Local Watershed Management Planning in Virginia

A Community Water Quality Approach

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Section One

Watershed Management Planning – An Overview

A watershed management approach can help coordinate ongoing or proposed natural resource-based planning efforts.

Local Watershed Planning

Environmental planning conducted by local governments, agencies and communities requires prioritizing goals and addressing needs that incorporate a wide range of social, economic and environmental factors. Considerations about water quality, stream management, habitat restoration, and the relationship between land use planning and healthy watersheds have become key components of planning at community and regional levels.

Over the past decade, the benefits of using watersheds as realistic delineators for natural resource planning efforts have been gaining attention. More localities are using watershed management planning either within their existing comprehensive planning or to promote regional cooperation. On the state level, the development of tributary strategies to reduce nutrient and sediment pollution in the Commonwealth's waters exemplifies watershed-based planning. At the community level, many local groups are initiating their own watershed planning processes.

The Virginia Watershed Advisory Committee (VWAC), a consortium of Virginia agencies, regional organizations and local government representatives involved in watershed management and restoration, developed this guide to give communities tools to develop local, effective, community-based watershed management plans. These plans are a framework to improve management of Virginia's 494 watersheds through strategies encompassing local solutions.

Effective watershed management plans can help Virginia's local governments meet new regulatory requirements, including Total Maximum Daily Load (TMDL) and stormwater provisions of the federal Clean Water Act. Plans developed locally also will help the state meet commitments in the Chesapeake 2000 Agreement. Most importantly, watershed plans enable communities to make appropriate decisions at a level that allows them to meet local residents' needs, such as improved water quality or enhanced recreational opportunities.

VWAC recommends a watershed management plan with eight basic components to effectively capture local needs, while assisting with meeting state commitments previously mentioned. This guide provides background narratives for those eight components, as well as a related checklist. It also explores the relationship between local watershed management planning and larger state and federal water quality programs such as TMDLs and other Clean Water Act programs.

Intended Audiences

Local government agencies and departments, including engineering, public works and planning, interested in devising a coordinated plan to manage and protect their local natural resources will derive the most use from this guide. Entities involved in regional planning, such as soil and water conservation districts and planning district commissions, can use it to establish a framework for their watershed planning processes. Additional users may include elected bodies, such as city councils and boards of supervisors, as well as appointed officials, such as planning commissioners or water planning boards.

Watershed: The area from which waters flows to a given river, spring, lake, ocean or other body of water. Elevated land forms divide watersheds. In Virginia 494 local watersheds encompass approximately 50,000 miles of rivers and streams.

Watershed management: An effort to coordinate and integrate natural resource based programs, tools, resources and needs of multiple stakeholder groups within a watershed to conserve, maintain, protect and restore habitat and water quality.

Watershed management plan: A detailed vision and strategy, usually at the small watershed level, to achieve watershed management. Many times initiated by local governments in conjunction with other local planning efforts, watershed management planning identifies specific actions to restore habitat and water quality, lands for conservation and development, and ways to reduce nonpoint sources of pollution. Pollution reduction actions are prioritized in the plan.

Community watershed and environmental groups, civic groups and neighborhood associations can use the guide to plan projects or suggest watershed protection strategies to elected officials and government agencies.

Watershed Management Planning Benefits

Protecting local watersheds leads to various benefits for Virginia's natural resources and environment. A watershed protection strategy can mean improved quality and quantity of water for the survival of fish, wildlife and people. Stable floodplains and vegetated stream buffers are important to any watershed because they reduce the likelihood of flood events, provide recreational opportunities such as greenway trails, and offer aesthetic natural scenery.

Every community in Virginia has a primary planning tool in place: the local comprehensive plan. Many communities have included water protection as a component of their comprehensive plans. However, localities' plans may not adequately address specific strategies for implementation of water protection goals. A watershed plan provides an opportunity to develop water protection strategies by applying an ecological and physical framework to planning. The water quality of streams is a direct measure of impacts from land uses in the watershed. Healthy streams with diverse aquatic life, stable stream banks, vibrant native vegetation, and healthy floodplain and buffer areas signify a well-protected watershed.

However, rivers and streams can become degraded quickly. Inadequate stormwater management and resultant high flows, toxic waste spills, contaminated rainfall, removal of streamside vegetation, stream channelization and other human impacts may take a heavy toll. Impacts from natural events such as hurricanes and extreme floods also may harm rivers and streams. An active watershed planning process can ensure that tools are in place to address unexpected changes and flooding events.

Effective local watershed management planning provides a new set of tools for communities to address policy challenges and new planning opportunities that extend beyond simply meeting minimum regulatory requirements. Effective watershed management can help ensure that surface and ground water supplies do not become degraded over time, drinking water supplies are sustained, soil and stream bank erosion are reduced, and wildlife habitat is restored.

In addition to protecting the environment, a watershed-based approach to land management also provides important benefits for the economy and for Virginia's communities. Watershed improvements can lead to ancillary benefits such as enhanced real estate values for homes and businesses near river greenway trails or other new recreational offerings. Effective watershed management can provide a new context within which to evaluate community goals, and assess current and projected future land use patterns.

Community Benefits of Watershed Planning

With myriad natural resource planning responsibilities facing local governments and communities, why consider taking on watershed management planning? Because a watershed management approach can often help you coordinate ongoing or proposed planning efforts. Watershed management planning is not a panacea but can provide a framework in which to coordinate existing planning, whether done as a component of a locality's comprehensive plan, or to coordinate multi-jurisdictional planning efforts. Many localities already possess the pieces that can form the basis for a watershed management plan; the plan itself can tie together local efforts.

