STORM WATER MANAGEMENT PROGRAM SUMMARY

OAKLAND COMMUNITY COLLEGE

Section 1: Why worry about Stormwater?

What is the problem with stormwater?
Many people may not realize that stormwater collected in drains located on the street curbs does not flow to their local water treatment plant. Rather, this water remains untreated and is discharged directly into the waterways. During this journey to the waterways, stormwater collects and carries a broad range of pollutants. Stormwater is a nonpoint source of pollution thus making it extremely difficult to address and the single greatest threat to our water quality and watershed health. Nonpoint source pollution comes from many diffuse runoff sources, such as rainfall and snowmelt, flowing over and through the ground, picking up pollutants as it goes.

Why worry about stormwater?
When we think of water pollution, many of us may imagine chemicals being dumped directly into our waters. As a result of the Clean Water Act and other environmental legislation, such acts of pollution-considered "point-source" pollution have been eradicated and/or stringently regulated. Even with the unquestioned success in addressing point-source pollution, more than 40 percent of our nation's waters fail to meet designated quality standards for recreation and drinking. Surprisingly, the single greatest threat to our water quality and watershed health nationwide is stormwater and "nonpoint source" pollution. Nonpoint source pollution comes from runoff, such as rainfall and snowmelt, flowing over and through the ground, picking up pollutants as it goes. Some of these pollutants occur naturally, such as nutrients from sediments, manure, or pet wastes. Other pollutants, such as fertilizers, automotive grease, and oil, occur from our interaction with the environment. Stormwater acts as a carrier of nonpoint source pollution and therefore is considered a major cause of water quality problems both in Michigan and nationwide.

What role does OCC play in stormwater management?
OCC implemented a Stormwater Management Program Plan (SWMP) to reduce the discharge of pollutants from their Municipal Separate Storm Sewer System (MS4) to the Maximum Extent Practicable and protect water quality in accordance with the appropriate water quality requirements of Michigan Act 451, Public Acts of 1994, Part 31, and the Federal Water Pollution Control Act and OCC National Pollutant Discharge Elimination System (NPDES) permit.

Contact Oakland Community College:

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LINKS:

- Take Our Watershed Survey
- Read Environmental News & Information on our Clean Water Chronicles page on Tumblr

Section 2: What are we doing about the problem?

A Brief History
Historical industrialization and urbanization during the 20th century resulted in unanticipated problems related to water quality in the nation's watersheds. In response to increased water quality issues, the first federal legislation was passed in 1948 as the Federal Water Pollution Control Act. This was updated and expanded in 1972 as the Clean Water Act. Later amendments led to the implementation of pollution controls for wastewater plants and industry as well as water quality standards for all surface waters.

The NPDES under the Clean Water Act essentially made it illegal to discharge pollutants directly into waterways without obtaining a permit. This program was an overwhelming success in addressing point-source pollution in our watersheds. However, it did not address the much larger and difficult problem of nonpoint source pollution. One of the first nationwide efforts to clean up and restore a river or watershed was locally focused on the Rouge River in Michigan.

The Rouge River and Stormwater Permitting

The Rouge River has a historic place in our understanding of both point-source pollution and stormwater pollution nationwide. As a result, it has been at the forefront of efforts to manage water pollution in general.

By the early 1960s, the Rouge River Watershed was in a severely degraded condition. The result of the same expansion of industry and urban areas has created similar water quality issues across the nation. Both point-source pollution and stormwater discharges contributed to a seriously polluted watershed. Following the success of the NPDES, plans were implemented to address the watershed-wide water quality issues associated with the Rouge River. Among these was the first voluntary watershed-based stormwater permit, under which fifty communities participated in watershed planning efforts. This permitting process was adopted for use statewide and became the model for the national stormwater permitting program.

Education

A major component of the stormwater permit is watershed-based outreach and education because stormwater pollution is the direct result of our daily activities. Since each of us contributes to the problem, the more we learn about it, understand how we contribute to it, and what we can do about it as a community, the more successful we will be in solving it. The only way this problem will be solved is through the collective efforts of each one of us.

LINKS:

- Visit the Environmental Protection Agency Stormwater Program
- Visit the Michigan Department of Environment, Great Lakes, and Energy Program

Section 3: What is a Watershed?

What is a Watershed?

We all live in a watershed. All the ground upon which we stand is in a watershed. Since water flows downhill, every place on land ultimately drains to another. It is possible to determine a boundary around a given area within which all rainfall, surface water, and underlying ground water drains to a common outflow. This boundary defines the watershed of that outflow location. Watersheds are defined by natural geographic and geologic boundaries and may be large or small. Larger watersheds may contain one or more smaller sub-watersheds. The two largest watersheds in the United States are separated at the Continental Divide, along which either side drains entirely to the Atlantic or the Pacific Oceans. All watersheds in the U.S. are sub-watersheds of one of these two.

