cleaned out of structural runoff controls, collected at stream or roadside cleanup events, or collected from sidewalk trash bins.

Costs

The costs for source control vary depending on the type of method. For example, the cost of a community education program or a plan to increase the number of trash receptacles can be very minimal. On the other hand, a structural control strategy can be quite costly. Physical filtering structures, including trash racks, bar screens, and silt traps, can range from $250,000 to $900,000. Centrifugal separation for municipal storm water management systems can cost as much as $3 million.

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