Following are just a few benefits of watershed management planning:

- Helps address community concerns about the quality of local waterways
- Provides a framework to identify resource issues and constraints that impact development and land use decisions

Lessons from localities involved in watershed management planning

Local government planners using watershed management planning say the plans:

serve as a framework for meeting NPDES regulations and other stormwater planning

address cumulative environmental impacts of development

offer a rational way to integrate objectives such as protecting sensitive resources, providing green infrastructure to accommodate balanced development, and generating greater nterest in and support for environmental programs

When asked to list major selling points of most common responses were that it:

helps meet regulatory requirements

enhances environmental planning

improves relations with citizen groups

enhances support for environmental programs

saves money by better coordinating planning activities

- Helps localities prioritize resources such as money, time and staff
- Uses natural rather than jurisdictional boundaries to foster regional cooperation
- Targets geographic areas for land conservation and development
- Approaches interdependent issues under one framework, leading to greater efficiency in the use of resources
- Helps plan for community sustainability, balancing environmental protection, economic development and quality of life
- Provides a forum for proactive community involvement and self-determination rather than crisis response

Watershed Plan Functions and Uses

Among its functions, an effective watershed plan should:

Define watershed boundaries as the geography of management
Establish a watershed's geographic location as the framework for the plan's organization and management. Identify the watershed's physical and jurisdictional boundaries, including the various government entities located within the watershed and their management responsibilities. West of the Blue Ridge, this process is complicated by karst topography, which can result in stream flow that bypasses topographic divides. Identifying watershed size and relevant government entities quickly establishes the scale and timeframe of the watershed planning process.

Leverage existing resources and mobilize new resources
Within the plan, existing resources are identified that can provide technical and financial assistance and work in tandem with existing programs. Watershed planning can mobilize new community resources to support local watershed management. For example, Nelson County's watershed plan for the Rockfish River led to the formation of a new citizens' advocacy group that has begun water monitoring and re-establishing riparian buffer areas.

Guide land use decisions
A watershed plan provides a basis for local land use planning decisions. These decisions could include designating potential economic growth areas, zoning in coordination with community land development or protection goals, designating locations for community access to surface and ground water supplies (e.g., drinking, recreation, aesthetics), as well as water resources that need to be preserved as environmental resources (e.g., fish and wildlife habitat).

The plan should be integrated with the local comprehensive plan and zoning regulations: The comprehensive plan should identify the watershed plan as a means of implementing comprehensive plan goals, and existing zoning should be evaluated to determine if and how regulations could be updated to meet watershed plan goals. Similarly, additional community planning efforts for parks, recreation facilities, transportation needs and other land use processes should be integrated with the watershed plan.

Provide consistency for other watershed plans
At a certain level, a watershed plan can be a model for similar local and regional plans. For example, Fairfax County is developing watershed plans for each of the county's 10 watersheds. The county is using a standardized process to guide plan development so the plans work well with each other. Additionally, the plans are being developed in a staggered sequence so that each can build on lessons learned during prior watershed planning processes.

Partnering for Successful Plans

Locally developed watershed management plans are critically important to protecting Virginia's natural resources as well as public health and safety. To be most effective, localities, government agencies and communities must work in regional partnerships to address issues facing the state's river basins, the Chesapeake Bay, and

waters downstream beyond Virginia's borders. Regional partnerships are important because, while state and federal legislation directly addresses environmental quality and public health, no single piece of legislation can resolve competing jurisdictional needs such as competition for surface water supplies among upstream and downstream users.

Management objectives for a shared watershed can vary from one jurisdiction to another. Without regional coordination, these objectives sometimes conflict. For example, one county may target a stream for future drinking water supplies, while a county upstream plans to use the stream for discharges from a proposed wastewater treatment plant. Similarly, several jurisdictions may share a large watershed, such as the Potomac River watershed, that is drained by the District of Columbia, Maryland, Virginia, and portions of Pennsylvania and West Virginia. Unless these jurisdictions coordinate their watershed management goals, the potential for competing needs and conflicting goals is high. As these examples illustrate, the future health of the Chesapeake Bay depends on all jurisdictions within its drainage area committing to effective regional coordination and coordinated watershed management strategies.

While federal legislation such as the Clean Water Act plays an important role in protecting water quality and habitat, localities' voluntary participation in watershed management is vital to make sure surface and ground waters are protected. Federal and state programs have requirements for stream protection, but these alone cannot adequately protect Virginia's watersheds. For example, it is impossible to assess and verify every pollution violation. Also, some property owners and local governments don't understand the importance of watershed management or how to develop a watershed plan. As a result, land areas that serve as key groundwater recharge areas may be paved over because of inadequate assessment of the local ground water aquifer. Similarly, local developers may not be aware of "low-impact development" approaches or clustered housing designs that limit detrimental watershed impacts. For these reasons, an effective watershed management plan covers ways to increase public and government awareness of watershed management techniques to ensure well-informed participation.

Key Components of an Effective Plan

When developing an actual watershed plan, it is important to include key components that will confirm that Virginia's environmental protection goals are met. All watershed plans should identify the watershed as the area to be managed. From there, an effective watershed planning process should:

1. Identify key stakeholders, stakeholder roles and responsibilities, and a clear participation process; involve stakeholders so they become invested in the plan
2. Establish a vision for the watershed and set goals that improve or protect water quality and habitat
3. Assess and evaluate the status of the watershed and identify critical concerns
4. Develop a framework of institutional and regulatory responsibility
5. Set goals based on results of data evaluation
6. Identify clear and achievable strategies based on the plan's goals, an action plan, and responsible parties and timeframes
7. Identify all resource needs including funding and technical support, as well as financial limitations
8. Provide progress benchmarks as part of a process for using and applying the watershed plan, and adapting it as needed over time

Including these eight key components in the watershed planning process will help the plan's outcomes result in a comprehensive approach to watershed management that meets community needs. Of course, a plan can incorporate additional community goals and related outcomes. These may include protecting recreational

opportunities, providing appropriate river or lake access, protecting drinking water supplies, enhancing fish and wildlife habitat, protecting cultural and historic resources, protecting threatened or endangered species, and others.

Virginia Watershed Management Planning Checklist

The broad range of data, participation and effort needed to accomplish the eight key components of a watershed management plan can make it difficult for those involved in the planning process to recognize when minimal planning criteria are met. The Virginia Watershed Management Planning Checklist in Appendix A gives planners a straightforward evaluation tool. Use this checklist to determine the degree to which a watershed management plan meets the components and functions envisioned by the Virginia Watershed Advisory Committee. Use of this checklist can reveal plan elements that require additional effort to ensure effectiveness.