Stormwater Pollution and Watersheds

The water quality of a watershed is affected by everything that happens anywhere above the outflow point. Detrimental inputs such as those introduced by stormwater, occurring anywhere within the watershed, affect the entire area downstream because the water flows downstream. In addition to the pollutants it carries, the increased flow rates associated with stormwater introduce other problems, such as channel erosion and flooding.

Ours to protect

We in Michigan are fortunate that we live in an area where there is such a vast resource of water that adds to our enjoyment and quality of life. Each one of us has a responsibility to help keep this water clean, so that it remains safe for us to drink and to play in. To do this, we need to understand the things we do that make a difference for better or worse. OCC is dedicated to teaching the community what choices can make a difference.

What can I do?

Recognizing the different watersheds in the area increases opportunities for participation in multiple watershed groups and related activities. Stewardship can be fun, even when we join groups outside of our community. Learn how different communities protect their watersheds while enjoying kayaking, fishing, or other outings. There are numerous educational opportunities for individuals or groups. It is a great way for children and families to become involved in their community, develop leadership skills, and have fun while helping protect our watersheds.

LINKS:

- Access the EPA Watershed Academy Page

Section 4: OCC Campus Watersheds

The Rouge River Watershed

The Rouge River is 127 miles long and drains 467 square miles before emptying into the Detroit River. This complex system has four main branches, and many small tributaries that run through three counties and 48 municipalities. The Rouge River serves 1.5 million people. This highly-stressed river system is located in the most densely populated and heavily urbanized area of the state. In fact, recent history has shown Southeast Michigan is the fastest urbanizing area of the state and continues to experience population growth.

Despite this fact, much of the river is highly accessible to the public through adjacent park lands. Although its state designated uses include water contact recreation and warm water fisheries, it is also designated for industrial and agricultural water supplies and commercial/recreational navigation. Unfortunately, because the Rouge is not meeting the water quality requirements for many of these designated uses in various locations, it has been identified as an Area of Concern by the Environmental Protection Agency.

As noted on our "What are we doing about the problem" page, the Rouge holds an important place in the history of the management of water pollution. It is at the forefront of the development of new solutions to the problem of stormwater pollution. A Remedial Action Plan (RAP), designed to restore the water quality in the watershed and to meet all of the designated uses, involves numerous projects and billions of dollars.

Proper pollution and watershed management is expensive. In the end, prevention is significantly less expensive than the cost of remediation. This is why stormwater management and permitting is so important. The most critical part of this is the collective efforts of everyone to be good stewards, minimize their impact on their watershed, and report violators.

Opportunities to Get Involved

There are numerous opportunities for the public to become involved and learn more about the health and care of the watershed all while having fun. The Friends of the Rouge offers educational activities as well as volunteer opportunities. While stormwater management plans define ways to address stormwater pollution, this public awareness is critical. It is only through the individual effort of each of us that the problem can be solved.

For more information, visit the Friends of the Rouge website.

The Clinton River Watershed

The headwaters of the Clinton River rise in Springfield and Independence Townships, and flow through four counties and 60 urban and rural communities, eventually discharging into Lake St Clair. The watershed encompasses seven sub-watersheds and drains approximately 760 square miles while sporting several high-quality trout streams. There is a rich ecosystem of open marshes and wetlands, a wealth of aviary and waterfowl populations, and a stunning array of wildflowers especially in the less developed headwaters regions. Serving a population of 1.5 million, the watershed has improved dramatically over the past 30 years since the environmental controls regulated under the Clean Water Act.

Once devoid of any living fish from Pontiac all the way to the mouth of the Clinton, this now vibrant river basin continues to face challenges. More than 200 contamination sites remain in the shed, 27 identified as EPA designated Superfund Sites. Both the Clinton and the Rouge River are identified by the EPA as Areas of Concern within the Great Lakes Basin. Oil, grease, and pesticides found in Bear Creek and Red Run Drain are a concern. Since watershed pollution is cumulative at the point of discharge, water quality issues are greater where the watershed flows into Lake St. Clair. Perhaps most well-known to the general public are the resulting beach closures due to high *E. coli* concentrations. Stream bank erosion due to sediment is also a growing issue in increasingly urbanized rivers like the Clinton, where efforts of restoration are ongoing.

Public Outreach

There are numerous opportunities for the public to become involved or learn more about the health and care of the watershed all while having fun. The Clinton River Watershed Council offer educational activities as well as volunteer opportunities. Recreational events like Paddlepalooza increase awareness of the watershed. While stormwater management plans define ways in which to address stormwater pollution. This public awareness is critical. It is only through the individual effort of each of us that the problem can be solved.

