FOREWORD

On behalf of the National Association of Counties, I am pleased to present Protecting Drinking Water – County Partnerships that Work. NACo understands the importance of supporting county efforts in working with key partners to protect local drinking water sources such as reservoirs and groundwater wells. This document provides examples of what counties and their partners have done to protect their drinking water from potential sources of pollution.

As a Howard County, Maryland Council member, I personally hope that counties will benefit from the experiences presented in this document, whether the county draws water from a particular reservoir or its jurisdictional boundary simply contains the watershed that drains into that reservoir. Howard County is an active partner in the Patuxent Watershed Protection Agreement, one of the drinking water partnerships profiled in this document, even though a small number of Howard County residents actually receive their drinking water from the Patuxent River. Howard County continues to work with the other signatories of the agreement to protect the river because we all have a stake in maintaining the ecological balance within the watershed.

C. Vernon Gray
President of NACo
Chair, Howard County Council
Howard County, Maryland
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EXECUTIVE SUMMARY

Introduction

People who are choosing places to live and work generally do not consider a clean and reliable source of drinking water as a factor in their decision. To most citizens, clean drinking water is a common expectation. Water is plentiful and will always be available. However, if a major spill or a viral contaminant threaten the quality of their drinking water, citizens will contact their local elected officials and demand quick and effective action to reconcile the problem. Even in cases when a county does not own or operate the water treatment plant and distribution system including pipes and pump stations, the county elected officials will be held accountable.

In preparing for such a crisis, many counties, especially those in small rural areas, may need additional staff and resources to address complex problems such as identifying and then minimizing potential causes of contamination to drinking water sources. It is very difficult for county governments to implement a comprehensive drinking water protection program on its own.

Consequently, multi-stakeholder partnerships and consensus building have been effective tools in strengthening county governments’ ability to identify problems and design solutions at minimal costs. Establishing inter-jurisdictional partnerships among key stakeholders (see side bar 1) is often the most efficient and cost effective way to protect a drinking water resource. In addition, forming partnerships is important because surface water watersheds’ and groundwater recharge areas’ are frequently interconnected and often cross political boundaries. (figure 1)

Source Water Assessment Plan

The Safe Drinking Water Act Amendments (SDWA) of 1996 (see side bar 2) broke new ground by focusing on protecting sources of drinking water, not only relying on just the cleaning and processing of water at the water treatment plant. The SDWA required that, by February 1999, each state and participating Indian tribes would develop a “Source Water Assessment Plan” (SWAP) (see side bar 3). Assessments for all Public Water Supply Service Providers are required to be completed by May 2003.

1 Key partners for Drinking Water Protection programs include:
   State agencies
   Other county and municipal governments
   Public water system personnel
   Commercial and industrial National Pollution Discharge Elimination System (NPDES) permit holders
   Community groups
   Agriculture and forestry representatives
   Customers and watershed residents

2 Safe Drinking Water Act Amendments of 1996
   The original Safe Drinking Water Act (SDWA) of 1977 established the first comprehensive drinking water standards. The new SDWA Amendments of 1996 go beyond regulatory enforcement and emphasize protecting drinking water resources through comprehensive watershed protection, state flexibility, and intensive public input.

3 Source Water Assessment Plan (SWAP)
   The Safe Drinking Water Act Amendments of 1996 requires that each state (with proper authority) develop a one-time SWAP. A SWAP explains how states will
   1) delineate source water protection areas, e.g., areas that support public tap water,
   2) inventory contaminants in these areas and assess the water system’s vulnerability to these contaminants, and
   3) submit the results to the public.
With very few exceptions, most states met the February 1999 submission deadline. As of April 2000, EPA had reviewed and approved 47 individual state plans, including Washington DC and Puerto Rico, and was reviewing four more plans. In addition, EPA Region 7 office is still working with Kansas to help finalize their SWAP.

**County Government Role in Protecting Drinking Water**

The source water assessment process, however, is just the first step in building a comprehensive program to protect local water supplies. As stated earlier, counties - whether they own and operate a drinking water system or not - are bearing an increasing responsibility for the protection of drinking water before it is treated at the water treatment plant, “Source Water Protection.” A recent survey conducted by NACo staff of more than 180 counties indicated that only 24 percent of the counties surveyed actually own or operate a water distribution system. However, more than 50 percent of county officials responding to the survey reported having statutory land use authority to protect drinking water watersheds and are often encouraged by their constituency to exercise that authority.

Though a county’s ability to implement drinking water protection programs varies from state to state, the counties can play a leadership role as a catalyst to bring partners together to focus on both source water assessment and protection. Counties play a key role in developing partnerships among stakeholders and this is critical because, again, counties cannot implement drinking water protection projects on their own.

**Why Is Source Water Protection Important to Counties and Local Drinking Water Providers?**

Source water protection enables both county and local leaders to determine if current and planned economic activities may compromise water quality and to assess the impact that future development may have on water supplies. Growth and development may generate potential sources of contamination (figure 2) to local drinking water sources from impacts of malfunctioning...
individual septic systems, increased stormwater runoff; and leaking underground storage tanks. A comprehensive Source Water Protection Program that addresses these potential contaminants can provide savings to the water providers and their customers. It is more expensive to clean up or replace a contaminated source of drinking water than to implement source water protection measures – such as a wellhead protection program (see side bar 4).