Collecting and Reviewing Existing Planning Documents

The review and categorization of local natural resource-based planning already in-hand are often overlooked when a watershed plan is begun. Many components of a watershed management plan may have already been completed thanks to previous local or regional initiatives. Not all of these initiatives will be watershed-based; many will be jurisdictionally based. Despite this, many localities are closer to an actual watershed plan than expected. Taking stock of previous efforts can be a valuable, timesaving first step.

Watershed Plan Scope and Scale

After taking stock of existing efforts, planners can determine the appropriate scale and scope for a local watershed plan. This is a must for a watershed plan to achieve the functions described previously. Ideally, the plan should seek to address an entire watershed, irrespective of jurisdictional boundaries. A whole-watershed approach also needs to cover the full scope of watershed conditions and impacts including the watershed's drainage area, land uses, land cover, geology and hydrology. For example, if a community decides to restore fish habitat but fails to account for stormwater runoff from a large shopping mall upstream, the project will likely not succeed. Similarly, a stream buffer enhancement program may not achieve water quality goals if stormwater outfalls are not abated.

Watershed management at the whole-watershed level can be a complex undertaking. Watersheds vary in scale from several acres to thousands of acres. The complexity of watershed management is not just tied to watershed size. Watersheds also vary greatly in ecology, geology, topography, land use, jurisdictional boundaries and climate. A large watershed may have relatively stable land uses (e.g., state park land) and low population densities, whereas a small watershed may contain diverse land uses, a rapidly growing population and increasing competition for access to natural areas. Different approaches may be needed within a watershed. For example, the lower flow and reduced assimilation capacity of a stream's headwaters may require more strict protection strategies than other stretches of the stream.

Within the whole-watershed framework, localities can also consider if and how to prioritize the management of multiple watersheds. Here are a few questions to help determine appropriate scale:

- Will the watershed management plan seek to protect the water quality of all watersheds within a particular jurisdiction?
- Will the plan be limited to watersheds that contain ecologically sensitive or unique cultural areas?
- Will the plan address targeted watersheds for protection?

If a smaller scale pilot approach is taken for the planning process, it may be

worthwhile to conduct an assessment of watersheds within the county or region to determine which watersheds would benefit most from a targeted approach. However, it is important to consider that targeting the most endangered or polluted watersheds may not yield the greatest return, nor necessarily be a practicable model.

After looking at the size of a watershed and the intensity of uses and land use patterns within its drainage area, it can be determined whether or not effective management of the watershed will require dividing it into sub-watersheds. For effective management, large watersheds may need to be split up. The James River, for example, drains more than 10,000 square miles and has been divided into three sections – upper, middle and lower James watersheds, to develop manageable water quality goals. As the river flows from the uplands of western Virginia to the Chesapeake Bay, local ecologies, population densities and land uses vary greatly, so different management strategies are needed.

Localities that share large watersheds can establish multi-jurisdictional partnerships to share management responsibilities and maximize available resources. For example, if a large watershed includes parts of three counties, each one can take ownership of a particular part of the watershed and work cooperatively to identify and achieve goals. Shared plan goals for a large watershed may still require different implementation tools in different areas. Consider a case where a local river suffers from excessive nutrient enrichment leading to algal blooms and low oxygen conditions. The upstream source of nutrients could be agricultural, the middle stream source could be failing septic systems, and sewer overflows could be affecting the stream's lower portion. In this example, achieving a shared goal to reduce nutrient levels would require a different solution for each part of the watershed.

As a locality assesses the potential scope and scale of its watershed management plan, a smaller-scale watershed planning process could be piloted to answer initial questions and refine methodology and approach. Demonstration projects also can be used as replicable models or field-tests before implementation throughout the watershed.

Section Two

Framework of Institutional and Regulatory Responsibility

The plan should outline agencies and organizations that have mandated or agreed upon responsibilities within the watershed, and identify known planning resources and opportunities for coordinating efforts.

Identifying Responsible Organizations

The variety of conditions affecting water quality and habitat within a watershed is diverse, just as is the particular mix of any given locality's public agencies and community groups that restore and protect its unique natural resources. The responsibilities these organizations have may be legally mandated or may result from negotiation and mutual agreement. Agency responsibilities may include promoting voluntary efforts through education or incentive programs or may be focused on regulatory or permitted activities. Many government programs include both regulatory and incentive-based approaches. Privately run groups generally assume advocacy roles and run volunteerism efforts.

Tables 1 and 2 list data sources in Virginia. Listed agencies and organizations generally collect or manage specific data as part of their mission or a program mandate. Aside from providing data, these agencies and organizations can contribute to a watershed management planning effort through commitment of resources and technical aid. It's important to identify resources available to watershed planning and implementation through an inventory of agencies' specific responsibilities and types of technical assistance.

Appendix B is a list of Virginia's mandated and specific assistance programs. The appendix is organized by land use.

Integrating Virginia Planning Initiatives

There are several planning initiatives in Virginia that either utilize or affect local planning efforts. The Virginia Pollutant Discharge Elimination System (VPDES) and Section 303(d) impaired waters and associated TMDL planning processes are examples of programs that can directly affect local watershed planning activities. Such planning can bring together, or make sense of, these various programs at that level while integrating local input within the planning processes. Seen in this light, local watershed management planning is not just another planning initiative thrust on local governments. It is, in fact, a tool that can help localities meet state and regional program goals and statutory requirements while providing a more comprehensive local perspective to the state and regional efforts. Local watershed management planning thus enhances regional and state efforts.

Programs and plans described below comprise a partial list of processes those involved in local watershed planning should bear in mind. At best, planning efforts should be coordinated with other processes to develop shared solutions that meet the needs of numerous constituencies, as well as restore and protecting natural resources. At a minimum, conflicts with other management plans should be avoided. Two charts in Appendix B provide an overview of programs and their relationships. Appendix E describes each program in detail and has contact information.