For more information, visit the Clinton River Watershed Council website.

The Huron River Watershed

The Huron River is located in Southeastern Michigan, the headwaters of the Huron River originate at Big Lake in Springfield Township and works its way through the Huron-Andersonville Swamp, a complex series of wetlands and lakes. The river basin drains 900 square miles, includes 24 tributaries, and meanders for 126 miles before discharging directly into Lake Erie. Ten Metroparks and two thirds of Southeastern Michigan's recreational lands are contained within its drainage boundary. The Huron River serves as a water supply to over 150,000 residents. Known for its high-water quality, twenty-seven miles have also been designated as a scenic river by the State of Michigan. The river is not free flowing along the course, as there are at least 98 dam segments, seventeen of which are along the main course.

Public Outreach

There are numerous opportunities for the public to become involved and learn more about the health and care of the watershed all while having fun. The Huron River Watershed Council offers educational activities as well as volunteer opportunities. Recreational events such as "River Round-Up" increases awareness of the watershed. While stormwater management plans define ways to address stormwater pollution, this public awareness is critical. It is only through the individual effort of each of us that the problem can be solved.

For more information, visit the Huron River Watershed Council website.

Section 5: Pollutants & Illicit Discharges

Types of Pollutants

Typically, pollutants are synthetic, man-made substances that are used as part of our daily lives. Lawn fertilizers, car wash soaps, pesticides, motor oil, household cleansers, paint, salt, and numerous other sources contribute to polluting our watersheds. However, some pollutants are natural substances that become problematic due to the actions of humans. Sediment, which is essentially dirt carried in stormwater, is one of our most prominent and problematic pollutants.

Sources of Stormwater Pollution

Unlike the point-source pollutants generated by industry, the sources of stormwater pollution are widespread and diverse. Thus, stormwater is considered nonpoint source pollution. Stormwater runoff, combined sewer overflows, illicit discharges, flooding, and failing septic systems are all potential sources of stormwater pollution.

How do Pollutants cause damage?

It is relatively easy to understand how some stormwater pollutants might be a problem. Combined sewer overflows, storm sewer overflows and leaking septic systems can introduce bacteria such as *E. coli* and biota into our lakes and rivers. Other sources may be less straightforward. Lawn fertilizers and pesticides are washed off of walks and even lawn areas and into our storm sewers, eventually settling into our waters. Once there, these pollutants create algal blooms that affect water temperature and kill fish.

What are we doing about Stormwater Pollutants?

Every body of water is required to meet certain quality standards based on its designated use(s). A body might be designated for use as a public water supply (high water quality) or for industrial purposes (lower water quality), swimming, or agriculture. Once a use is determined, the water quality must continue to meet the level required for that use. Levels of pollutants are restricted and all parties that are potential contributors of pollutants are limited to a fixed quantity of each. We are all potential polluters, therefore each of us is responsible for policing our watershed by minimizing our own contributions and reporting violators.

Illicit Discharges

Illicit discharges are generally any discharge into a storm drain system that is not composed entirely of stormwater. The exceptions include water from firefighting activities and discharges from facilities already under an NPDES permit. Illicit discharges are a problem because, unlike wastewater which flows to a wastewater treatment plant, stormwater generally flows to waterways without any additional treatment. Illicit discharges often include pathogens, nutrients, surfactants, and various

toxic pollutants.
Phase II MS4s are required to develop a program to detect and eliminate these illicit discharges. This primarily includes developing:

- A storm sewer system map
- An ordinance prohibiting illicit discharges
- A plan to detect and address these illicit discharges
- An education program on the hazards associated with illicit discharges

Illicit Discharge Reporting
If you see an illicit discharge occurring outside of district property, please call the Pollution Emergency Alert System number listed below.

Oakland Community College Spill and Illicit Discharge Number: 248-858-4911- *Call this number to report concerns, spills, or illicit discharges to the Oakland Community College Department of Public Safety or 5555 from a campus phone. The Oakland County Sheriff's Department Dispatch will answer. Tell the Dispatcher the nature of your concern and OCC Public Safety will respond.*

Oakland County Environmental Hotline: 248-858-0931- *Call this number to report concerns regarding storm drain related pollution*

Pollution Emergency Alert System (PEAS) Hotline: 1-800-292-4706

For non-emergency calls or inquiries call the Environmental Assistance Center: 1-800-662-9278

LINKS:

- Learn About Pollution Control on the Environmental Protection Agency Page

Section 6: Total Maximum Daily Loads (TMDLs)

What are TMDLs?
The Environmental Protection Agency has published a series of Total Maximum Daily Loads (TMDLs) for a variety of known water body pollutants such as *E.coli*, phosphorus, sediment, dissolved oxygen, and total dissolved solids. A TMDL represents the maximum amount of a pollutant that can enter a water body so the water body will continue to meet the State of Michigan water quality standards. Studies are conducted on local water bodies to assess their relative quality and if there are any known impairments. If there are impairments and they meet specific criteria, a TMDL is issued for the water body.

