Webcast Sponsored By EPA's Watershed Academy

Wastewater Utilities Using Sustainable Watershed Approaches

Feb. 20, 2008

Andy Crossland, U.S. EPA
Kevin Shafer, Milwaukee Metropolitan Sewerage District
Stefanie Farrell, Hallsdale-Powell Utility District

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Topics for Today's Webcast

- Sustainable Water Initiatives
- Milwaukee Metropolitan Sewerage District
- Hallsdale-Powell Utility District

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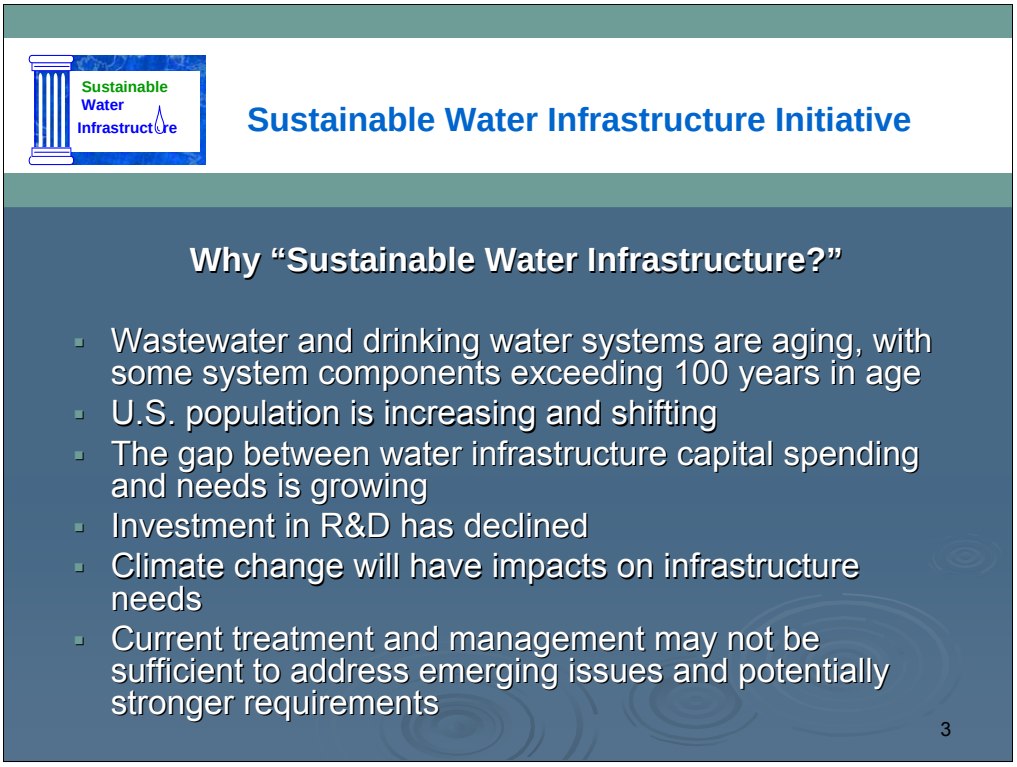

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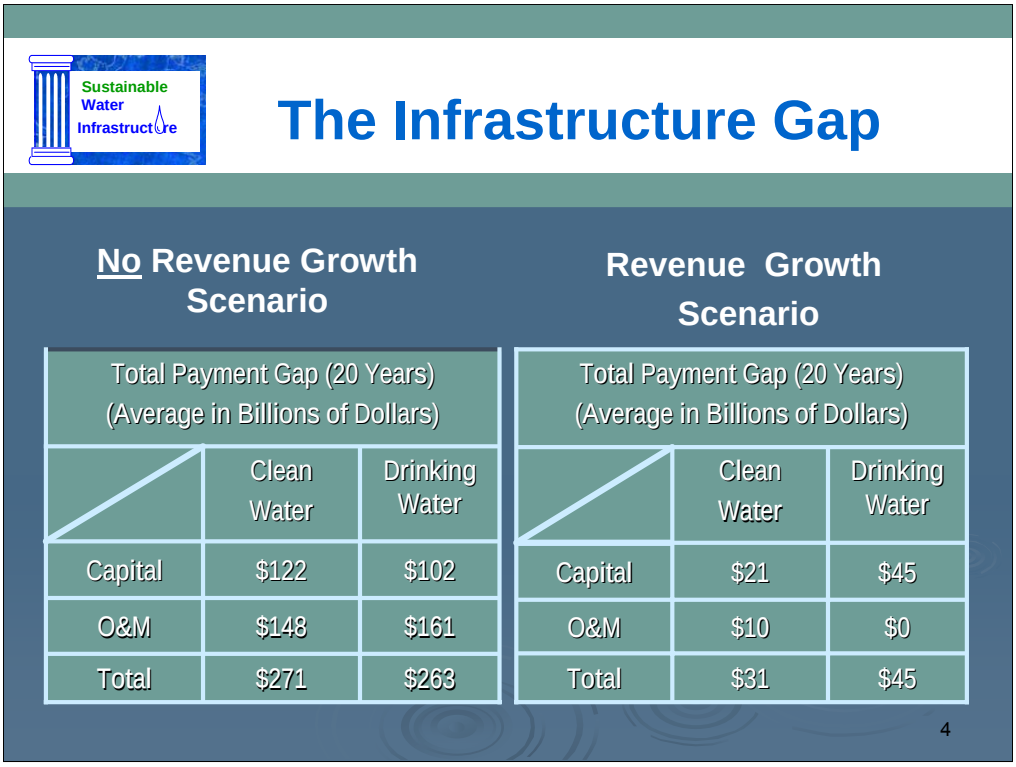
•2004 Clean Watersheds Needs Survey - nationwide capital investment needs for wastewater pollution control is approximately $202.5 billion for up to a 20-year period.

•2003 Drinking Water Needs Survey - $276.8 billion in drinking water infrastructure needs between 2003 and 2023.

•GAO report (2003) - By 2013, 36 states are projecting water shortages.

•USGS - Studies of water use show that water withdrawn for the public supply increased by 7 percent from 1995 to 2000 -- an increase of 1 trillion gallons.

•U.S. Bureau of Census - National population will increase by 3% by 2010, 12% by 2020, and 30% by 2040.



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Better Management - The Better Management "pillar" involves changing the paradigm from managing for compliance to managing for sustainability. EPA's comprehensive strategy for better management includes developing more productive and sustainable utility practices, attributes and tools.

Full-cost Pricing - Our strategy also includes efforts to ensure that customer rates fully and continually reflect the value of the service delivered to homes and businesses. Under this "pillar", EPA is developing tools and techniques to assist utilities interested in recognizing and recovering the long-term, full cost of providing service. Our goal under this "pillar" is to help utilities correct market signals that have been distorted by years of subsidies, and to help communities find appropriate options for cost allocation and rate design.

Full cost pricing isn't always the easy thing to do, but it's the right thing to do. It also recognizes there will be a need for lifeline rates and other hardship exceptions.

Water Efficiency - The Water Efficiency "pillar" involves reducing per capita demand on our water infrastructure. Through water efficiency, utilities can delay expansions to deal with population growth and make better use of existing resources. Our water efficiency "pillar" is about providing consumers and communities with information and choices, establishing pricing policies to encourage efficiency, identifying technologies and promoting programs to detect and repair leaks, and encouraging water reuse.

Watershed-based Approaches - The basic goal of this "pillar" is to break down the stove-pipes that exist at the local level so that all reasonable options for water and wastewater infrastructure are examined and prioritized, and the best decisions that meet community needs and values are made. In its ultimate form, this involves integrated planning in all programs affecting local water resources in order to achieve the watershed's water resource goals in an optimal way. Using a watershed approach, multiple stakeholders integrate regional and locally-led activities with local, State, Tribal, and Federal environmental management programs.