Source water protection efforts may allow county and local water systems to realize substantial savings by reducing the need for spending on future capital infrastructure and monitoring needs to meet future regulations. For instance, water suppliers could avoid costs related to compliance with the proposed Disinfection Byproducts Rule since cleaner source water supply requires less disinfection, thereby reducing the cost for removing disinfection byproducts. Water suppliers with drinking water protection programs in place may also be eligible for waivers from monitoring requirements which, in turn, would reduce their monitoring costs. Under the Surface Water Treatment Rule’s filtration waiver program, huge savings are potentially available to drinking water systems with a good source water protection program alleviating the need for expensive filtration systems.

Objective of Report
Local drinking water managers and county and local government officials across the country have already begun working with other stakeholders to provide some measure of protection to their drinking water. Many counties currently participate in watershed protection partnerships and agreements that were initiated before the passage of the 1996 SDWA amendments. This document profiles four examples of county leadership in such efforts and the various tools and strategies that were used. These examples, or profiles, can serve as prototypes to other counties, which are just getting started in the source water assessment and protection process. The profiles include:

- **Patuxent Reservoir Watershed Protection Agreement** - Howard, Prince George’s, and Montgomery Counties, Maryland.
- **Spokane Aquifer Protection Program** - Spokane County, Washington.
- **Olmsted County and the South Zumbro Watershed Partnership** - Olmsted County, Minnesota.

### Terms to Know

- **Watershed** - Land lying adjacent to water courses and surface water bodies which creates the catchment or drainage area of such water courses and bodies; the watershed boundary is determined by connecting the topographic high point surrounding such catchment or drainage areas.

- **Groundwater** - The portion of rain and snow that soaks through the earth’s surface and moves down through the soil - through the unsaturated zone - to the water table. The water table is the top of the saturated zone: the large underground area in which all the interconnected spaces in the rocks and soil are filled with water.

- **Recharge areas** - Groundwater supplies are replenished, or recharged, when water enters the saturation zone by actions like rain or snow melt.

- **Stormwater Runoff** - Runoff from rainfall, snowmelt, or irrigation that picks up pollution as it moves various surfaces, including streets and parking lots, and deposits it into rivers, lakes, and coastal waters, or into ground water.
Another example includes a multi-county, statewide effort in which assistance in developing drinking water protection programs is provided to local and county governments through training sessions, public outreach products and a case study database:

- **Georgia Water Management Campaign - Association County Commissioners of Georgia and Georgia Municipal Association**

These initiatives are taking place in different regions of the country as well as in urban, suburban or rural settings. Though the issues these counties face may vary, the county leadership role is a key factor in initiating these source water assessment and protection efforts.
PATUXENT RESERVOIRS WATERSHED PROTECTION AGREEMENT:
IMPLEMENTING STRATEGIES THAT REDUCE NUTRIENT AND SEDIMENT LOADINGS TO RESERVOIRS.
Howard, Montgomery, Prince George’s Counties, Maryland

“Howard County continues to work with the other signatories of the Patuxent Reservoirs Watershed Agreement to protect the reservoirs and maintain the ecological balance within the watershed. The watershed provides many valuable natural, aesthetic, and recreational resources to Howard County residents. Therefore the protection of the watershed is a key element to sustaining the reservoirs as a drinking water source.”

C. Vernon Gray, President of NACo
Chair Howard County
Maryland

Summary
Studies have indicated that degradation to the Patuxent Reservoirs, Triadelphia and T. Howard Duckett are due to nutrients and sediment runoff and would continue without any protection measures. As a result, the Patuxent Reservoirs Watershed Protection Agreement was developed with the overall goal of establishing an inter-jurisdictional partnership that would implement strategies to protect the Patuxent Reservoirs Watershed. The reservoirs are located in both Montgomery and Howard Counties, MD, between the cities of Washington D.C. and Baltimore, Maryland.

Background
The two Patuxent River Reservoirs are located in central Maryland. The watershed of about 132 square miles is almost equally divided between Montgomery and Howard Counties, with less that 1 percent of the drainage within Frederick and Prince George’s counties. The area is entirely Piedmont and is situated between Washington, D.C. and Baltimore, Maryland. The watershed includes a combination of suburban, rural, and agricultural uses within one of the fastest growing areas in the Mid-Atlantic region. Only a small number of residents living in the watershed get their drinking water from the Patuxent reservoirs since most of them must use water supplied by private wells or from another reservoir system. The reservoir provides drinking water for large portions of Montgomery and Prince George’s Counties and a smaller portion of Howard County.
Over a fifteen year period, several separate studies and monitoring efforts have been conducted on the two reservoirs and the surrounding watershed, and results of these studies are currently being used to develop a source water assessment and protection program. Data from these studies indicated reservoir degradation from nutrients and sediment runoff and further stress would result from continued nonpoint source pollution. The three county resource management and planning agencies and Washington Suburban Sanitary Commission (WSSC), the regional water supplier, agreed that a strategy needed to be developed to protect this drinking water source and its watershed. In 1995, these agencies completed a report “Developing a Patuxent Reservoirs Protection Strategy” which led to the adoption of the Patuxent Reservoirs Watershed Protection (PRWP) Agreement.