What can you do to help?
Here are some simple steps developed by Southeast Michigan Council of Governments (SEMCOG) that can help you reduce your impact.

Fertilization - A significant contributor to depleted dissolved oxygen in our waterways
Proper fertilization is important for a healthy lawn.
When fertilizer is put down at the right time and in the right way it strengthens lawns. A healthy lawn protects water by holding soil and pollutants and minimizing the need for pesticides.

Improper fertilization harms our water.
Improper fertilization causes discharge into storm drains in streets, which empty into lakes and rivers. Fertilizers in lakes and rivers cause algae to grow, which uses oxygen that fish need creating a TMDL for dissolved oxygen.

Fertilize in the fall.
Fall is the best time for plants to absorb nutrients and develop a strong root system.

Pet Waste - A significant contributor to E. coli levels in our waterways

Dispose of pet waste promptly and properly.

Whether in your yard or on a walk, promptly dispose of your pet's waste in the trash or down the toilet where it will be properly treated. When pet waste is left behind, it washes into storm drains and ditches. From there, it heads straight to your local lakes and streams, carrying harmful bacteria with it.

Watch instead of feeding.

Feeding ducks and geese may seem harmless but, in fact, can be a nuisance to people and harmful to our water. Feeding waterfowl causes them to become dependent on humans. This creates unnaturally high populations and problems in our parks and lakes. Waterfowl waste can pollute our water with harmful bacteria.

Spread the word.

Tell others how they can help protect our lakes and streams. Also, work cooperatively with your local government to install signs, bag dispensers, and trash cans in convenient public places to remind visitors to clean up after their pets.

LINKS:

- Learn about Total Maximum Daily Loads (TMDLs)

Section 7: Sewer Overflows and Septic Systems

Sewer Overflows and Septic Systems

In Southeast Michigan, one of the most complex and persistent pollution issues being addressed is the introduction of sewage to our waters through Combined Sewer Overflows (CSOs), Sanitary Sewer Overflows (SSOs), malfunctioning septic systems, and illicit or illegal/ inappropriate connections to the storm system.

Combined Sewer Overflows

A Combined Sewer System is one in which sanitary wastewater and stormwater are carried through the same pipes to a wastewater treatment plant. When functioning within their designed capacity, these systems provide a mechanism for stormwater to be treated, along with the wastewater, prior to being discharged into the waterways. These types of systems were typically installed prior to the rapid expansion of our built environment. The added loads and associated increased stormwater runoff generated by massive urbanization has resulted in an overloaded system. These stresses result in the regular occurrence of what are known as CSOs. When precipitation is great enough, the combined sewer flows exceed the pipe capacity, and the overflow exits the main pipe at interceptors, which discharge the mixed storm/sanitary flows directly into waterways without treatment. Combined sewer systems are no longer allowed in new construction. However, identifying and eliminating all such existing systems and connections is complex and expensive to accomplish.

Sanitary Sewer Overflows

Even areas serviced by separate sanitary and stormwater sewer systems have overflows, which affect water quality similar to CSOs. SSOs typically result from aging infrastructure or electrical/mechanical failures. Stormwater flows find their way into sanitary sewer lines via broken lines from any number of causes or lift station failures. This causes back flows and basement flooding as well as discharge to local waterways. This problem is equally difficult to both diagnose and treat.

Addressing the Problem of CSOs and SSOs

Solving the problem of CSOs and SSOs is complex and expensive. Being the focus of pioneering efforts in managing point-source pollution stormwater runoff and a national model for stormwater permitting, it is no surprise that the Rouge River is also taking the lead as a test bed for new methods of solving the problem. The Rouge River Wet Weather Demonstration has already utilized $1 billion of a projected $2.4 billion, with the remaining projects in various stages of development and completion. When the project is complete, it is anticipated that there will be a total reduction of 85% in combined sewer overflows.

Septic Systems

Did you know that as a homeowner you are responsible for maintaining your septic system? Did you know that you should periodically inspect your system and pump out your septic tank? Your septic system can, if properly designed, constructed, and maintained, provide long term effective treatment of household wastewater. If your septic system is not maintained, you may need to replace it. This could end up costing you thousands of dollars. A malfunctioning system can contaminate groundwater

that might be a source of drinking water.