Better Management

Water utilities face critical challenges due to rising costs, increasing performance requirements, energy and climate considerations and aging infrastructure.

Utility Management Collaboration

- ***Ten Attributes of Effectively Managed Water Sector Utilities*** – Agreement between EPA and six national water utility professional organizations to promote *Ten Attributes* in effective utility management across the water sector.
- ***Keys to Management Success*** - The Agreement also identifies five *Keys*, designed to assist utility managers in the implementation of these Attributes.

www.epa.gov/waterinfrastructure/bettermanagement.html

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the American Public Works Association (APWA),
Association of Metropolitan Water Agencies (AMWA),
American Water Works Association (AWWA),
National Association of Clean Water Agencies (NACWA),
National Association of Water Companies (NAWC),
the Water Environment Federation (WEF)] and
the U.S. Environmental Protection Agency

Effective Utility Management

Ten Attributes of Effectively Managed Water Sector Utilities

Financial Viability
Operational Optimization
Employee and Leadership Development
Community Sustainability
Product Quality
Stakeholder Understanding and Support
Customer Satisfaction
Operational Resiliency
Infrastructure Stability
Water Resource Adequacy

Keys to Management Success

Leadership
Strategic Business Planning
Organizational Approaches
Measurement
Continual Improvement Management

www.epa.gov/waterinfrastructure/bettermanagement.html

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Several key products to help utilities manage more effectively under this framework are anticipated soon, including:

•Implementation Guide — to help utilities assess current operations and facilitate adoption of the Attributes and Keys to Management Success;

•Utility performance measures — linked to the Attributes and Keys to Management Success to help utilities gauge progress; and

•On-line Resource Toolbox — linking utilities to key resources and tools to help them manage based on the Attributes and Keys to Management Success.

Better Management of Energy Use

- For many utilties, energy is one of the largest costs for on-giong operations – 30% of O and M is typical.
- Energy consumption by water and wastewater utilities is expected to grow by 20 percent in the next 15 years…
- …which make energy efficiency a prime opportunity for significant savings that will help with out overall infrastructure costs.
- EPA has recently posted a Web page that brings together a number of resources to help with Water / Energy issues

www.epa.gov/waterinfrastructure/bettermanagement_energy.html

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the Water Environment Federation (WEF)] and
the U.S. Environmental Protection Agency

Full Cost Pricing

For our infrastructure to be truly sustainable, the upkeep and renewal of our systems cannot be subject to uncertain funding sources.

- We pay less for water than any other developed country.
- Rate structures should reflect the true cost of providing service.
- www.epa.gov/waterinfrastructure/fullcostpricing.html

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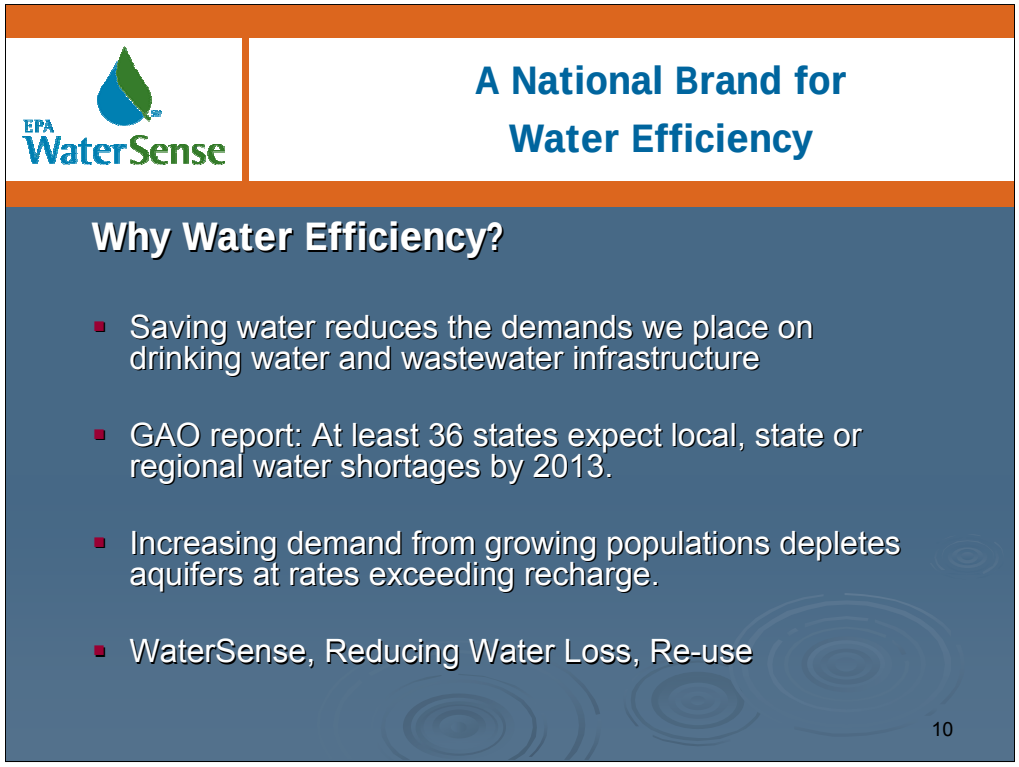

EPA has always supported water efficiency as one of the many tools utilities and communities can use to support a sustainable infrastructure, but in 2006 we launched a more concerted effort to promote water efficiency as a way to protect the future of our nation's water supply.

The need was obvious: A report released by the U.S. Government Accountability Office in 2003 found that at least 36 states expected some kind of water shortage within 10 years. And, as we saw in the Southeast last year, they have a real reason to be worried.

Our population is growing by leaps and bounds, faster than our water and wastewater infrastructure can keep pace; aquifers across the country are being depleted at a rate far exceeding their recharge rate.

EPA's Office of Water has conducted a national survey on the needs of publicly owned wastewater treatment works. The report estimates that nationwide capital investment needs for wastewater pollution control are $202.5 billion for up to a 20-year period. In addition, EPA's third report to Congress on Drinking Water Needs identified drinking water infrastructure needs totaling $276.8 billion between 2003 and 2023.

Water conservation programs can help stem the tide, and water efficiency is a critical component of an effective conservation plan.

The key to water efficiency? Keep it simple. And WaterSense offers that simple solution for communities that want to make water efficiency a priority. WaterSense has created a consistent, national brand that is backed by the credibility of EPA and easy to recognize in the form of a simple label that manufacturers can only use if they are independently tested and certified to meet EPA's criteria for both efficiency and performance.

We've released two product specifications so far, and already more than 120 toilets and 30 faucets have earned the WaterSense label.

Since we launched the program in June 2006, more than 500 partners, including 200 utilities, water districts, cities, and states, have joined our effort to promote water-efficient products and services.

Watershed Approaches to Infrastructure

By thinking beyond the utility 'fenceline' and making decisions on a watershed basis, we can make our infrastructure dollars count

- Green Infrastructure approaches to wet weather
- Watershed-based permits and water quality trading programs
- Source water protection
  -- see www.protectdrinkingwater.org -- new local officials guide to be released soon

www.epa.gov/waterinfrastructure/watershedapproaches.html

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EPA is committed to helping our partners sustain progress and increase opportunities for SRFs through financial stewardship, innovation, and collaboration. With a focus on promoting investment in sustainable infrastructure and encouraging greater creativity in project planning and development, we look forward to working with our state and local partners to make the program even more effective.