Partners involved in the adoption of the agreement included:
- Howard County
- Montgomery County
- Prince George's County
- Howard County Soil Conservation District (HSCD)
- Montgomery County Soil Conservation District (MSCD)
- Maryland National Capital Park and Planning Commission (M-NCPPC)
- Washington Suburban Sanitary Commission (WSSC)

The three county executives; the chairs of the Howard and Montgomery Soil Conservation Districts; the general manager of WSSC; and the executive director of M-NCPPC signed the PRWP Agreement on Oct. 29, 1996. The agreement created two inter-jurisdictional groups, the Patuxent Reservoirs Watershed Technical Advisory Committee (TAC) and the Patuxent Reservoirs Watershed Policy Board (Policy Board). The TAC consisted primarily of local, regional, and state resource management and planning agencies that had been working together informally to examine various tools to protect the Patuxent Reservoirs Watershed. The signatories of the PRWP Agreement, listed previously, formed the Policy Board.
Strategy
The overall goal of the PRWP Agreement was to develop an inter-jurisdictional partnership to implement strategies to protect the long-term biological, physical, and chemical integrity of the Patuxent Reservoirs Watershed. The signatories committed to use a watershed management approach to assure a continued supply of high-quality potable water at a reasonable cost. In addition, the cooperative effort aimed to protect the numerous resources of the watershed including trout streams, stream valley parks, wildlife habitat, farmland and recreational areas.

The mission of the TAC was to carry out the necessary tasks to accomplish the goals of the PRWP Agreement. One of the first tasks was to complete a Comprehensive Watershed Management Planning Study (Watershed Study). The Watershed Study, completed in 1997, laid out a long-term plan of research, activities and public participation for watershed protection efforts.

During the development of the Watershed Study, the TAC recognized the fact that the implementation of any recommendations would require an allocation of cost and identification of possible funding sources. The TAC compiled a variety of funding allocation options and reviewed each option to determine which technique worked best for the watershed. In addition, the process called for input from stakeholder groups to identify allocation techniques that were acceptable to each group’s interest.

It was decided to use a cost allocation based on area of specialty and interest. For example, Prince George’s County funded the watershed modeling work since the county already had the resources and expertise to do it. WSSC funded the reservoir modeling work and Howard and Montgomery counties conducted both the biological/habitat monitoring of the watershed tributaries and the stream corridor assessments. The advantage of this cost allocation technique is that it takes advantage of the existing in-house expertise in the watershed, which reduces costs and can also take advantage of economies of scale. Member agencies have also successfully pursued significant grant funding to support the reservoir modeling ($96,000) and agricultural preservation ($3.25 million).

Costs for the first three years of the action plan (discussed in “Tools Used” section) are listed below. Funding allocation among the partners to support the comprehensive watershed management plan is currently in place.

Action Plan Costs - (totals for three counties)
- FY 1999 - $281,000
- does not include grants of
  1. $850,000 through Maryland Department of Natural Resources (DNR) to acquire easements on agricultural prop-
TERMS TO KNOW


Properties in Montgomery County,
2. $900,000 through DNR to acquire easements on agricultural properties in Howard County and
3. $96,000 through Maryland Department of Environment to support reservoir model development.

FY 2000 - $358,000
does not include state grants of $1.5 million through DNR to acquire agricultural easements in Howard County
FY 2001 - $267,000

Tools Used

The Watershed Study evaluated existing programs and data and identified new activities for more effective watershed and reservoir protection. The recommendations addressed key elements for data collection, analysis, and public outreach initiatives. These recommendations also formed the basis for an action plan and an annual report adopted by the policy board at its first annual meeting in October 1997. The 10 tasks of the action plan included:

- Expand reservoir and tributary water chemistry monitoring
- Expand tributary biological and habitat monitoring
- Perform stream corridor assessments and identify sediment hot spots for potential remediation
- Develop and apply GIS-based watershed modeling tools
- Develop coordinated data and information exchange process
- Establish an enhanced agricultural management initiative
- Initiate regular referral of development proposals for WSSC input
- Seek enhanced on-site wastewater system efficiency for new systems, including those to replace older systems
- Enhance public outreach and involvement initiatives
- Complete annual reports

Since the PRWP Agreement was signed in 1996, through voluntary cooperation among the three counties and the participating agencies and with increased public awareness about the reservoirs and their watershed, a comprehensive protection plan is being implemented which benefits all stakeholders.