LINKS:

- Learn More About Combined Sewer Overflows
- Learn More About Sanitary Overflows
- Learn More About Septic Systems Maintenance

Section 8: Impervious Cover and Flooding

What is impervious cover?
Impervious cover is any surface that cannot effectively absorb water. Such surfaces are typically man-made or the result of human input. Concrete or asphalt roads, parking lots and walks, rooftops of all types, and compacted soil are all examples of impervious cover.

What is the problem with impervious cover?
Stormwater runoff is the greatest threat to our water quality and impervious cover is the single greatest contributor to stormwater runoff. In a natural landscape, rainfall and any runoff are absorbed by the soil and vegetation. In this process, the flow of water is slowed as it percolates into the soil. This replenishes the water table and ultimately restores our streams, rivers, and lakes. This slow absorption has the added benefit of naturally filtering the runoff of any impurities.

Increased development brings with it increased areas of impervious cover and thus increased runoff. This also results in a reduced area of natural landscape to intercept and filter runoff. As the area of impervious surfaces increases, the quantity of pollutants carried by the runoff increases. This results in an increase in the distributed polluted runoff over a small natural area. The smaller natural area cannot properly absorb or filter the water and runoff, and the polluted runoff ends up in our waters.

In addition to affecting water quality by allowing more pollutants to enter our waters, impervious cover directly affects the quantity of water in our watersheds. Stormwater runoff flows much more quickly over impervious surfaces. The increased volume of runoff and increased speed of flow does several things. First, it makes that flow more erosive, resulting in channelizing and scouring of riverbeds/banks, and depositing of slugs as the flow reaches water bodies. Second, the increased flow combined with reduced natural area capable of absorbing the water results in increased and more intense flooding. In fact, studies show that the size of one hundred-year floods can double in areas with as little as 20-30 percent impervious cover. Third, because less water is able to be absorbed, water tables and wetlands are not replenished, resulting in streams and wells going dry.

What can be done about the problem?
With such a direct relationship between the amount of impervious cover as a result of development and the degree of damage caused to a watershed, any efforts to address watershed health must focus on reducing impervious cover. Accomplishing this is a difficult task because it encompasses a range of economic, political, social, and legislative issues. However, there are other steps that we as individuals can take to help alleviate the problem. Minimizing our use of polluting substances and keeping them off away from impervious surfaces, practicing good housekeeping by properly storing and disposing of household materials, and saving water are all efforts that are easily accomplished. Incorporating elements of green infrastructure into our land is something else we can do at the community level as well as in our own homes. Green infrastructure involves the use of native plants and earth friendly landscaping in ways that enhance the natural absorption filtration processes and help mitigate the impact of stormwater runoff. Such elements might include rain gardens, no mow zones, buffer strips, green roofs, and grassy swales. All are designed to increase the infiltration rate of the soil. Again, it is significantly more cost effective to prevent pollution than to remediate the water.

LINKS:

- Learn About Environmental Protection Agency's Urban Nonpoint Source Fact Sheet
- Learn About United States Geological Survey-Stormwater Impervious Surface, and Stream Health

Section 9: Green Infrastructure

Why is Green Infrastructure important?

Stormwater runoff has the potential to carry pollution from a surrounding area into local rivers, ponds, and lakes, resulting in damage to local infrastructure and ecosystems. Therefore, treating stormwater where it first falls is a critical step in ensuring community safety and structural integrity of public works.

For stormwater specifically, green infrastructure can protect coastline areas, mitigate flooding risks and damages, improve groundwater storage, and reduce the strain on wastewater treatment systems. The process of implementing green infrastructure involves gathering community input, tailoring solutions for local issues that can improve existing structures or add entirely new areas for residents to enjoy.

What is Green Infrastructure?

Green infrastructure is a broad term that defines physical improvements in landscape design that treat multiple effects of weather and environmental hazards. When talking about green infrastructure in terms of stormwater management, the focus becomes ways to slow the speed of stormwater runoff, capture some of it in place, and filter the runoff before it reaches the nearest waterbody. Green infrastructure can be implemented at the personal or local level depending on the scope of the chosen project.

Some examples of green infrastructure include:

1. **Rain Gardens (Bioretention)** – Rain gardens are designed to intentionally collect and capture rainwater, as well as pollution carried by runoff, in lower-gradient areas. Formally known as 'bioretention' areas, rain gardens provide aesthetically pleasing landscapes, adding beauty with native shrubs, grasses, and flowering plants with deep root systems that store and filter stormwater. Rain gardens from both private and public landowners can impact the health and quality of local waterways. The mixture of soil, gravel, and sand beneath the chosen plants acts as a natural filter for chemicals and other soluble pollutants, treating the water as it sinks beneath the ground to recharge nearby streams and rivers. These areas can be created and maintained at low or no cost, often requiring no additional pesticide or fertilizer inputs due to the resilience of native plant selections adapted to local weather and soil conditions. Additionally, rain gardens can be used as wildlife habitat for birds and pollinating insects.