Watershed Approaches to Infrastructure

Green Infrastructure approaches

- A tool for mitigating sewer overflows
- Has benefits that go far beyond reducing infrastructure costs
  - Reduce heat island effect
  - Improvements to water quality in streams and rivers
  - Recharges aquifers
- Examples include things like:
  - Rain gardens, green roofs, permeable pavement…

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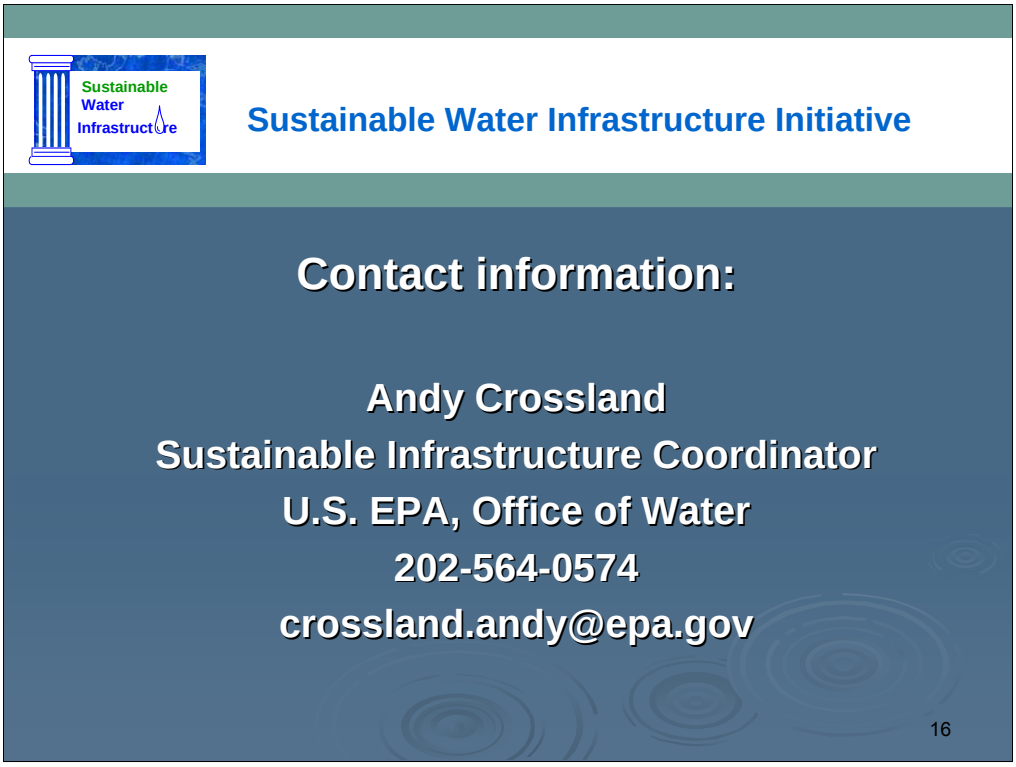

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Questions?

Andy Crossland, Sustainable Infrastructure Coordinator, U.S. EPA

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Working *with* Nature - Milwaukee's Green Infrastructure Initiatives

milwaukee metropolitan sewerage district

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What is MMSD Today?

- State-chartered regional agency
- Provides wastewater treatment and flood management
- Serves 1.1 million customers in 28 communities
- Covers 411 square miles

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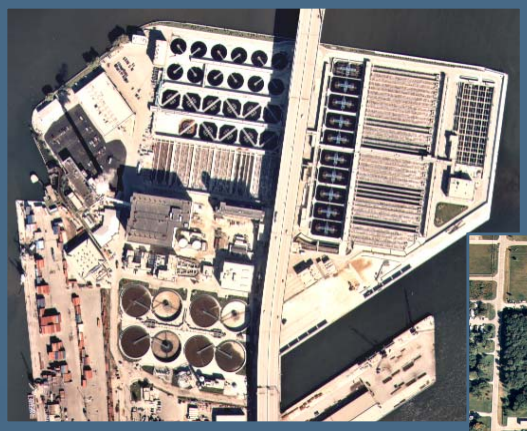
Jones Island

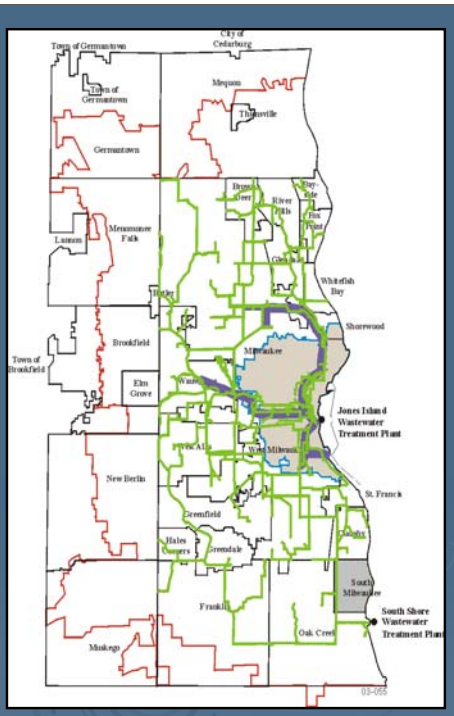


Water Reclamation Facilities

South Shore

How does the water get to the Treatment Plants?

- 300 miles / MMSD sewers
- 3,000 miles / Community sewers
- 3,000 miles / Private property sewers



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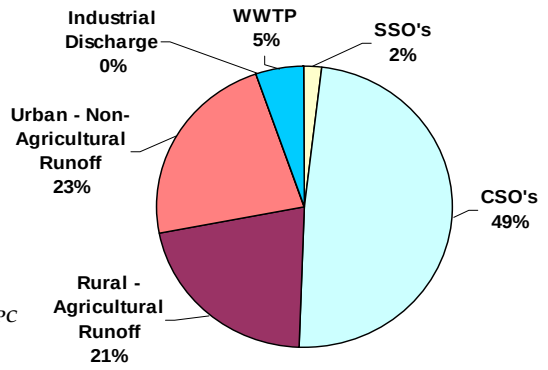
Greater Milwaukee Region's Combined Fecal Coliform Loadings

1975



Source: SEWRPC

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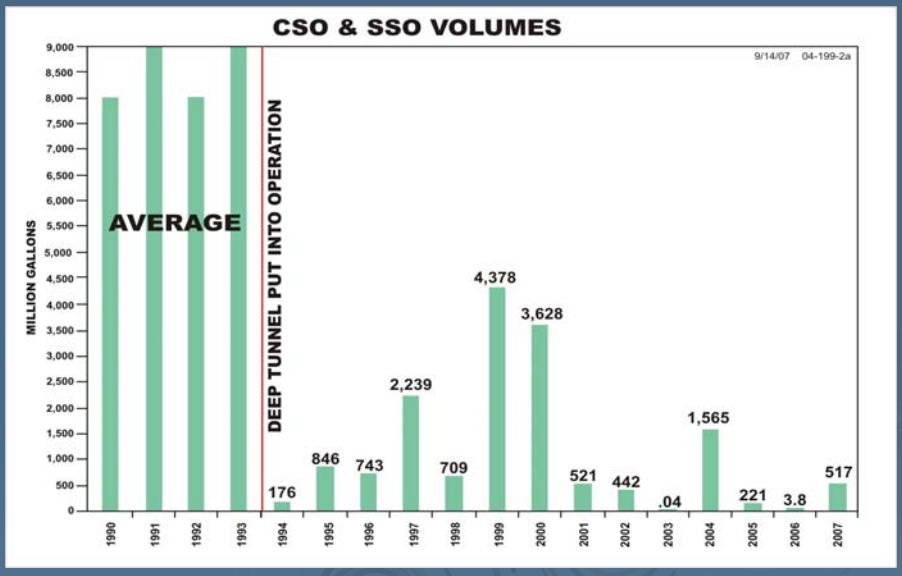
Deep Tunnel System in 1994 2006

- ~~405~~ 494 million gallons
- 300 feet below ground
- ~~19.4~~ 26.5 miles long
- 17- to 32-foot diameter
- Designed to minimize basement backups and for 1-2 overflows a year