Data Sources	Commonwealth of Virginia								
Type of Data	**DCR**	**DEQ**	**DGIF**	**DMME**	**DOF**	**DOH**	**VDACS**	**VDOT**	**VMRC**
Riparian System									
water chemistry		X		X	X	X			X
biological monitoring		X	X	X					X
habitat		X	X		X				X
rare, endangered or threatened species	X		X						X
water flow		X							
Physical Attributes									
wetlands									X
channel and navigation data								X	X
soils				X					
floodplain mapping	X								
riparian buffers	X				X				
topography	X			X					
shoreline erosion rates	X								
stream morphology data			X	X	X			X	
conservation easements	X								
drainage and utility easements								X	
land ownership								X	
existing and historical land uses			X	X	X			X	X
zoning and subdivision regulations	X								
permitted point source discharges		X		X		X			
identified NPS pollutant sources	X	X		X		X	X		X
future land use								X	X
highway right-of-ways								X	
recreational and historical sites	X		X		X				
forest cover			X		X				

Data Sources	Federal Agencies					Regional and Local Organizations				
Type of Data	**EPA**	**USDA-NRCS**	**USDA-FSA**	**USFWS**	**USGS**	**PDCs**	**SWCDs**	**CWOs**	**LOCAL GOV'T**	Colleges & Universities
Riparian System										
water chemistry	X				X		X	X	X	X
biological monitoring	X				X		X	X	X	X
habitat		X		X						X
rare, endangered or threatened species				X					X	X
water flow					X					X
Physical Attributes										
wetlands		X		X	X	X	X		X	
channel and navigation data										
soils		X			X	X	X		X	
floodplain mapping						X			X	
riparian buffers		X	X	X		X	X		X	
topography					X	X			X	X
shoreline erosion rates						X	X		X	
stream morphology data				X	X	X	X	X	X	X
Existing Use and Land Cover										
conservation easements			X			X	X		X	
drainage and utility easements						X			X	
land ownership						X			X	
existing and historical land uses		X	X			X	X		X	
zoning and subdivision regulations									X	
permitted point source discharges	X					X			X	
identified NPS pollutant sources	X	X		X	X	X	X		X	X
future land use						X			X	
highway right-of ways						X			X	
recreational and historical sites				X		X	X		X	
forest cover						X	X		X	X

Local comprehensive plans

Every locality in Virginia is required to develop a comprehensive plan to guide coordinated and harmonious land development. Comprehensive plans generally include the guiding principals a local government employs to accomplish development as well as specific regulations, such as zoning maps and subdivision ordinances, that govern development. A locality may use its capital improvement program as the mechanism to fund specific measures deemed important.

When developing and updating the comprehensive plan and its components, local governments generally evaluate land management concerns such as floodplains, wetlands, soil types, karst features and springs, ground water supplies, and critical or sensitive habitats. As the tool that drives the type and intensity of uses permitted in different locations, zoning ordinances should also be reviewed from a watershed-based perspective to make sure regulations adequately address watershed protection goals, in accordance with the comprehensive plan. It is crucial that both comprehensive plans and zoning proposals are reviewed in the watershed context since, though these local plans often serve as the basis for zoning decisions, this relationship is not codified in state law. In other words, because a concept is in a comprehensive plan does not guarantee it will be reflected in local zoning decisions.

Local governments in Tidewater Virginia must address additional requirements to restore and protect water quality in the Chesapeake Bay through the Chesapeake Bay Preservation Act. These localities must consider specific measures aimed at protecting state waters because land use impacts water quality and habitat.

Integration with local watershed management planning: The detailed environmental inventory included in a watershed management plan can lend an increased level of data and context to guidance provided by the comprehensive plan. A thorough watershed-based inventory of the constraints to development and an evaluation of critical natural resources add rigor to the comprehensive planning process, improve decision-making, and help establish policies that will drive needed zoning amendments. Including watershed management planning in the comprehensive plan – and in subsequent zoning decisions – will better connect and integrate natural resource goals with other plan goals. These include high quality of life, safe drinking water, efficient and safe roadways, and abundant recreation opportunities. This approach avoids potentially costly mistakes and secondary impacts of land use decisions on water and habitat quality. Finally, using watershed management planning as a basis for the comprehensive plan helps localities recognize that they share watersheds and natural resource concerns with neighboring jurisdictions.

MS4 and Virginia's new stormwater management program

About 50 Virginia communities are affected by Clean Water Act Municipal Separate Storm Sewer System (MS4) Program regulations. MS4 communities must develop, implement and enforce a local stormwater program that addresses six minimum control measures including public education and outreach, public participation and involvement, illicit discharge detection and elimination, construction site runoff control, post-construction runoff control, and pollution prevention/good housekeeping.

Legislation passed by the 2004 Virginia General Assembly has created a statewide, comprehensive stormwater management program related to construction and post-construction activities effective in 2005. The Virginia Department of Conservation and Recreation is developing consistent statewide stormwater management requirements for projects with land disturbances of one acre or more. This new program requires eastern Virginia communities and MS4s to adopt and implement stormwater management programs in conjunction with existing erosion and sediment control programs. Similarly, other local governments are authorized by this new program to also adopt and implement local

stormwater management programs. The new program will develop a statewide uniform permit fee system and will encourage low-impact development approaches and better site designs to minimize stormwater runoff and long-term maintenance.

Integration with local watershed management planning: The MS4 and new state stormwater management programs are meant to protect water quality by reducing stormwater pollutant discharge. For some communities, development of a local program will require mapping and evaluating the storm sewer system, including contributing watersheds and sub-watersheds. Local watershed management planning can provide the wider context for evaluating the storm sewer system and addressing the six minimum control measures. A watershed management planning approach enables a local government to better use community resources to engage stakeholders and address issues affecting the stormwater program.

Total maximum daily loads (TMDLs)

The TMDL for a water body represents the maximum amount of pollutant(s) the water body can receive and still meet water quality standards. Once monitoring data show a water quality problem (chemical and/or biological) in a body of water that causes it to not meet standards, the waterway is added to a list of impaired waters. Virginia must establish TMDLs for all pollutants causing impairment (as required by The 1972 Clean Water Act and Virginia's 1997 Water Quality Monitoring, Information and Restoration Act). This includes a watershed-wide assessment of pollutant sources and a determination of pollutant reductions necessary to support the water body's beneficial uses, such as swimming, fishing or aquatic life. A thorough public engagement effort reaching all stakeholders in the process is also required. Once the TMDL is determined, a TMDL implementation plan (TMDLIP) is written that defines specific actions and a timetable needed to accomplish the TMDL.

Virginia's TMDL program is also governed by a federal court order Consent Decree that lays out a schedule for TMDL development through 2010. DEQ is the lead agency for the program.