2. **Green Roofs** – Green roofs are a departure from traditional roofing styles in that they use plant cover and substrate to absorb and evapo-transfer stormwater and snowmelt. Mimicking groundcover by retrofitting spans of unused roofing brings other benefits aside from stormwater reduction and filtration, including additional insulation. The insulation provided by the green roof system has been proven to increase a building's energy efficiency, which in turn reduces greenhouse gas emissions.

3. **Porous/Permeable Pavement** – With increased upstream development comes an increase in impervious surfaces. This increases the flow rate and therefore causes accelerated stream bank erosion in our streams and rivers. One solution to these problems is porous/permeable pavement, an engineering system of permeable surfacing which allows stormwater to soak through the ground instead of rapidly washing away. Types of porous pavement include pavers, asphalts, or concretes designed to direct water down to a drainage system or to groundwater storage. These porous options are often low-cost, low-maintenance, and can replace existing areas if space for larger projects isn't available.

4. **Bioswales/Grassed Swales** – Grass swales are particularly common in roadside applications due to their linear, sloping designs. Lengths of open-air channels filled with vegetation like grasses help redirect stormwater runoff and reduce the runoff's speed, allowing the water a chance to filter naturally back into the ground. Swales can also be used to direct excess runoff to a nearby basin, pond, or rain garden for further filtration.

LINKS:

- Learn more about Green Infrastructure with guidance from the EPA

Section 10: Native, Non-Native & Invasive Species

What is a Native Plant?

Native plants (also called indigenous plants) are plants that have evolved over thousands of years in a particular region. They

have adapted to the geography, hydrology, and climate of that region. Native plants occur in communities, that is, they have evolved with other plants in association with animals, parasites, and disease-causing organisms. As a result, a community of native plants provides habitat for a variety of native wildlife species such as birds and butterflies.

What is a non-native species?
While native species occur in their natural regions without the direct or indirect activities of humans, "non-native" species occur outside that natural range. In North America, many non-native plants were brought over for agricultural, medicinal, and ornamental purposes. Many plants were introduced accidentally as well. The introduction of the non-native organisms continues to be a problem today due to our increased travel and international trade. Not all non-native plants or animals become a problem. Many non-native plants represent significant human food sources. However, some of these plants have certain aggressive traits that make them an invasive species.

What is an invasive species?
Invasive species are those non-native species that can significantly disrupt natural communities causing environmental or economic harm. In a new environment, invasive plants are released from the natural constraints of their native ranges. They lack the control of herbivores, parasites, diseases, and competition that was present in their native habitats. Invasive plants exhibit both rapid growth and reproduction rates because of abundant seed production, reproduction through vegetative clones, and/or extended growing seasons.

Why are invasive non-native plants a concern?
Invasive, non-native plants displace native plants and animals, and so disrupt ecological processes, and degrade biological resources. Invasive plants often lack the natural population controls that keep them in check in their native ecosystems. Controls existing in the new ecosystem (herbivores, parasites, diseases, and native plants) are not adapted to make use of the non-native invaders. This disparity of population controls, in addition to their rapid growth and reproduction, creates a situation in which the invasive plants are better competitors. They reduce the amount of sunlight, water, nutrients, and space available to native plants, eventually competing with and replacing natives. This represents a loss in habitat and food source for wildlife. Invasive plants have even been shown to alter hydrological patterns and soil chemistry. In the big picture, invasive plants reduce biodiversity.

How do invasive, non-native plants get into natural areas?
Our increasing global society has transported plants worldwide at an unnaturally fast pace. Once a new species is introduced, either from another continent or another region of North America, its seeds may be carried by wind, water, animals, or vehicles. Seeds or vegetative structures can be deposited miles from their original sites, allowing the species to spread at a rate that it could never accomplish on its own. Unsuspecting homeowners may use invasive, non-native plants in their landscaping. Species may easily spread into natural areas from nearby yards and lawns.

LINKS:
- Find general information about Invasive Non-Native Species
- Learn More About Invasive Species Awareness
- Check Out Michigan's Department of Natural Resources Invasive Species Watch List

Section 11: Why use Native Plants?

Why use Native Plants?
OCC encourages the use of native vegetation, wildflowers, and rain gardens at school facilities. Please contact the **Department of Environmental Health and Safety/Risk Management at 248-232-4633 -** for more information.

- Native plants do not require fertilizers. Vast amounts of fertilizers are applied to lawns. Excess phosphorus and nitrogen (the main components of fertilizers) run off into lakes and rivers causing excess algae growth. This depletes oxygen in our waters, harms aquatic life and interferes with recreational uses.