Overflow Reduction



$900 milliion

Lincoln Creek

- Concrete Removal
- Minimized Floodplain
- Habitat Enhancement

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Beaches will still close even with
ZERO overflows.
CLOSED
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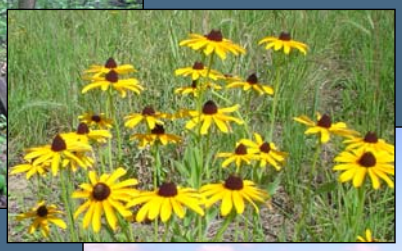
Water conservation, every drop counts logo

Green Seams



- 454 acres in 2006
- Over 1,300 acres since 2001
- $8.9 million since 2001
- $891,000 grants since 2001

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Stormwater Ordinances

- In 2002, MMSD implemented a "Stormwater rule"
  - Requiring 28 communities to implement a stormwater runoff ordinance for all new impervious areas greater than ½ acre.
    - 100-year runoff release rate - 0.5 cfs/acre of new impervious area
    - 2-year runoff release rate - 0.15 cfs/acre of new impervious area

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Rain Barrels

1,638
Sold in 2006

7,144
Since 2003

Lead by Example

MMSD Headquarters

- Installed Summer 2003
- 435 containers in "green grid" container system
- Covers 4,000 square feet

Green Roof

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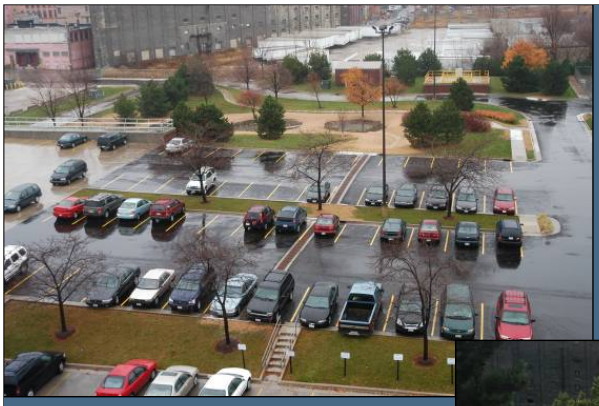

Stormwater BMPs

MMSD has sponsored 23 projects since 2003

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Rain Gardens

- Shorewood – 50 rain gardens
- Urban Ecology Center
- Auto Recyclers

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Reduce the volume and rate of runoff

Absorb and filter pollutants

Require minimal maintenance

LAKE MICHIGAN Rain Gardens INITIATIVE

6,298

Plants sold in 2006

35

Cisterns

- **Walnut Way Neighborhood**
  - 4 residential cisterns
  - Water source for community gardens

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Walnut Way Pilot Project
In early August, the U.S. Environmental Protection Agency (EPA) presented to the Mayor and DCD staff an opportunity for a $100,000 grant which would focus on stormwater retention and management. The City, in partnership with EPA, is proposing to transform a portion of the 2.25-acre schoolyard at Lloyd Street School from asphalt pavement to a bio-retention area (rain garden) planted with native Wisconsin plants. The project would reduce storm water runoff from the site and develop an environmental education curriculum using the schoolyard's natural area as a sustainable education on-site teaching tool for students and the surrounding community.

Stormwater Management Education

Milwaukee River Flushing Station

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Whole Demonstration Sites

Alterra Coffee Shop

- Porous pavement
- Downspout Disconnection
- Rain Barrels
- Rain Garden
- Water Quality Inlet Filter
- Estimate 30% reduction in runoff

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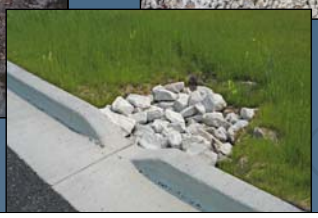
Hart Park Flood Management



Stormwater Reduction BMP Volume Reduction

1. Downspout Disconnection (dd)	12%
2. Rain Barrel (w/ dd)	14%
3. Rain Garden (w/ dd)	36%
4. Rain barrel and Rain Garden (w/ dd)	38%
5. Green Roof	22%
6. Bioretention	70%
7. Green Parking Lot	76%
8. Stormwater Trees	10%

Source: CDM

Pollutant Removal Estimates for Stormwater BMPs

Pollutant	Infiltration Practices	Bioretention	Porous Pavement	Constructed Wetland
Total phosphorus	70	34	85	49
Soluble phosphorous	85	38	--	35
Total nitrogen	51	84	--	30
Nitrate	82	31	30	67
Copper	--	51	--	40
Zinc	99	71	--	44
TSS	95	81	85	76

Sources: National Pollutant Removal Performance Database for Stormwater Treatment Practices, Center for Watershed Protection, June 2000
Pennsylvania Stormwater Manual (draft, 2004)

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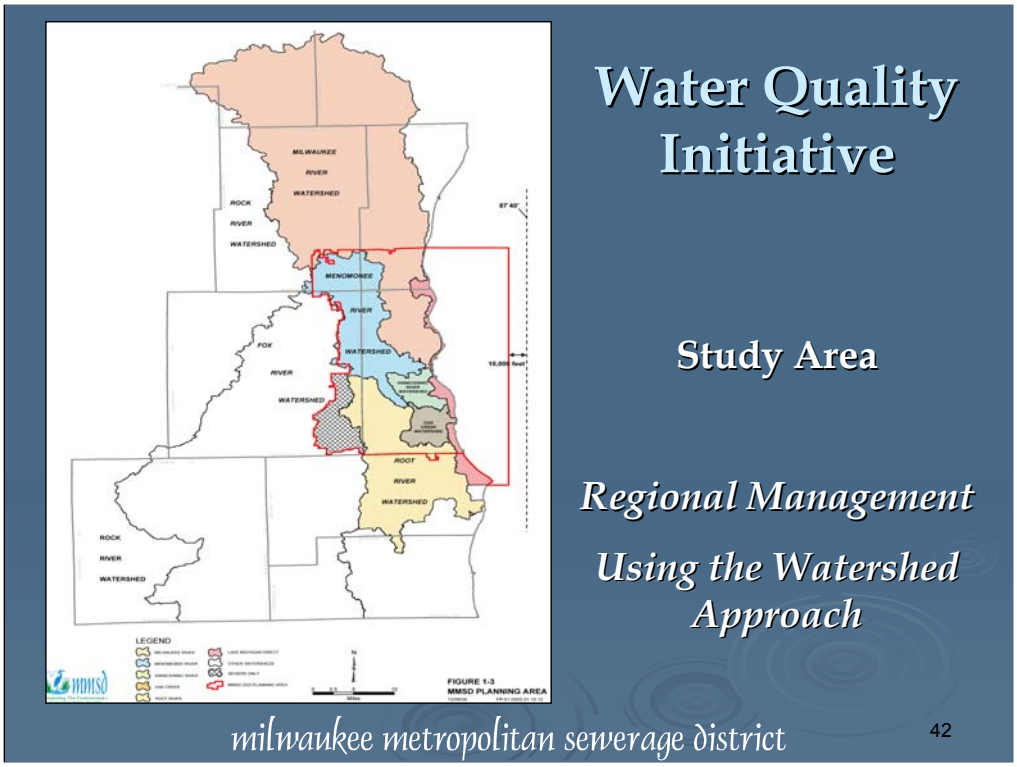


Karen: Explain what the watersheds are.