Results

To date, the TAC has provided technical oversight and review for:

- “Our Water, Our Land, Our Community” an environmental and cultural curriculum on the reservoirs watershed for use in local schools, developed in the summer of 1996

- On-Site Wastewater Management Practices in the Upper Patuxent Watershed, a study to investigate and recommend low-cost ways of improving septic systems for single-family resi-
dences, completed in April of 1997

- Expanded reservoir and tributary water chemistry monitoring by WSSC and watershed monitoring and assessments by Howard and Montgomery counties
- Watershed and reservoir modeling as calibration efforts get underway
- Successful integration of GIS layers for streams, land cover, protected lands, monitoring, and assessment results on a watershed basis
- Cost-share arrangement among the counties and WSSC to fund a conservation planner for the watershed and to provide a local subsidy for streamside best management practices
- Annual newsletters for residents and resource users of the watershed
- Various outreach activities, including streamside clean-ups, fish habitat creation, videos, workshops, tours, and a watershed awareness day (May 1999)

**Lessons Learned**

According to officials involved in the Patuxent Reservoirs Watershed effort, the success of the activities to protect the Patuxent watershed was due primarily to the adoption of the PRWP Agreement because it required voluntary cooperation and consensus building of all stakeholders. There is greater acceptance of the current watershed activities since they are conducted through an agreement among all the stakeholders. This consensus-building process is time consuming and requires many meetings and hours for technical review. However, the assurance of continued cooperation is already leading to the development of various tools that provide opportunities to make prudent land management and resource protection decisions in the watershed. In addition, the PRWP Agreement has opened the doors to financial support at various levels.
OLMSTED COUNTY/SOUTH ZUMBRO
WATERSHED PARTNERSHIP:
INTEGRATING SURFACE AND GROUNDWATER
MANAGEMENT STRATEGIES TO ADDRESS
GROUNDWATER POLLUTION.
OLMSTED COUNTY, MINNESOTA

“Protecting our drinking water isn’t just about keeping pollution out of our aquifers. It’s about educating and bringing people to the table to discuss our present and future drinking water needs. The South Zumbro Watershed Partnership has played an integral part in educating and training the general public and staff on the importance of protecting and enhancing the St. Peter-Prairie du Chein and Jordan aquifers.”

Jean Michaels
Commissioner
Olmsted County, Minnesota

Summary
The St. Peter-Prairie du Chein and Jordan aquifers, had been vulnerable to groundwater pollution for a long time. This led to a study that recommended the integration of surface and groundwater management strategies. Based on the results of the study, the South Zumbro Partnership was formed in 1986, and this entity began to put the results of its implementation plan into action. The implementation plan, completed in 1996, proposed a number of different pollution prevention and landscape management strategies to protect the priority water management areas of the watershed. The aquifers, located in South Zumbro watershed, are the sole sources of drinking water for the City of Rochester, Minnesota and its adjacent suburban areas.

Background
Olmsted County, located in southeastern Minnesota, is becoming an urban county. Most of the county’s population lives within the South Zumbro Watershed. The City of Rochester is the county seat and is located in the heart of the South Zumbro Watershed. Land use in the upland areas of the watershed is predominately agriculture with most of the cropland in corn and soybean production. The county and city have been among the fastest growing areas in Minnesota over the last 10 to 15 years.

The boundaries of the South Zumbro Watershed approximate the boundaries of the groundwater recharge areas that collectively serve the
Rochester community. Much of the area consists of a karst geology that is characterized by thin soils overlying fractured bedrock. In this geologic setting, precipitation can carry pollutants into underlying aquifers with little or no natural filtration. Consequently, nearly all land uses have the potential to degrade groundwater quality.

Regional groundwater pollution problems were first documented in 1939 when a typhoid epidemic was linked to a community water supply well contaminated by sewage discharged into a stream. By 1960, pollution problems led the county to abandon the Galena aquifer as a source for new drinking water wells. However, studies conducted in the late 1980s suggested the Galena provides up to half of the recharge to the city’s principal aquifers and work is now underway to identify and protect upstream recharge areas.

In the spring of 1995, Olmsted County played the lead role in forming the South Zumbro Watershed (SZW) Partnership. The SZW Partnership provided an opportunity for all governmental units to contribute their expertise and input into the collaborative efforts to protect the watershed. The SZW Partnership included:

- Olmsted County
- City of Rochester
- Rochester Public Utilities
- Olmsted County Extension Service
- Olmsted Soil and Water Conservation District (SWCD)
- Other state and federal agencies

This SZW Partnership was formed as a result of a wellhead protection study that was funded through a Clean Water Partnership grant provided by the Minnesota Pollution Control Agency. In fact, the SZW Partnership’s current annual budget of approximately $73,000 is funded through the same state program.

The purpose of the Wellhead Protection study was to identify areas of the St. Peter-Prairie du Chein and Jordan aquifers that were most susceptible to contamination from nonpoint pollution sources. The study’s results indicated a need to integrate surface and groundwater management strategies in order to protect the drinking water for the city and the adjoining suburban areas.

As a result of the Wellhead Protection Study, the SZW Partnership formed a management team to develop an implementation plan that
would incorporate both surface and ground water management protection strategies for the two aquifers, as recommended in the study. The management team consisted of staff from all the formal members of the SZW Partnership.

The Southeast Minnesota Water Resources Board also played a role in developing the plan by providing input and feedback during the early stages of the discussion process. The board assisted the SZW Partnership by working with the management team in defining strategies for an effective, comprehensive water management program. The board was a good resource because, since its inception in the 1980s, it had coordinated county-based water resource planning and implementation activities in the nine county-region. The board was originally formed out of a regional effort among the county/local governments in the sensitive karst region, in addressing regional groundwater and solid waste problems.