Integration with local watershed management planning: By definition, TMDLs and TMDLIPs address only the pollutant(s) identified as causing the water quality impairment(s). While TMDLs and TMDLIPs focus on the entire drainage area, or watershed, contributing to the impaired segment, the plans will not address watershed activities not unrelated to the TMDL water quality problem. For example, habitat destruction may not be addressed as part of a TMDL. Similarly, a stream may meet state water quality standards at the moment even though monitoring data reveals that it is trending downward. Water bodies may be vulnerable to decline as a result of rapid land use changes occurring in the associated watershed. Anecdotal data from residents within the community may support this conclusion. Still, the TMDL development process is a good start broader local watershed management planning efforts. By starting with an inventory of impaired streams or an existing TMDL, local government can build on existing stakeholder involvement and take a broader approach to water quality and habitat in a watershed that has become, by virtue of the TMDL process, an important local issue.

Virginia tributary strategies

Virginia Tributary Strategies are multi-agency efforts to coordinate and implement large-scale water quality management plans that restore living resources in the Chesapeake Bay by reducing and eliminating specific pollutants. The strategies set nutrient and sediment reduction goals and develop methods for implementing related activities at major river basin levels (e.g. Shenandoah, Potomac, James, etc.). Virginia's tributary strategies result directly from the Commonwealth's commitment as a Chesapeake Bay Program partner.

Just as TMDLs address impaired specific stream segments and defined pollu-

tants, tributary strategies address specific pollutant loads (nitrogen, phosphorus and sediment) for the entire Chesapeake Bay. Tributary strategies have been described as proactive TMDLs for addressing nutrients and sediment in the bay, since pollutant loads are assessed from all land uses and then reductions are allocated for each pollutant and for each major tributary. In the late 1990s, Virginia set nutrient reduction strategies for each of the bay's major rivers and smaller creeks based on pollutant load allocations derived by the Chesapeake Bay Program. As a result of the revised Chesapeake Bay Agreement, Chesapeake 2000, new nutrient and sediment goals and strategies must be developed in 2003 and 2004 for the Shenandoah, Potomac, Rappahannock, York, James and Eastern Shore watersheds.

Integration with local watershed management planning: Because implementation of each tributary strategy is determined locally, local watershed management plans are logical building blocks for the larger tributary strategy. Local plans can address water quality impairments of all types, including those caused by nutrients and sediment, thus they can prove valuable in developing TMDL and tributary strategy implementation plans. Local planning that incorporates these efforts involves land use decisions, stormwater management, erosion and sediment control, and other issues localities otherwise address. Tributary strategies are now being revised, and those writing local plans should take those initiatives into account.

Watershed roundtables

Active in each of the state's 14 major river basins, watershed roundtables are forums that enable stakeholders to define critical basin-level needs, target significant water quality problems, provide input on management options and develop strategic watershed action plans. Roundtables perform critical roles in watersheds, providing education, outreach and solutions to restore and protect water quality. Roundtables in Virginia's "Southern Rivers" watersheds – i.e., those outside the Chesapeake Bay basin – are working on strategic plans similar to Chesapeake Bay Tributary Strategies in that they address water quality and habitat needs. Basin-level planning can set basin-wide goals, but local information must be integrated to reflect local conditions and needs. Roundtable strategic planning must also support local implementation goals.

Virginia's southern rivers connect Virginia to the Albemarle-Pamlico Sound, through the Roanoke and Chowan rivers, to the Gulf of Mexico through the Tennessee, Big Sandy and New rivers, and to the Atlantic Ocean through the Yadkin River. Basin-level coordination and planning are underway in each of these watersheds, offering opportunities for local watershed planning efforts.

Integration with local watershed management planning: Because implementation of each roundtable strategy is determined locally, local watershed management plans are logical building blocks for the larger basin-level strategy. Local plans deal with water quality and habitat issues and are useful in writing TMDL and roundtable strategic implementation plans. Local planning that incorporates these efforts will involve land use decisions, stormwater management, erosion and sediment control, and other issues that localities otherwise address.

Scenic rivers program

The Virginia Scenic Rivers Act was passed in 1970 to protect and preserve certain rivers or sections thereof possessing natural or pastoral beauty. Many river sections have been found worthy of this status. The first designation was in 1975; 19 rivers or river segments have been designated since, including one identified as a State Historic River. Ten more have been evaluated and found to qualify for designation. The Virginia General Assembly and the governor must approve each addition. A river's inclusion in the scenic rivers system provides a framework whereby preservation of that river is encouraged. This includes the review of all projects for which there are plans for using or developing water and related land resources. The river

is evaluated as a scenic resource when reviewing alternative plans for use and development. Furthermore, once a river is designated scenic, no dam or other structure that impedes natural flow can be built, operated or maintained unless specifically authorized by an act of the General Assembly.

Integration with local watershed management planning: River resources protection and management rests with local governments. Current water laws add to the protection of the state's river resources. Through comprehensive planning, zoning and special-use tax incentives, localities are able to maintain the quality of their scenic river resources while allowing continued development and other important landowner activities. Although the scenic river program cannot protect a river absolutely, it does call attention to the resource's importance.

Other Related Initiatives

Local agency plans

Local watershed planning also needs to include a review of relevant local and regional planning efforts focusing on regional parks, river trails, heritage tourism, recreation and other opportunities that could be linked with watershed planning efforts. Taking these into account improves the effectiveness of all planning efforts and mitigates potential conflicts. Planning efforts undertaken by local, state and federal parks, planning district commissions, agricultural programs, extension services and nonprofit land trusts should be considered for review. Without coordination between local and regional planning efforts, different processes can reach very different conclusions, as illustrated by the following:

> A city had two planning processes underway. One process focused on redevelopment of the city's waterfront as a tourist destination. Those involved concluded that riparian areas would need to be removed and replaced with a bricked walkway to improve the view of the waterfront. The second planning process focused on development of a network of river greenways. This group concluded that protection of riparian zones would be an effective way to preserve wildlife habitat along the trail. Those involved in both processes reached logical but diametrically opposed conclusions.