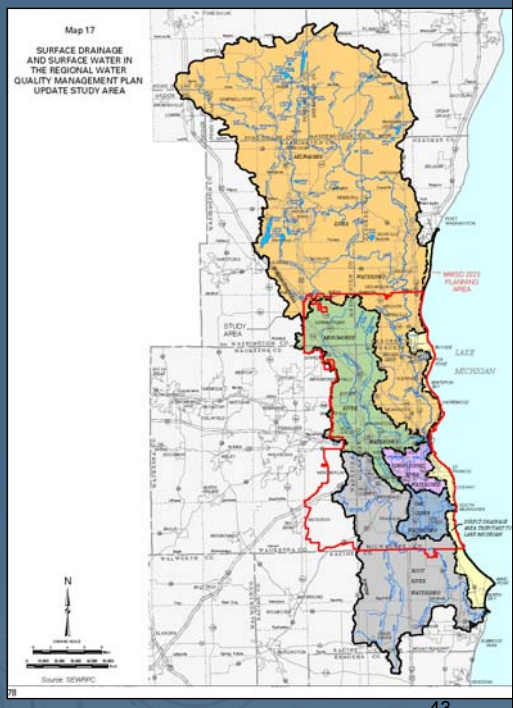
•6 watersheds

•Drainage areas cross geo-political boundaries

•Integrated planning outside of MMSD planning boundary

The Water Quality Initiative
A Watershed Approach

Watershed	Area (square miles)
Kinnickinnic River	24.7
Menomonee River	135.8
Milwaukee River	700.0
Oak Creek	28.2
Root River	197.6
Lake Michigan Direct Drainage Area	40.7
Total	1,127.0
Number of Counties	9
Number of Local Municipalities	83



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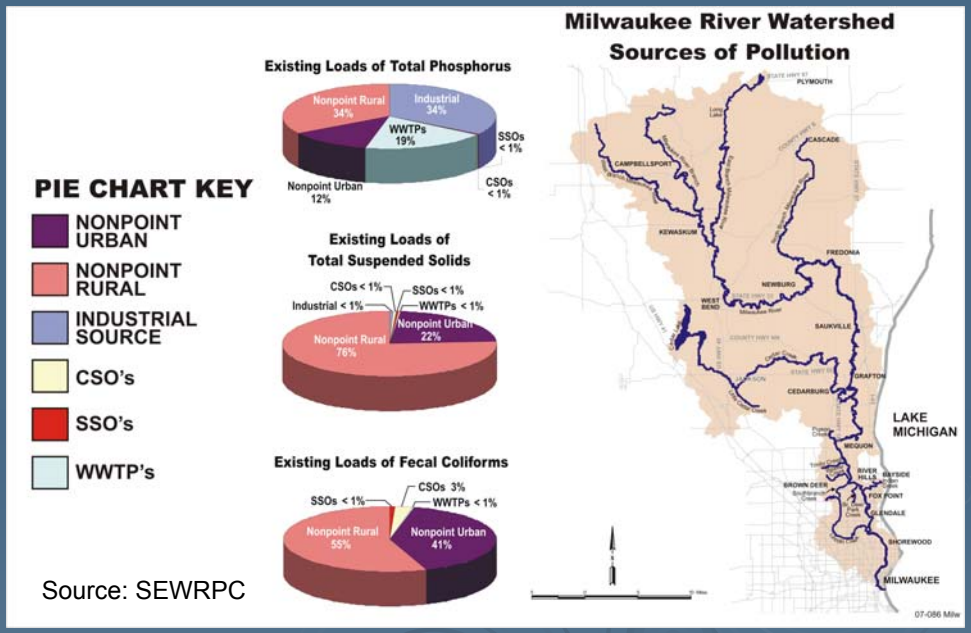
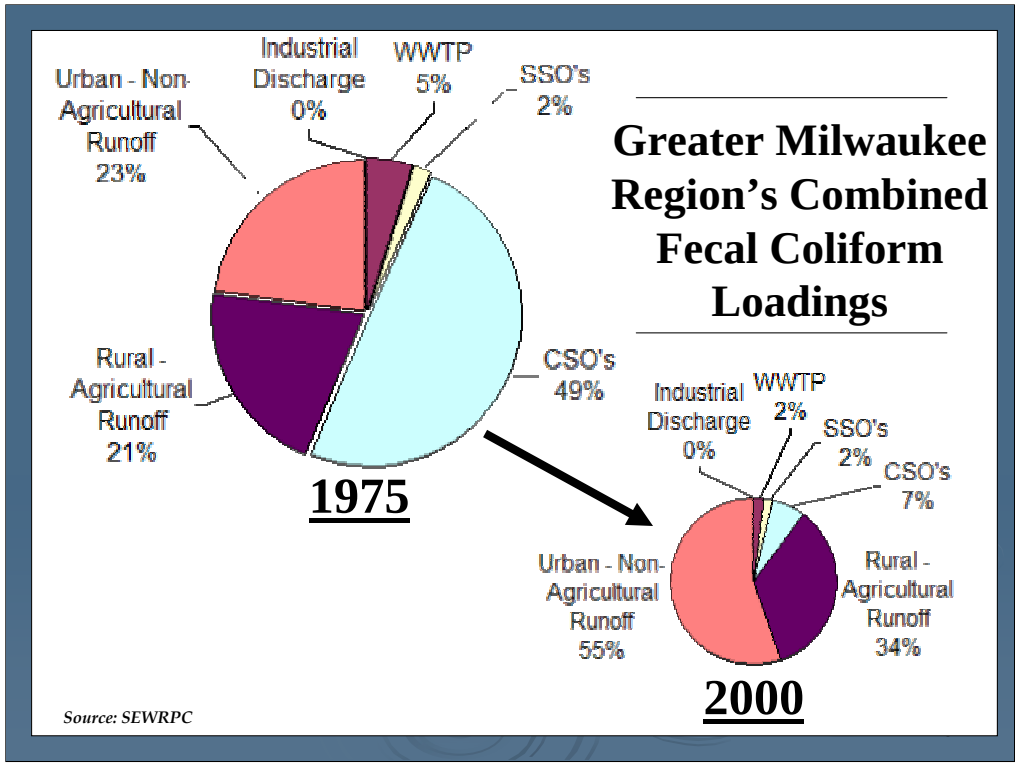


Source: SEWRPC


Greater Milwaukee Region's Combined Fecal Coliform Loadings
Industrial Discharge 0%
WWTP 5%
SSO's 2%
Urban - Non-Agricultural Runoff 23%
Rural - Agricultural Runoff 21%
CSO's 49%
1975
Industrial Discharge 0%
WWTP 2%
SSO's 2%
CSO's 7%
Urban - Non-Agricultural Runoff 55%
Rural - Agricultural Runoff 34%
2000
Source: SEWRPC

Source Identification Studies through University Partnerships

- DNA typing of pollutants
- Fate and Transport Study
- Human Source Studies of Stormwater
- Endocrine Disrupter Investigations

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Expanding Water Quality Monitoring Program

Expanding extensive WQ database with additional ambient in-stream continuous monitoring

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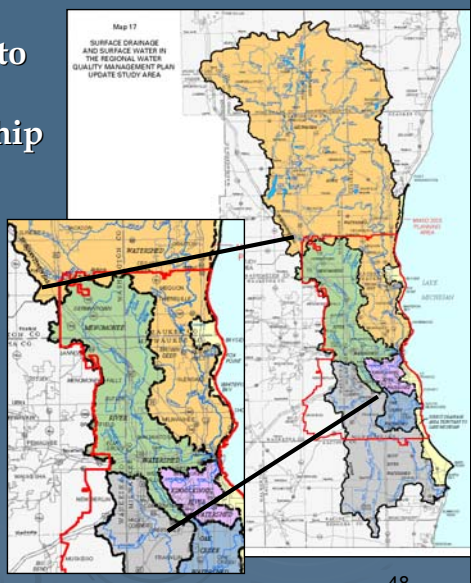
Building From Existing Frameworks

- Building a collaborative effort to look at all pollutant sources (Milwaukee Regional Partnership Initiative, i.e. Milwaukee RPI)
- Expanding 8-Municipality Menomonee River Watershed Stormwater permit
- MMSD to provide monitoring for the municipalities



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Total Maximum Daily Loads for 303(d) Pollutants

- A third-party TMDL will be initiated in Oct. 2007 for the Milwaukee River, Menomonee River, and Kinnickinnic River for the 303(d) listed pollutants.
- Existing modeling is approximately 80% of the TMDL. Menomonee River TMDL will be completed by 2009.