**Strategy**

The plan was completed in the fall of 1996 and identified seven critical elements for improving the quality of the water resources in the watershed. These included turf and landscape management; stormwater management; hazardous material management; wastewater management; sealing of unused wells to reduce any contaminants leaking from the well into the groundwater; farmstead management; and coordinated nutrient, pesticide, and feedlot manure management.

The SZW Partnership employed various strategies to address each of the elements listed above. One key strategy was employing a full-time coordinator, for water resource management activities, to report directly to the management team. The coordinator and the management team developed a public relations strategy that entailed reaching out to the public - through newsletters, educational programs, and technical assistance - on issues specific to the South Zumbro Watershed. To further involve the general public in the activities of the watershed, a volunteer network for education and monitoring was created.

In addition, the SZW Partnership established a low-interest loan program for residents, farmers, and businesses to implement best management practices and technologies. The SZW Partnership also provided funds for local agencies to pilot new services and new approaches. This allowed new practices and technologies to be sufficiently demonstrated.
Tools Used and Results
The SZW Partnership has demonstrated great success in assisting local governments, businesses and private citizens in protecting the St. Peter-Prairie du Chein and Jordan aquifers and surrounding watershed. This has been accomplished through education, technical training, and financial assistance. The activities resulting from the Partnership’s efforts include:

Education and Outreach
 ➤ A survey of turf and landscape management practices at 100 homes was conducted and soil samples were taken. The results of the survey and sampling were used to develop an educational program to encourage better management of lawn fertilizer, grass clippings, leaves, and pet wastes.
 ➤ Weather resistant educational signs were installed at 250 storm drains that discharge into Cascade and Silver Lakes.
 ➤ All major appliance retailers in the Rochester area were trained to better encourage the sale of water conserving washing machines, estimated to be 20 percent of all washer sales in the last several years.
 ➤ Other educational and outreach programs have included: newsletters, newspaper articles, radio advertising, posting time learning signs at projects and along bike paths, volunteer training, school programs, and a children’s water festival.

Demonstrations and technical training:
 ➤ Demonstration low-maintenance landscapes were installed at the Olmsted County Extension Service Building and at the County Human Services Campus. Educational signs were placed at each site.
 ➤ A demonstration of an innovative conservation oriented on-site wastewater treatment system was installed and monitored.
 ➤ A septic system owner’s manual was developed and distributed to septic system owners, realtors, and lenders.
 ➤ A riparian buffer demonstration was installed along Cascade Creek.
 ➤ On-site farm demonstrations are conducted each year to illustrate best management practices for manure, fertilizer, herbicides, and insecticides.
 ➤ Two conferences were held in the last several years and brought scientists and government staff together to develop a plan for identifying and protecting groundwater recharge areas. As a result, consultants were recently hired to complete the last of the recommended actions from these conferences, to produce an inventory of the groundwater recharge areas, and to develop model site plans and proposed zoning ordinance changes to protect the recharge areas.

Terms to Know

Aquifer - The area in which groundwater is located is called an aquifer. Aquifers store water because the rocks and soils that they are made of are porous, that is, characterized by large open spaces; and they transmit or move the water if they are permeable, that is, if these open spaces are large and interconnected.

Karst - Areas that have underlying dissolvable bedrock such as limestone or dolomite. There is generally much more interaction between groundwater and surface water in karst regions than in non-karst regions.

Nonpoint Source Pollution - Unlike pollution from industrial and sewage treatment plants, nonpoint source pollution comes from many diffuse sources. Rainfall or snowmelt moving over and through the ground causes this type of pollution. As the runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands, coastal waters, and even underground sources of drinking water.

Farmstead - The buildings and adjacent service areas of a farm.

Riparian buffers - A relatively narrow strip of land that borders a stream or river, often coincides with the maximum water surface elevation of the one-hundred year storm.
Best practices and nutrient management plans:
- Prairie restoration projects were undertaken at three prominent sites as part of highway construction and reconstruction work. Educational signs were installed at each of the sites.
- A prairie nursery was established at Chester Woods County Park. The nursery will be used as a seed and plant source for prairie restoration projects along highway right-of-ways and at county parks.
- Nutrient and manure management plans were developed at over 85 farms covering an area of 26,000 acres. This resulted in more efficient use of 107,000 tons of manure and reduced the use of commercial fertilizer.
- Farmstead assessments were conducted at over 100 farms to identify and correct potential groundwater pollution problems.

Monetary assistance and low interest loans to encourage private conservation efforts
- Rebates were provided to homeowners to purchase water conservation kits to retrofit water usage devices such as faucets and toilets in over 900 homes and businesses.
- Low-interest loans were provided to landowners to finance the following activities: (1) replacing individual sewage treatment systems, (2) sealing unused wells, (3) purchasing water conserving appliances, (4) using conservation oriented landscaping techniques, (5) constructing manure storage facilities, (6) purchasing tillage and chemical reduction equipment, and (7) funding for other agricultural land use structures.
“There are over a hundred well fields operated by 20 major water suppliers that draw water from the Spokane Valley - Rathdrum Prairie Aquifer to serve the citizens of Spokane County. As these well fields are scattered over 125 square miles in Spokane County, it is easy to understand why every well might be down stream from some potential contamination source. County government, with its general planning and legislative authority, is the natural candidate for coordinating the needed regional aquifer protection effort.”