In contrast, effective coordination between watershed planning efforts and other community planning processes means that a comprehensive watershed plan can be developed, linking riparian restoration with enhanced eco-tourism opportunities, to meet the needs of different community constituencies. The review of past studies and existing planning processes is key to any local watershed planning process. Determine how best to incorporate their useful elements and what resources they can contribute to the plan's development. For example, the first step in Fairfax County's watershed planning process entails a review and synthesis of past plans such as drainage basin plans, stream protection strategies, in-fill studies, drainage complaint records, and state, county and volunteer monitoring data.

Transportation plans

Proposed transportation projects can have profound impacts on nearby rivers and streams, specifically because roads increase runoff. Roadways also impact future land use and where development occurs. Virginia's planning district commissions or the Virginia Department of Transportation can provide information about plans for new roads and improvements to existing roads.

Section Three

A Community-Based Watershed Vision

Articulate a clear vision for the watershed in the plan. Both the vision and the plan will receive greater support if the community and local governments are active in their development.

A Vision for the Future

The process of defining a vision can be an effective way to involve the community in the watershed planning process. As well, it can be a means for implementing and sustaining the plan over time. A vision describes future desired conditions. In this sense, it should encapsulate the community's shared desires for future watershed condition. An effective vision statement expresses a community's shared interests while defining a rationale for the development and implementation of the watershed plan.

If a community hasn't developed an approach to watershed protection and restoration, the process of defining a vision proves useful. At the outset, participants may have very different perspectives. For example, an agency's goal for the watershed might be to protect environmental health whereas the business community's goal might be withdraw more water for new housing. The parties work to understand each other's perspectives and the importance of managing the watershed and setting limits. A vision for the watershed enables the community and decision-makers to support shared goals for the watershed plan. Appendix D describes the visioning process in detail.

Restore the Elizabeth River to the highest practical level of environmental quality through governmental, business, and community partnerships.

The Elizabeth River Project

With the cooperation of citizens and agencies, our vision is a clean, healthy and restored Guest River ecosystem that supports economic and recreational prosperity for the region.

The Guest River Group

Watershed Plan Constituencies: Who Should Be Involved?

An effective watershed planning process must involve a wide range of interested parties. Before a vision can be defined, partners must be identified. Roles of agencies, organizations and constituencies in the planning process are important to consider and define. A plan developed solely by staff in one government agency or one citizen group will likely fail because it would be difficult to gain support or aid from relevant agencies and organizations that had been left out.

Core planning team - The first step in watershed planning is to form a core team. Consisting of representatives from different agencies and organizations, it can gather to work on the plan, bringing in experts and decision-makers as needed. The team may be formed and/or led by the private sector through a professional organization or citizen river group. Regardless, a public-private partnership is the model most likely to achieve buy-in and success.

Potential roles for others involved in the plan include:

Oversight organizations are needed to shepherd the plan through development. An organization or a team of organizations must move the plan forward, evaluate

progress and adapt the plan as needed to make sure it reflects community goals and objectives. Examples: local departments of environmental protection, planning district commissions, and soil and water conservation districts.

Decision-makers are those who evaluate the plan's development and content, and provide formal political support for the process. Examples: boards of supervisors, planning commissions, city managers and county administrators, and state agencies with watershed management responsibilities.

Decision-shapers are community members and organizations that provide feedback on the plan's objectives, development and content. Examples: neighborhood associations, fishing, boating and recreation clubs, community civic and religious groups, tourism boards, owners of large land tracts, business community representatives, land developers, local chambers of commerce, local residents and, as appropriate, state and federal agencies.

Plan implementers are those who will implement activities and tasks in the watershed management plan. Examples: soil and water conservation districts, local land trusts, conservation organizations, park administrators, local departments of engineering, public works, and planning, and local organizations, including the farm bureau, the chamber of commerce and individuals.

Roles described above show how different agency and organizations' shared responsibilities can result in a successful watershed plan. Parties' actual roles and responsibilities will vary by locality.

Key constituencies in the planning process

Identifying the numerous agencies, organizations and constituencies required to develop a successful watershed plan requires extensive research and community outreach. Pinpointing stakeholder groups should be far more extensive than simply distinguishing between government and non-government organizations.

Once stakeholders are identified, an advisory committee comprising key watershed constituencies can be formed to advise the core planning team throughout the process. Each stakeholder advisory committee, made up of key watershed constituencies, can review plan drafts and provide detailed feedback to the core planning team. This committee can also help identify issues, prioritize concerns and help with community outreach efforts. Examples of such constituencies include:

Agricultural community: farmers, agribusiness and farm advocacy groups such as a local farm bureau representative.
Business: local small and large business owners, or a business representative, such as a member of the local chamber of commerce.
Government: local government planning staff, soil and water conservation district staff, planning district commission staff, local extension service, and state or federal government staff.
Universities and schools: faculty from a local university can provide expertise and resources, including water quality monitoring and printing or mapping capabilities. The university may also be a large landholder in the watershed. Schoolteachers may offer environmental education, water monitoring and river restoration classes.
Tourism community: local tourist bureau staff and tourist attraction staff/owners can help with watershed planning that addresses recreation and water-related historical resources such as canal locks and dams.
Development community: members of the development community are a key constituency in rapidly growing areas because they affect how land is developed. They are also a key constituency in developed areas because they may be engaged in the redevelopment of land or retrofitting developed areas in order to abate pollution.
Environmental and conservation groups: local environmental groups, land trusts and "friends of" groups, especially those concerned with waterways. If there are many groups in the watershed, several representatives may be needed.
Civic organizations: although not historically associated with watershed efforts,

Government roles
There are varied governmental roles in watershed management. Federal agencies may be involved where watersheds include federal lands such as national parks, or where there are federally mandated, state-run programs such as the Total Maximum Daily Load program. State agencies, such as the Virginia Department of Environmental Quality, are also engaged locally with TMDL planning. If the watershed falls within the jurisdiction of the Chesapeake Bay Preservation Act, DCR's Division of Chesapeake Bay Local Assistance should be contacted. A local planning district commission will cover all or part of the watershed and may have a role in planning activities within the watershed. Several counties and cities may fall within the watershed's boundaries. Their planning commissions, councils and boards of supervisors should participate in the plan's development and include it as part of their work related to the comprehensive plan, zoning and other planning programs.

many civic groups, such as Lions Clubs or the Ruritans, undertake various community projects, especially in rural areas. Garden clubs and Virginia Native Plant Society chapters are also active in urban and rural areas. In urban areas, the Urban League and boys and girls clubs may be valuable resources. Other service organizations, such as Conservation Corps or Americorps, may have young adults who can help with watershed projects and planning. Church groups may also be an important resource.