- Native plants require fewer pesticides than lawns. Nationally, over 70 million pounds of pesticides are applied to lawns each year. Pesticides run off of lawns and can potentially contaminate rivers and lakes. People and pets in contact with chemically treated lawns can be exposed to pesticides.

- Native plants require less water than lawns. The modern lawn requires significant amounts of water to thrive. In urban areas, lawn irrigation uses as much as 30% of the water consumption on the East Coast and up to 60% on the West Coast. The deep root systems of many native Midwestern plants increase the soil's capacity to store water. Native plants can significantly reduce water runoff and potential flooding.

- Native plants help reduce air pollution. Natural landscapes do not require mowing. Lawns must be mowed regularly. Gas powered garden tools emit 5% of the nation's air pollution. Forty million lawn mowers consume 200 million gallons of gasoline per year. One gas-powered lawn mower emits 11 times the air pollution of a new car for each hour of operation. Excessive carbon from the burning of fossil fuels contributes to global warming. Native plants sequester, or remove, carbon from the air.

- Native plants provide shelter and food for wildlife. Native plants attract a variety of birds, butterflies, and other wildlife by providing diverse habitats and food sources. Closely mowed lawns do not benefit most wildlife.

- Native plants promote biodiversity and stewardship of our natural heritage. In the U.S., approximately 20 million acres of lawn are cultivated, covering more land than any single crop. Native plants are a part of our natural heritage. Natural landscaping is an opportunity to reestablish diverse native plants, thereby inviting the birds and butterflies back home.

- Native plants save money. A study by Applied Ecological Services (Brodhead, WI) of larger properties estimates that over a 20-year period, the cumulative cost of maintaining a prairie or a wetland totals $3,000 per acre versus $20,000 per acre for non-native turf grasses.

LINKS:

- Explore the United States Department of Agriculture "Why Use Native Plant Materials?" page

Section 12: Household Hazardous Waste

Why is household hazardous waste disposal important?

Leftover household products that contain corrosive, toxic, ignitable, or reactive ingredients are considered to be household hazardous waste. Products such as paints, cleaners, oils, batteries, and pesticides contain potentially hazardous ingredients that require special care during disposal process.

Improper disposal of household hazardous wastes can include pouring them down the drain, on the ground, into storm sewers, or in some cases putting them out with the trash. The dangers of such disposal methods might not be immediately obvious, but improper disposal of these wastes can pollute the environment and pose a threat to human health. Many communities in the United States offer a variety of options for conveniently and safely managing household hazardous waste.

How can you reduce your household hazardous waste at home?

Consider reducing your purchase of products that contain hazardous ingredients and learn about the uses of alternative methods or products, without hazardous ingredients, for some common household needs. To avoid the potential risks associated with household hazardous wastes, it is important that people always monitor the use, storage, and disposal of products with potentially hazardous substances in their homes.

How can you reduce, reuse, recycle, and dispose of waste in your community?

The options of reduction, reuse, recycling, and disposal, listed in order of the Environmental Protection Agency's preferred waste management hierarchy, are all important tools to help safely manage and mitigate household hazardous waste. The links displayed along the right side of the page include information that can help you determine the best ways to reduce, reuse, or dispose of common household products that may contain hazardous ingredients.

For more information regarding household hazardous waste disposal, see your local county or municipal website.

LINKS:

- Learn about Safe Management, Reducing, and the Regulations of Household Hazardous Wastes
- Find Michigan Disposal and Drop-off Location Information

Section 13: Good Housekeeping

Why is Good Housekeeping/Pollution Prevention Necessary?
OCC conducts numerous activities that can have an impact on water quality if practices and procedures are not in place to prevent pollutants from entering nearby municipal sewer systems (MS4s) and/or nearby lakes, streams, and rivers. These activities include bus and vehicle fleet maintenance, minor road repairs, landscaping, construction activities, and building maintenance. OCC also conducts activities, such as parking lot and street sweeping, which remove pollutants from the MS4 when performed properly. Finally, OCC can be a source of stormwater pollutants if Best Management Practices (BMPs) are not in place to contain spills, manage trash, and manage non-stormwater discharges.