Kate McCaslin, Chair, Spokane County Board of County Commissioners
Spokane County, Washington

Summary
A study identified the primary sources of contamination to The Rathburn Prairie-Spokane Valley Aquifer as being: numerous failing or leaking septic systems, stormwater runoff, landfills, and other urban pollution sources. A technical advisory committee was formed to develop the Water Quality Management Plan, which proposed recommendations for managing all of the identified potential sources of contamination. (see side bar 1). The Aquifer is located in north Idaho and eastern Washington.

Background
Spokane County, which includes the City of Spokane, is located on the Washington-Idaho border. The Rathdrum Prairie-Spokane Valley Aquifer, which covers nearly 400 square miles in north Idaho and eastern Washington, flows through Spokane Valley and under the City of Spokane. It is the sole source of drinking water for nearly 400,000 people living in the Spokane-Coeur d’Alene (Idaho) area. Approximately 300,000 people live over the aquifer in Washington, as do approximately 60,000 in Idaho. The water table\(^1\) varies from 30 feet to 180 feet, and in some areas is exposed to surface water remaining in abandoned gravel pits.

The aquifer was highly vulnerable to contamination due to the fact that it was located close to the surface and that the protective between the aquifer and surface was a highly permeable\(^2\) protective layer consisting mostly of...
sand and gravel. As population growth continued, elected officials commissioned a study entitled the Spokane Aquifer Cause and Effect Report and the subsequent development of the Water Quality Management Plan. The two-year study indicated that the primary potential source of contamination to the aquifer was leaking individual septic systems. Additional potential impacts resulted from injection of stormwater through dry wells; leachate from landfills over the aquifers; and other urban pollution sources such as chemical spills, lawn fertilizers and household chemicals.

**Strategy**

Once the study was completed, the Spokane County Engineers Office was given the responsibility to develop the plan. Several groups were also involved in this effort including:

- Spokane County staff members
- City of Spokane staff members
- Spokane Regional Health District

The technical committee was formed to provide technical advice to the study staff and included representatives from key agencies and departments such as the city and county planning commissions, city and county engineering departments, the health district, and soil conservation services. The citizen committee had 40 representatives from various interests such as the local chamber of commerce, local homebuilders association, water suppliers, sand and gravel extractors, professional engineers, environmental groups and individual citizens. The citizen committee was formed to be a public outreach advisory to the study staff. (please see side bar 2)
The Water Quality Management Plan was completed in the spring of 1979. The plan included recommendations for managing all of the identified potential sources of contamination. Many of the recommendations called for public education. The initial cost of the study/plan was $600,000 (1977-1979) which included:

- $140,000 from the Washington Department of Ecology for monitoring
- $460,000 through Section 208 (Clear Water Act) funds - local match of $115,000 of which 10% ($60,000) was in the form of in-kind services

The plan also called for creation of an Aquifer Protection Implementation Office to provide staff support and technical expertise to other agencies (e.g. local government entities) identified as having a role in implementing the recommendations of the plan. The office is currently located in the Spokane County Public Works Department and since 1980 has been jointly funded by the city and county with additional support from the Washington Department of Ecology. A key role for the office is educational and public information activities and requires a budget of approximately $200,000/year.

The office, with a staff of two to three people, currently is funded through the county’s Aquifer Protection Area taxing district, which generates $2.25 million to $2.50 million per year. The new county taxing district is an important feature of the Spokane program since all revenue raised through this mechanism is directed to the aquifer protection area. The funds primarily are used for building and extending sewers, but again are also used to support activities of the Aquifer Protection Implementation Office. Before the taxing district was established, the office went through some lean times and there was only one staff person.

In order for the Water Quality Management Plan to have a regional focus, Spokane County and the City of Spokane initiated the plan under the Spokane Regional Planning Conference. The conference, which was the closest entity to a regional government at the time, was used as an umbrella agency to promote the involvement of other local jurisdictions to participate on the advisory committees. One key element of the intergovernmental cooperation was the representation of the Panhandle Health District in Idaho on the technical committee.

**Tools Used**

The Water Quality Management Plan intended to eliminate the major contaminants at the source and restore the water quality of the aquifer to the levels of the late 1970s. The major tools used to implement the plan include the following:
Zoning ordinances and development restrictions -
Spokane County incorporated recommendation of the Water Quality Management Plan into its comprehensive land use plan. The land use plan adopted Aquifer Sensitive Area (ASA) overlay zones to regulate land use, stormwater, on-site septic systems and hazardous materials in the ASA zones. An important feature of the land use plan was to encourage in-fill development in areas with central sewer services or areas that will be supplied with sewer services over the next ten years (priority area). Development in the ASA zones will be limited and land uses in the rural surrounding areas would remain agricultural. (please see side bar 3)

Wastewater Management Plan - The Wastewater Management Plan recommended the following actions: identify priority sewer service areas for new development, extend central sewer service areas, and establish interim septic system design requirements for new development.

Stormwater management - A stormwater management manual was developed. The manual specified construction practices for stormwater controls in newly developed areas and required all developed land in the ASA to incorporate stormwater runoff treatment facilities, if deemed feasible by county engineer. The manual consist of guidelines for using bio-filtration methods (e.g. grass swales, berms) for these stormwater runoff treatment facilities.