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Working towards a Pilot Watershed Permit

- In-stream water quality data will be the backbone of the permit
- TMDLs will be the measurable goal for 303(d) listed pollutants
- TMDLs will have embedded in them:
  - Targeted Greenseams
  - Targeted Green Infrastructure
  - Discovery Farms / Discovery Watershed approach
  - A timeline with interim milestones
  - Adaptive approach
- Watershed Permit will be the regulatory umbrella for TMDLs

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Water Quality Trading

- A means of bringing a market based approach for inclusion of the non-regulated community into the watershed permit.
- Key component – incorporating agricultural community into the discussion at the table using a market-based approach.

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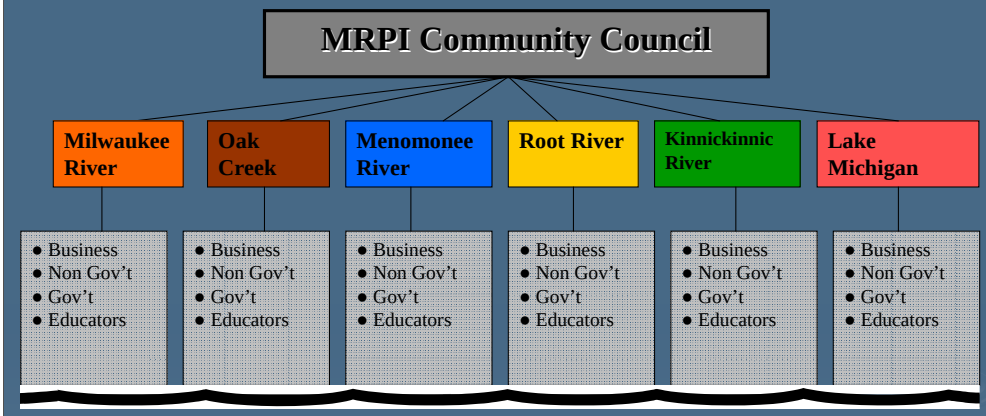
Milwaukee Regional Partnership Initiative



MMSD

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Most Importantly…

- **The Milwaukee RPI along with TMDLs, the Watershed Permit, and water quality trading will provide the path to go *beyond* the current regulatory requirements but in a cost effective manner that maximizes the environmental benefits.**

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But, back to Leadership…

- It all started with EPA
  - Green Infrastructure Statement of Intent
  - August 7, 2007 - Water Quality Trading Toolkit for Permit Writers
  - August 16, 2007 – Use of Green Infrastructure in NPDES Permits and Enforcement
  - August 23, 2007 - New Guidance on Watershed Permitting

  These are tools we needed!!

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Questions?

Kevin Shafer, Executive Director

Milwaukee Metropolitan Sewerage District

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Next Month's Webcast

Nutrient Management in Your Backyard

March 19, 2008, 1-3 pm Eastern

See epa.gov/watershedwebcast

for more details

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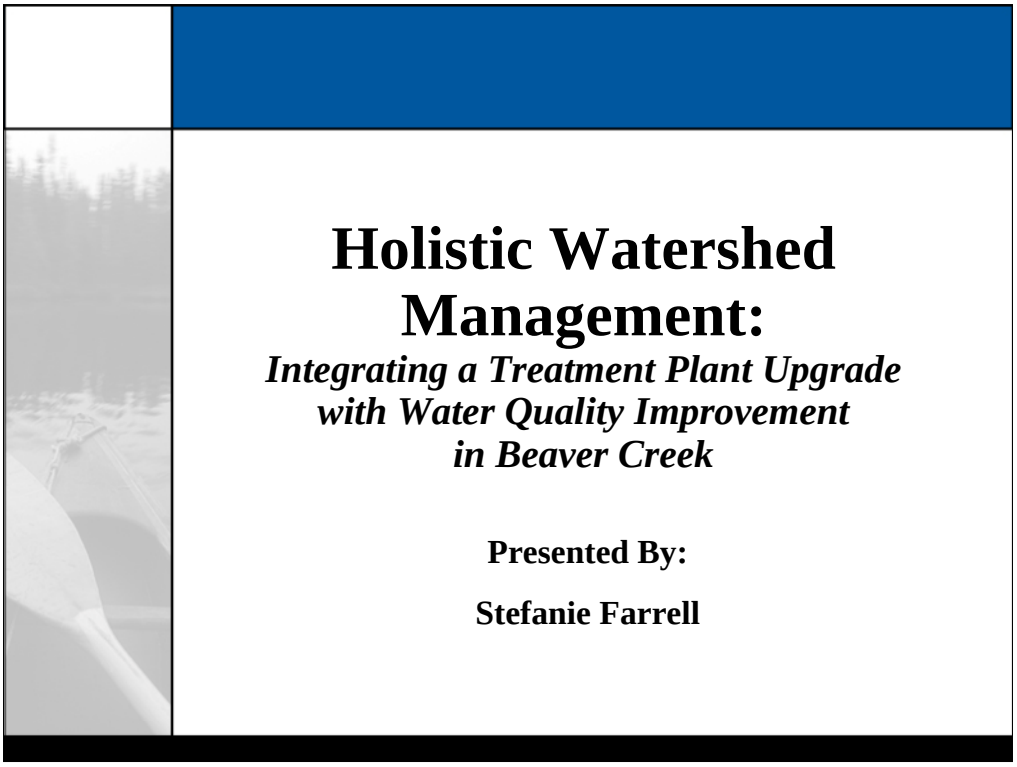
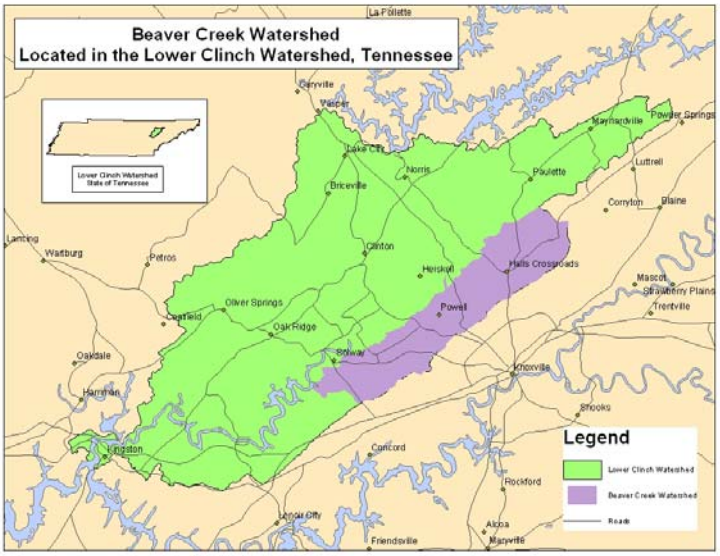
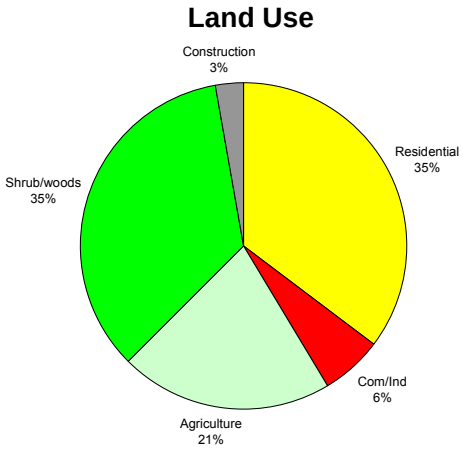