OCC has trained staff on ways to protect stormwater, to maintain MS4 infrastructure, and performing daily municipal activities such as park and open space maintenance, fleet and building maintenance, new construction, and land disturbances, and stormwater system maintenance. This includes:

- Development of inspection and maintenance and schedules for stormwater BMPs
- Implementing BMPs to treat pollutants from transportation
- Infrastructure, maintenance areas, storage yards, sand and salt storage areas and waste transfer stations
- Procedures for properly disposing of pollutants from the MS4s
- Identification of ways to incorporate water quality controls into new and existing flood management projects

LINKS:

- Learn about the Environmental Protection Agency's Best Stormwater Management Practices

Section 14: SEMCOG "Seven Simple Steps"

Contributors to Stormwater Pollution:

- **Washing cars in the drive and letting soapy/dirty water run to the storm drain.**
- **Leaving pet waste on lawns and other areas.**
- **Improperly using, storing, or disposing of household cleaners.**
- **Fertilizing more than required and leaving it on the sidewalk.**
- **Allowing grass clippings and leaves to sit on walks and drives.**

SEMCOG offers technical support on a number of issues including effective stormwater management. SEMCOG has developed a series of simple steps each of us can take to help decrease our impact on our watersheds. These "Seven Simple Steps" offer practical, real-world tips on ways we can keep our water clean.

Save Water
The Great Lakes are the largest system of fresh water on earth and contain almost 85 percent of North America's supply. Each one of us uses about 77 gallons of water each day. That is a lot of water. Overuse wastes water, money, and adds to pollution.

Practice good car care
There are over 68 million automobiles in the U.S., and almost half of them leak some sort of hazardous fluids. Combined with the used fluids that are improperly disposed of, and the substances used to keep them clean, our cars are a major contributor to the pollution of our waters. Proper care of them is crucial.

Choose earth friendly landscaping
Many of us take pride in our lawns and gardens for the curb appeal we think they provide yet the way we maintain them is a major contributor to the pollution of our waters. There are better alternatives.

Help keep pollution out of the storm drains
If you learn only one thing from reading these pages, it should be that the water that goes into our storm drains does not get treated but is discharged directly into our waterways. This means that all the pollutants carried by the water are also

discharged there. Keeping pollutants out of our stormwater and thus our storm drains is the single biggest contribution we can make toward eliminating stormwater pollution.

Fertilize caringly
Your lawn does not require all the fertilizer you likely apply to it. Fertilizer is a pollutant; it should be used sparingly. It is required by law that any fertilizer left on your walks and drives be swept back onto the lawn area. Be sure that you or your lawn care contractor does this.

Clean up after your pet
Stormwater carries everything it encounters, including pet waste, to storm drains and discharges it untreated into our waters.

Carefully store and dispose of household cleaners and chemicals
The great majority of household cleaners and chemicals are poisons and pollutants. Proper care in their use, storage, and disposal, is critical to your health, safety, and the environment. Take steps to protect yourself and keep these substances out of our waters.

For more information, please see the Southeast Michigan Council of Governments (SEMCOG) website.

Section 15: Managing Waste

Why is Managing Waste important?
The first step in reducing stormwater pollution is by reducing waste at its source. Larger entities such as educational facilities, industrial facilities, and commercial facilities generate larger amounts of waste, in addition to different types of waste than those of private citizens. When taking a proactive approach to reducing wastes, facilities reap benefits such as decreased operational costs, better insight into what kinds of waste are produced and in what quantities and enhancing their long-term sustainability. Sorting wastes can reduce greenhouse gas emissions, identify reusable materials, and contribute to the conservation of natural resources. The byproduct of waste management is a healthier environment, including a healthier watershed, for the public to enjoy.

How to Manage and Reduce Waste for Stormwater
Public and private entities are responsible for properly storing and disposing of hazardous and non-hazardous wastes as part of Best Management Practices (BMPs) and good housekeeping standards laid out in their individual Stormwater Management Plans. The EPA introduces waste management methods, described below, to guide a decision-making process when assessing implementation options.

1. **Source Reduction and Reuse** – Modification to existing waste management practices is an easy way to begin impacting the generation of pollution. First, the purchase and reuse of input products incorporate sustainable practices into everyday operations; look for products with reduced or limited packaging, including products that come in easily recyclable materials to reduce landfill waste and the potential for chemical leaching due to stormwater runoff.

2. **Recycling and Composting** – Second, and just as important as choosing the right products, is choosing the right recycling methods. According to the USDA, out of total food produced in America, 30-40% is wasted (Food Waste FAQ, n.d.). Organizing no-waste lunch sharing initiatives and maintaining lawn/yard waste through composting are just two examples of eco-friendly swaps that reduce the total waste of a facility. For non-organic product recycling, facility staff and visitors alike will need visible, accessible reminders and separate collection units to encourage sorting habits.

3. **Treatment and Disposal** – Finally, when considering hazardous industrial materials, proper disposal and recycling practices reduce regulatory and compliance costs for a facility. After inventorying substances for applicable hazardous waste management and connecting to a regulated recycling/disposal service, entities can track their reduced pollution in real time, offering stakeholders and the public a glimpse into their safety reputations and eco-friendly commitments.

LINKS:
- Waste Management Resources and Toolkits from the EPA
- Steps to Consider When Recycling Industrial Hazardous Waste from the EPA