Critical Materials Ordinance - Spokane County enacted an ordinance establishing procedures for handling and disposal of critical and hazardous materials used by all entities located over the aquifer. The ordinance required that facilities using or storing such materials be connected to a central sewer system. Alternative protection methods - such as sealed lagoons, holding tanks, use of licensed haulers, etc. - were identified. The ordinance also required facilities constructed after the date of adoption to have secondary containment for all critical material storage areas.

Public Education - This effort included developing outreach materials such as brochures, curriculum materials for schools, newspaper advertising, radio Public Service Announcements, and bus placards that raise public awareness of where water comes from and what protects it.

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3 Spokane Aquifer Protection Program - The comprehensive land use plan has been amended several times since 1980. Each revision has included most of the philosophical framework of the first version that was developed in coordination with Water Quality Management Plan. Currently the plan is being updated as part of the county’s program to comply with the state of Washington’s Growth Management Act. The objective of the Growth Management Act is assuring urban services, such as water and sewer, are available in urban areas and preserving open space and agricultural lands. The latest revision will provide the strongest aquifer protection to date.
Results
As of today, the program for protecting the Spokane Valley-Rathdrum Prairie Aquifer is viewed a success on several accounts. A major goal of the program and thus a key indicator for measuring its success is maintaining or improving the aquifer’s water quality. A ground water monitoring program, which has been tracking the water quality of the aquifer for several years, indicates that the degradation of water quality in public water supply wells observed in the 1970’s has been stopped. The concentrations of several contaminants of concern, in most wells, have leveled off. A prime reason for this lies in the success of the major protection efforts that resulted in the reducing the number of individual septic systems located over the aquifer (from 40,000 in 1979 to only 22,000 in 1999) even though the population increased by 50 percent over the same 20 year time frame. This scenario was due to the increase in commercial and residential hook-ups to central sewer systems.

The program to control potential sources of chemical contamination has also been successful. Local ordinances, requiring secondary containment systems in all on-site facilities containing potentially hazardous chemicals, have been adopted. Strict rules calling for tank tightness testing for all single-walled underground storage tanks coupled with the double containment requirement for new tanks, has resulted in the removal of over 2,000 substandard tanks over the aquifer. Nearly all of the remaining tanks currently meet the double containment requirement.

Finally, the landfilling of municipal solid waste over the aquifer has been stopped, and all three of the landfills have been closed.

Lessons Learned
While there is still considerable work to do, progress has been made addressing all of the major potential contaminant sources. In light of the improvement in water quality of the aquifer however, there is constant pressure to relax some of the standards. One key success of the aquifer protection program is the support of a well-educated public. The public has been involved in the program from the beginning through comprehensive public education efforts. As a result, the public continues to endorse and contribute to the program by adhering to the recommendations proposed by the Water Quality Management Plan and participating in activities of the citizen committee because they understand the importance of aquifer protection.

Terms to Know

i  Water Table - The top of the saturated zone: the large underground area in which all the interconnected spaces in the rocks and soil are filled with water.

ii  Permeable - A porous surface in which water passes through quickly.

iii  Leachate - Materials readily soluble in water and removed and transported in solution to groundwater.
GEORGIA WATER MANAGEMENT CAMPAIGN: ASSISTING LOCAL GOVERNMENTS IN INTEGRATING WATER MANAGEMENT POLICIES IN THEIR DECISION MAKING.

“We must move beyond resolving water problems on a crisis basis so that in the future when a water faucet is turned on or there is a need for water dependent industry in your community, we will have done the things that ensure a good supply of quality water as we all desire.”

Sherrill Stafford
Houston County chairman and Georgia Water Management Campaign co-chair

“Education and public input are the big key no matter what we do or how we do it; education from county to county, citizen to citizen, and jurisdiction to jurisdiction is needed to make sure we understand all of the issues to make intelligent decisions.”

David Hankerson
Cobb County Manager

Summary
The Georgia Water Management Campaign was established to enhance the abilities of local government officials to protect Georgia’s water resources. The campaign assists local governments in integrating water management policies in the decision-making, guidance, and technical assistance they provide to their local citizenry. This is to be accomplished through enhancing communication among all key stakeholders, encouraging local governments’ commitment to protecting and managing Georgia’s water resources, and providing technical assistance and training programs to county and city officials.

Background
A majority of the population living in the state of Georgia gets its drinking water from surface water sources such as lakes and rivers. State and local officials agree that one of the greatest threats to Georgia’s drinking water is nonpoint (diffuse) sources of pollution. As growth and development increases in various parts of the state, the degradation of local water quality due to nonpoint source pollution, especially stormwater runoff, increases as well. The growth in the state is evident by the fact that the population of the 16 largest counties in the state increased by 51 percent over the past 25 years. The 55 fastest growing counties in the state are expected to have a population in excess of 6.7 million people by 2010, more than Georgia’s total population in 1990. This growth increases both the demand for and the threats to Georgia’s drinking water sources.
Since the local government system is very fractured in the state, with 159 counties and approximately 540 municipalities, the Association County Commissioners of Georgia (ACCG) decided to play a formal role in facilitating regional water management discussions throughout the state. During the late summer of 1997, ACCG met with key water resource management representatives within the state to determine whether it was possible to establish a program that would blend ACCG’s strengths with the identified goals of the Safe Drinking Water Act set-aside program. The SDWA Amendments of 1996 required EPA to award capitalization grants to the states through the Drinking Water State Revolving Fund. Funding from the set-aside program was used to initiate the activities of the Georgia Water Management Campaign (Campaign). The funding was provided through a $1 million multi-year grant.