Holistic Watershed Management:
Integrating a Treatment Plant Upgrade with Water Quality Improvement in Beaver Creek
Presented By:
Stefanie Farrell

Background


Beaver Creek Watershed
Located in the Lower Clinch Watershed, Tennessee
Lower Clinch Watershed
State of Tennessee
La Follette
Jacksboro
Jasper
Maynardville
Powder Springs
Lake City
Norris
Luttrell
Briceville
Paulette
Corryton
Blaine
Lamping
Wartburg
Petros
Clinton
Halls Crossroads
Mascot
Strawberry Plains
Trentville
Oliver Springs
Powell
Oakfield
Oak Ridge
Solway
Oakdale
Knoxville
Harriman
Brooks
Kingston
Concord
Legend
Lower Clinch Watershed
Beaver Creek Watershed
Roads
Rockford
Alcoa
Friendsville
Maryville

Background



Causes of impairment:

- Siltation
- Phosphorus
- Nitrate
- *E. coli*
- Habitat Alteration
- Dissolved Oxygen

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Pivotal Projects
Beaver Creek Initiative

- 1998: Beaver Creek Task Force Formed
- 1998: Updated FEMA Flood Study
- 2000: Floodplain no fill line expanded
- 2002: Initial BCW Assessment complete
- 2003: BC Watershed Association formed
- 2003: Part time Watershed Coordinator hired
- 2003: Intensive Watershed Education initiated
- 2003: Site Planning Roundtable convened

Pivotal Projects
Beaver Creek Initiative

- 2004: USA/USSR assessments for 23 sub basins
- 2004: Green Infrastructure plan commissioned
- 2005: 604(b) Watershed Planning Grant
- 2005: GIS Land Use Map update
- 2005: BMP projects initiated
- 2005: EPA Consolidated Watershed Grant
  - Pilot Market Based Ecological Credit Trading Program
- 2006: Developed Watershed Plan

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Beaver Creek Task Force Partners

- Beaver Creek Watershed Association
- CAC AmeriCorps
- Hallsdale-Powell Utility District
- Knox County
- Knoxville-Knox County MPC
- NRCS
- Knox County SCD
- KGIS
- TVA
- TDEC – Water Pollution Control
- University of Tennessee
- USGS
- West Knox Utility District

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Watershed Improvement Projects

- Environmental Stewardship Program
- Ag BMP Projects
- Watershed planning process
- Expand education & outreach initiatives
  - AAW
  - Media...
- Develop construction BMP demonstration sites
- Expand Ag BMP program
- Eco-trading credit $353,000
- Senate approved appropriations bills for $500,000
- 319 Grant for $919,000

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What Is Watershed-Based Permitting?

An ***approach*** to NPDES permitting that results in permits:

- Designed to attain watershed goals with consideration of **all** sources/stressors in a watershed or basin
- A component of the watershed planning framework to better integrate monitoring, water quality standards, TMDL, nonpoint source controls, source water protection and other programs

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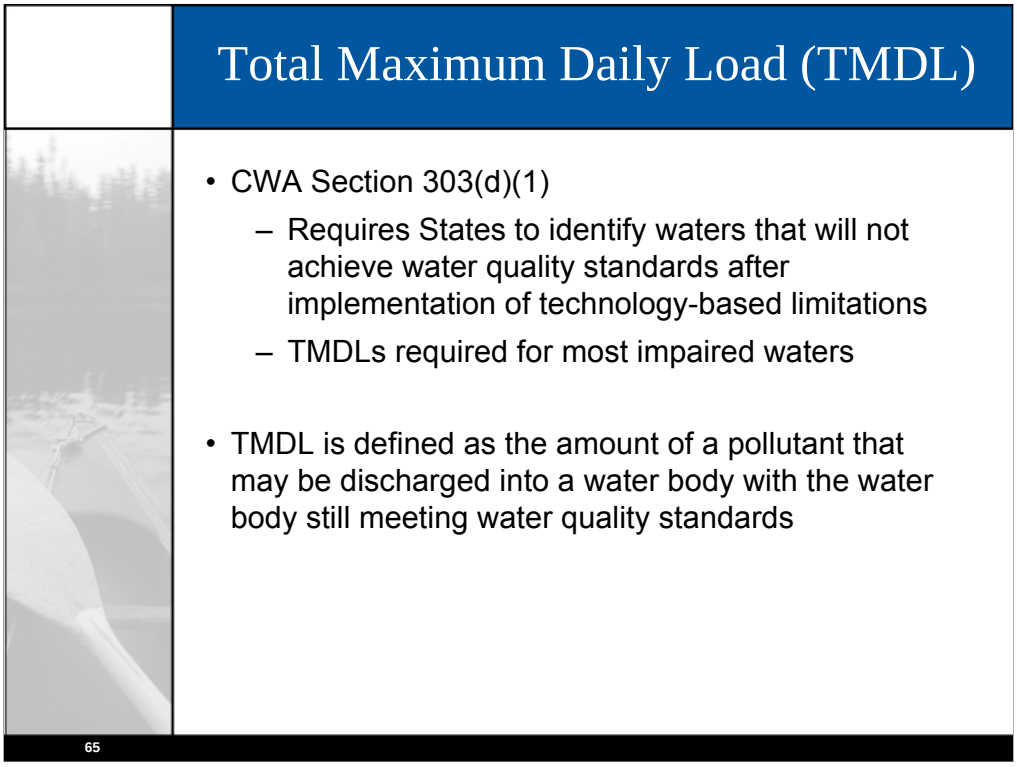


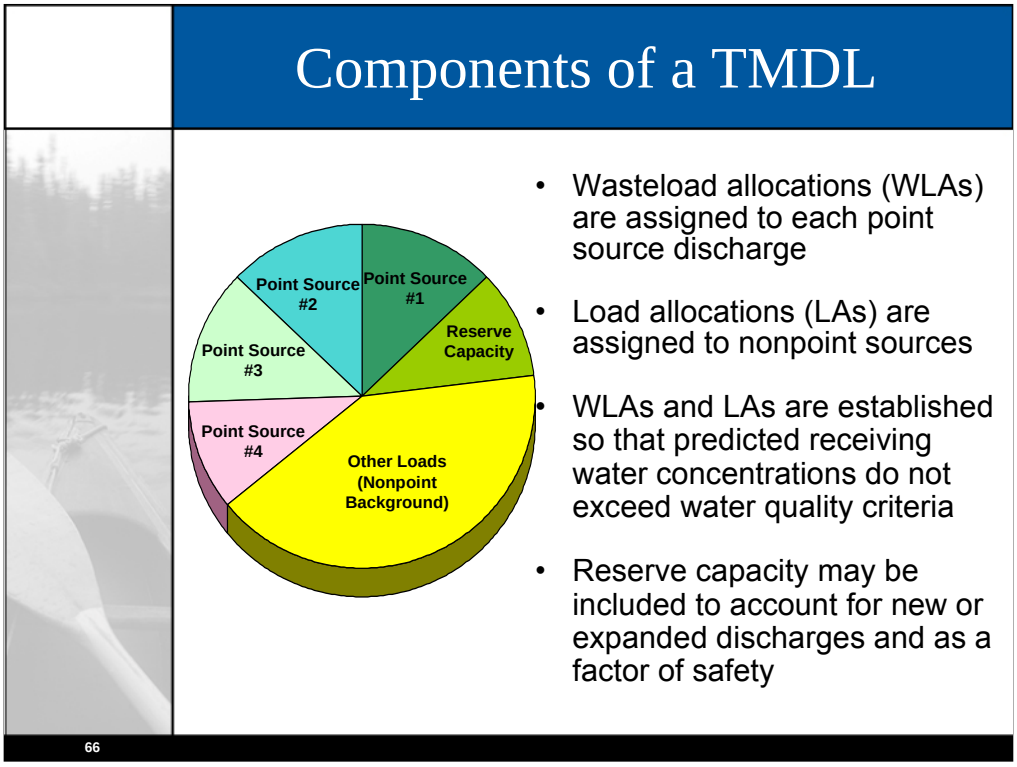
OK....who here has heard of a "TMDL" ??