Individuals: individuals may have important perspectives to share as part of the watershed planning process, particularly if they own large tracts of land. They may also represent other individuals through neighborhood associations or other civic or professional affiliations.

Community leaders: those with a formal or informal leadership role in the community can help with outreach and education efforts, and build community support for watershed planning.

A Clear Participation Process

Before engaging potential stakeholders, it is important to establish a clear process and objectives for their involvement. Sample objectives include:

- Increase community understanding of watershed management needs and benefits.
- Provide meaningful participation options for diverse stakeholders.
- Incorporate community ideas into the scope of the watershed plan.
- Achieve community buy-in and support for the final plan.

To engage different stakeholders, a range of outreach approaches should be considered. Watershed planners should attend the forums, club meetings and gatherings of key stakeholder groups to enlist their participation. If there are non-English speaking residents in the community, materials and workshops written in the particular language can be provided. All formal and informal community gatherings, including barbecues and concerts, as well as public meetings, can be considered opportunities for outreach.

Watershed plans should be tailored to address needs, interests and conditions of each watershed and community. Below are examples of phases an outreach process might have. The phases can be adapted to meet an individual community's requirements:

Phase 1: ***Have a watershed briefing, visioning and scoping forum*** for key stakeholder groups to learn about the watershed's condition and to discuss and prioritize key issues the plan must address. Incorporate these issues into a vision statement and into the formulation of a draft watershed plan.

Phase 2: ***Hold a community watershed forum*** for key stakeholder groups to present draft approaches. Revise plan to reflect stakeholder input, and distribute paper and online copies of the draft plan for community review.

Phase 3: ***Offer a draft plan review workshop*** to obtain additional community input on the proposed plan. Incorporate these changes and develop the final plan.

Phase 4: ***Hold a final draft review workshop*** to present the plan to the stakeholder advisory committee and community. Consider final suggestions then submit a final plan and associated comments to local decision-makers for adoption.

During planning, key watershed information should be given to those involved to better enable informed participation regarding:

- existing baseline stream and riparian conditions
- existing regulations to protect or restore the watershed's streams
- existing zoning and current land uses and impacts
- an analysis depicting future watershed land uses with full implementation of current zoning and predicted impacts to stream flows or water quality

Plan Adoption

It will become apparent as the plan is written which agencies will need to work as partners to implement the plan. Although many may have participated in the plan's development, there may be several agencies new to the process. For example, if

Citizen roles

Citizens may be the motivating force to engage decision makers in watershed planning. This may occur through a "friends of the creek" group, neighborhood association, conservation group or anglers' group. Involving a local government entity helps ensure that those making legal and management decisions about the watershed offer expertise and support decisions during the process. However, a plan can be developed as a partnership that defines clear roles for both the private and public sectors for planning and implementation, with the private sector taking the lead. The Rockfish River Plan in Nelson County followed this model. In the Rockfish watershed, although the county supported the plan and participated on the planning committee, a nonprofit group coordinated the planning.

the creation of a new buffer protection program is a plan objective, relevant agencies will need to be identified and contacted to develop and implement the program. The program may necessitate amendments to local zoning to provide buffer protection overlays, the soil and water conservation district could be asked to help acquire riparian easements, the county parks department may be asked to institute new landscaping requirements, and the engineering department could be asked to review and police inappropriate land use in protected buffer zones. Each entity must be contacted before plan adoption so it has have enough time to see if and how it can fulfill suggested roles. There will also likely be roles identified for non-governmental entities, and they will need to review and agree to those.

Once all agencies and organizations with prospective responsibilities have been contacted, the locality needs to adopt and implement the watershed plan. If the watershed includes portions of several jurisdictions, successful implementation will require that the plan is officially reviewed and endorsed by all involved. This is especially important if the impetus for the plan came from an entity that does not have management authority, such as a planning district commission or a soil and water conservation district.

A process for sharing draft plan information with decision-making bodies (e.g. boards of supervisors, city councils, planning commissions and relevant agencies) should be determined soon after watershed planning begins. Elected bodies, such as city councils or boards of supervisors, may be concerned primarily with political controversies that may arise. Their concerns can be addressed by engaging stakeholders early and often during plan development to learn about and handle such concerns before the plan is completed. Involving a planning commissioner or planning agency representative in the watershed plan development betters chances that the plan is in line with local government goals.

Section Four

Environmental Inventory

Base a comprehensive watershed management plan on an inventory of existing conditions, resources and impairments, as well as the relative conditions of each.

Understanding and Evaluating Watershed Conditions

Assessing current watershed conditions is an important stage of watershed plan development. However, this does not necessarily require extensive new research. State and local agencies, including planning district commissions, soil and water conservation districts and the departments of Conservation and Recreation, Environmental Quality, Forestry and Game and Inland Fisheries, may have existing stream, river and watershed data that can be used for an initial assessment. In addition to evaluating water quality in the watershed, the assessment should also cover potential environmental impacts of current and anticipated land uses.

The need for additional data will become apparent during watershed planning. Some can be considered while the plan is being developed or as part of the plan's review and evaluation strategy. For example, if the plan identifies restoring riparian buffers as an objective, then a watershed assessment will be needed to determine the size of existing buffers and amount of new buffers needed to meet pollution abatement goals. The watershed plan can then specify areas lacking adequate buffers and target them for expansion or replanting.

A baseline inventory helps in developing sound and effective watershed protection strategies. The extent of the inventory depends on the resources available to the entity developing the plan. If existing data and funds for professional inventory are lacking, volunteers can be tapped to help conduct research and site visits. This is an effective way to engage citizens, particularly members of existing groups, in natural resources planning. Volunteers have been trained to conduct inventories of land uses, aquatic insects, stream habitat, sinkholes, springs, buffers and other natural resources. Contact the departments of Conservation and Recreation and Environmental Quality to learn about volunteer programs in Virginia.