The Campaign was formed as a three-party contract between the Georgia Environmental Protection Division, the Georgia Environmental Facilities Authority, and the ACCG. The Georgia Municipal Association, central voice for municipal governments in Georgia, endorsed the Campaign and, with the ACCG, established a 21-member Local Government Policy Advisory Committee. Members of the advisory committee serve as the Campaign’s ambassadors and provide overall guidance on how best to achieve the goal of capacity building, for local governments, in water resource protection. The Campaign currently serves as a mechanism through which local governments can develop long-term water management strategies that work to guarantee an adequate supply of safe drinking water is available to both

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**Georgia’s 52 Watersheds**

Figure 5  Georgia’s 52 Watersheds
serve the current population and to meet the demands of newly arriving businesses and residents. The Campaign also facilitates effective dialogue among all key officials to network and discuss ways to address impacts of growth and development on drinking water quantity and quality.

**Strategy**

The Campaign promotes stakeholder involvement in developing and implementing effective strategies for water management. To accomplish its mission, the Campaign works to:

- **Enhance leadership communication and build community awareness by:**
  1. holding leadership summits of officials from local, state and federal governments, legislators, policy makers, industry leaders, academia and water professional associations. The summit provides these stakeholders a “bottom up” and “top down” understanding of the issues that affect how water resources are managed and protected in Georgia.
  2. developing a shared vision to effectively manage and protect water resources in Georgia.
  3. developing outreach and awareness tools - such as public service announcements on the Safe Drinking Water Act and taped sound bites and videos - for local governments to release to local communications media, local cable access channels and public television affiliates.
  4. enhancing public and official awareness of local governments’ role in protecting water resources and providing drinking water.

- **Provide technical assistance and training programs by developing:**
  1. guidance and policies on establishing and maintaining local government comprehensive water management programs including case studies.
  2. local government, executive training program for local officials in addressing various drinking water related issues such as source water protection, drinking water capacity development (technical, financial, and managerial capabilities), public/private partnerships, etc.
  3. model agreements and criteria for local governments’ use in working with privately owned community water systems.
Tools Used
A key part of the Georgia Water Management Campaign’s educational effort is to provide technical assistance to local governments through a series of water resource case studies. ACCG has a database of case studies that provide local government decision-makers with background information on topics of interest tied to water resource management. In many of these cases, local government officials have developed regional cooperatives or authorities in addressing both drinking water quality and quantity issues. In the development stages of these cooperatives or authorities, local government officials agreed to commission studies to assess the various vulnerabilities of their drinking water to pollution. These studies usually led to formal agreements to manage and protect water resources. The campaign uses case studies as an education tool because they provide “how to” information about local governments using partnerships and regional cooperation to take a proactive approach in protecting the local watersheds. The City of Thomson/McDuffie County Multi-Jurisdictional Water Commission case study (see side bar 1) and many others are available on the ACCG’s website.

Results
The Campaign is in the early stages of engaging local government officials in the protection of Georgia’s water resources. The campaign has developed a case studies database and in 1998, sponsored a Georgia Water Resources Leadership Summit with key local, state, and federal officials. The summit facilitated open dialogue among these officials on water resource management concerns in the state. The two-day summit was a success as approximately 320 participants attended the summit, including three members of the Georgia U.S. congressional delegation and key federal and state resource staff from Washington D.C., Georgia and Florida. The campaign is currently planning to hold another statewide water resources summit in the spring of 2000.

Case studies and the summit are just the beginning of a series of technical assistance and public education tools that are being completed and disseminated to local and county officials. The Campaign is currently developing public service announcements and technical guidebooks. In addition, the Campaign recently conducted a two-day conference on the topic of erosion and sediment control. The purpose of the conference was to educate local government officials on proper erosion and sediment management practices. Approximately 200 local officials attended the conference and they viewed a video “When Red Clay Meets Blue Water.” Burst Video/Film, Inc. produced this video for the Georgia Water Management Campaign. In addition, each attendee received a “Soil Watch Tool Kit” prepared for local governments by the Campaign in collaboration with the upper Chattahoochee Riverkeeper. The
Campaign will continue holding these conferences addressing nonpoint source pollution and stormwater impacts to drinking water.

**Lessons Learned**

The Georgia Water Management Campaign was developed to assist both county and city governments in managing water resources, especially those that are sources of drinking water. An adequate and safe water supply has an effect on land use decisions, economic and community development, public safety/fire service provision, and health care. ACCG officials felt that it was critical for county governments to recognize the significance of a clean water supply and plan accordingly. Though counties in other states may not have a resource such as the Campaign, counties can seek out any assistance or technical expertise that may be available to them, either through their own state association of counties, state agencies, or other locally directed programs. It is also important for counties to coordinate with other key stakeholders to implement effective water resource, management programs.