As many (or most) of you know, environmental groups have sued States and EPA because they have not developed these "TMDLs" as required by the CWA. Therefore, there is a lot of activity now to get them developed.

Now lets talk about what these things are, and why we need to be aware of them.

-- CWA 303(d) requires that every two years, States must list waters that will not meet designated uses after implementation of Tech-based limits. States rank waters, and establish priorities for TMDL development. EPA reviews the list and the TMDL schedule.

Simple enough....but what is a TMDL???



You can think of the TMDL as a "pie" -- where the sum of all of the slices equals the maximum that can be discharged to the water body while still meeting applicable WQS. Generally speaking, there are three types of slices to our pie.

The slices assigned to point sources are called Wasteload Allocations (WLAs) - POLL: How are WLAs implemented?? (through limits in NPDES permits)

The slices assigned to nonpoint sources are called Load Allocations (LAs). - POLL: How are LAs implemented?? (State nonpoint programs - zoning - land use planning ---- Fed tools are very limited)

The third type of slice (allocation) is typically set aside as a reserve capacity to allow future development. This is not required, but sometimes is include so that the TMDL doesn't have to be reopened to accommodate new dischargers. Sometimes this slice is used as part of the Margin of Safety to account for data limitations or modeling, but generally the Margin of Safety is addressed through conservative assumptions in the TMDL calculations.

Basic Steps to Watershed Based Permitting

- Step 1: Select a Watershed
- Step 2: Identify and Engage Stakeholders
- Step 3: Analyze Watershed Data
- Step 4: Develop Permit Conditions
- Step 5: Issue Watershed-Based NPDES Permit(s)
- Step 6: Measure and Report Progress

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Expected Benefits & Challenges
• Benefits
– Emphasis on environmental results
– Promotes watershed monitoring plans
– Encourages efficiencies and targets resources
– Increases stakeholder involvement
• Challenges
– Expands stakeholder involvement
– May involve nonpoint sources
– Investment of agency time and resources
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Water Quality Trading

- **Opportunity to meet water quality goals at lower cost**
  - Primarily nutrients, but other pollutants as well
  - Watershed-scale trading creates more environmental benefits and cost savings
  - Momentum evident in recent years; EPA Guidance in January 2003
- **Prerequisites highlight best opportunities**
  - Multiple sources, significantly different pollutant control costs, sufficient modeling/monitoring
  - EPA Handbook issued December 2004

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Issues with Utility

- Accommodate growth
- Reduce SSO's
- Obligation to ratepayers

Several reasons behind Hallsdale-Powell rate hikes

ED MARCUM
North Notes

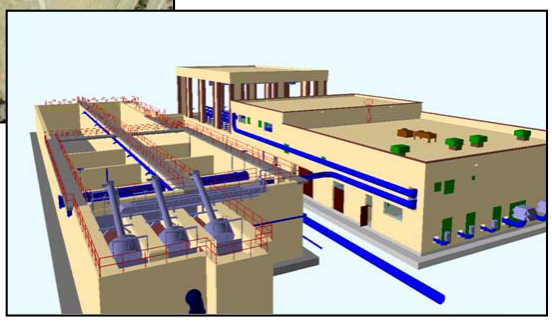
Bills, bills, bills.
Don't you hate them?
Especially when you are asked to shell out more money than usual the next time the hand comes out for a payment.
The News Sentinel's editorial page staff asked me to check out a

decades, rates were left artificially low, and improvements to the system were not done. Also, Hallsdale-Powell is among 14 utility districts in East Tennessee under an Environmental Protection Agency unfunded mandate to improve their wastewater systems, so the district is in a double bind, he said.
Hammond said that when he became CEO in 2000, the district's board of

Hammond said.
Smith said Hallsdale-Powell's problems are not that unusual. Utility districts across the country are facing similar challenges as pipes installed 50 years ago near the end of their life.
In 2002, Hallsdale-Powell hired Raftelis Financial Consultants Inc. of Charlotte, N.C., to develop a rate model that would produce the increases needed to fund the required improvements.

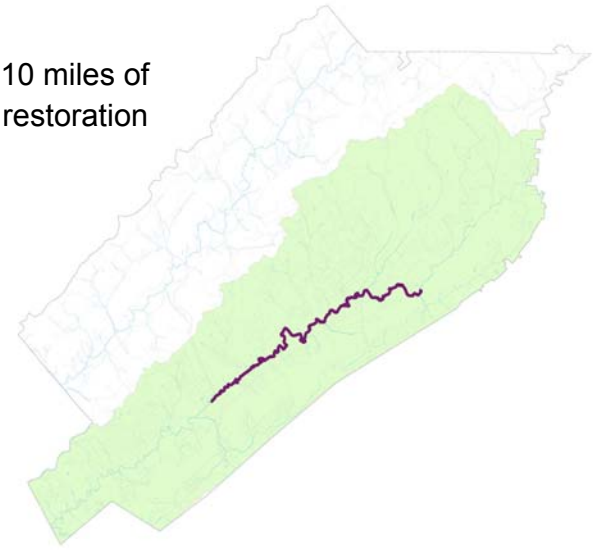
completion of another plant on Norris Lake, which should be in operation by September or October.
The rate model developed by Raftelis is designed accommodate these needs, and unfortunately, it includes a spike in rates to do it, although 2008 would be the last year rate increases would reach into the double digits, Hammond said.
One of the findings by Raftelis was that water rates had been too low for the

Nutrient Removal Costs



Stream Restoration

- Over 10 miles of stream restoration



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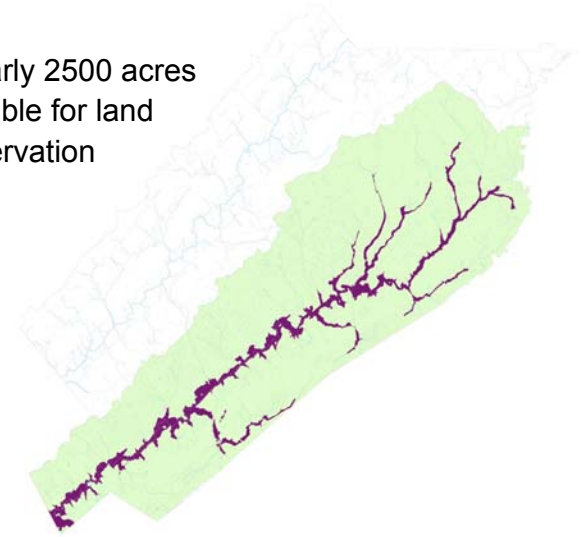
Land Conservation

- Nearly 2500 acres available for land conservation



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Flooding




Targeted BMP's

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Targeted BMP's

Targeted BMP's

Benefits to Watershed Approach

- More ‘water quality’ bang for the buck
- Sustainability
- Community asset

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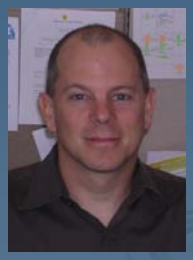
Permit Approach

- Quantify P loading in the watershed
- Comprehensive watershed plan
- Monitoring – chemical and biological

Questions?

Stefanie Farrell, Hallsdale-Powell Utility District

Kevin Shafer, Executive Director
Milwaukee Metropolitan Sewerage District



Andy Crossland, Sustainable Infrastructure Coordinator, U.S. EPA

Check out Additional Resources at:

http://www.clu-in.org/conf/tio/owwuuswa/resource.cfm

Please give us feedback on the Webcast at:

http://www.clu-in.org/conf/tio/owwuuswa/feedback.cfm

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