Once created, an inventory of available data and data needs can help determine watershed plan priorities. The inventory can be used to identify areas that urgently require restoration or protection. It can also be a tool for evaluating costs and potential benefits of different watershed protection strategies. The following components should be included as part of a comprehensive resource inventory.

Riparian System

Effective watershed management requires monitoring of condition of the river's riparian zone. The riparian zone includes the waterway itself, banks and surrounding floodplain and associated vegetation.

Water quality data

A complete picture of the health of the riparian system requires collection and analysis of chemical, physical and biological data. Typical chemical and physical monitoring programs include basic parameters, such as measures of dissolved oxygen, pH and temperature. Monitoring to reveal the presence of a suspected pollutant, such as metals or a specific pesticide, requires more sophisticated analysis and

can be costly. Virginia has a variety of water monitoring programs that characterize physical and chemical qualities and volume of Virginia's waterways. DEQ stores much of this data. Water quality monitoring data is also available from federal agencies, universities and colleges, local governments and volunteer- or citizen-based monitoring organizations. Data from these sources are usually collected as part of special study and can provide detailed information on specific geopraphic areas.

Macroinvertebrates lack backbones yet are visible by the naked eye. They include aquatic insects and their larvae and nymph forms, crustaceans, aquatic worms and leeches. Macroinvertebrates are particularly useful as water quality indicators. For example, stoneflies are highly sensitive to pollutants, hence the flies' presence or absence can indicate the health of a stream. The diversity and relative abundance of macroinvertebrates can indicate river health. Biological monitoring of aquatic organisms can reveal water quality concerns that chemical monitoring approaches may not. DEQ runs a biological monitoring program, as do numerous volunteer groups.

The status of a river's aquatic life serves as an important measure of a river's health and the effectiveness of ongoing watershed management efforts. The amount, type and distribution of fish in different parts of the river can reveal areas of localized and general water quality concerns. Fish tissue analysis can also show whether or not there are pollution sources in the river.

The Virginia Water Monitoring Council maintains an online inventory of monitoring activities throughout the state. See Appendix E, Data and Planning Resources, for details.

Natural habitats

A river may meet water quality standards but lack the requisite in-stream habitat needed to support native species. For example, trout require deep pools, runs, riffles, overhanging roots and vegetation for cover. These conditions can be assessed and mapped to show habitat needing protection or restoration.

Within the river's floodplain, surrounding riparian wetlands may help filter stormwater runoff and provide critical nursery grounds for amphibian species, such as salamanders and newts. Riverside vegetation contributes leaf litter to the river where it serves as food for aquatic insects, which, in turn, are food for fish. Waterways that lack adequate native vegetation cannot support a diverse range of insects and animal species.

Rare and endangered species

The watershed's animal species, including rare, threatened or endangered species, should be noted and mapped.

Physical Attributes

An understanding of the key physical attributes in a watershed is critical to effective planning. Elements to review include:

Drainage areas

A watershed is the land that drains directly or via tributaries into a particular river or body of water. Determining drainage areas can be complex in karst areas of western Virginia because the topography can have underground and surface stream flow that bypasses topographic divides. In these areas, watershed delineation can be accomplished only by tracer dye investigations.

Floodplains

Flooding is natural. The river's floodplain stores floodwaters as the river rises during storms. Soils deposited by floodwaters enrich the floodplain's soils. Building in floodplains has resulted in property damage as well as lives lost and can reduce the tax base long-term because flood damaged areas are not rebuilt. Properly protected, floodplains are resources that provide natural flood and erosion control, protect water quality by filtering runoff and promote groundwater recharge. Excessive flooding - higher frequency and volumes - often occurs because of changes in the watershed's drainage area, such as an increase in impervious, paved areas.

Floodplains should be mapped and protected.

Wetlands
Upland wetlands often slow down and filter stormwater, Locations and types of wetlands should be mapped. Areas experiencing flooding may suffer from past loss of wetlands. Wetland protection and restoration are essential to watershed stewardship.

Erosion potential
Locations and percentages of steep slopes, especially areas with highly erodible soils that may contribute to excessive siltation, help determine erosion potential. Sensitive soils can be mapped to help determine potential erosion rates, stormwater issues and more. Data from the statewide soil survey are available for many counties, and soil survey information can be obtained from the local soil and water conservation district.

Karst features
Karst landscapes allow surface waters to reach groundwater, often very quickly. Areas with sinkholes, caves and karst springs are particularly sensitive and require special treatment for most types of land use. Note areas where surface waters enter bedrock or sinkholes. Developed and agricultural areas west of the Blue Ridge are concentrated on karst.

Riparian conditions
Consider the degree of stream sinuosity and channel type, stream buffer widths, vegetation types and tree canopy coverage.

Springs
Groundwater emerges naturally at springs to become surface water. Much of the base flow of Virginia's streams is supported by spring water. Spring flows of several million gallons per day are common, especially in the karst areas of western Virginia. Water emerging at these springs commonly includes surface waters pirated from other surface watersheds. Accurate delineation of watersheds in karst areas can be done only by tracer dye studies that delineate spring basins.

Water budget
Characterizing water flows and storage throughout the hydrologic cycle entails assessing the amount of water in various places, such as in aquifers and surface flow, and the amount of water needed to recharge aquifers to relate community water needs to actual water supply.

Existing and future land use/cover

Complementing a review of physical attributes is an assessment of current land uses, future land uses, and existing laws and ordinances impacting them. Specific areas to review include:

Land uses
List watershed land uses and zoning, including current and projected future land uses and their potential environmental impacts. Expectations for current and future uses can be found in local comprehensive plans.

Major forested areas
Essential to land use data, major forest areas should be assessed. Forests trap and filter land runoff, helping water recharge groundwater aquifers.

Disturbed areas
Land that needs remediation, such as abandoned mine lands, brownfields, etc., may harm natural resources.

Flood mitigation areas
Compare the percentage of undeveloped land within the river's 100-year floodplain available to mitigate flooding impacts with the percentage of developed land at risk during flood events.

Runoff potential
The percentage of impervious cover, measured by paved area and compacted soils in high-use areas, affects runoff rates and volumes, hence water quality.

Potential pollution sources
A review of land uses and soil data can shed light on the watershed's nonpoint source pollution potential. An inventory of point sources (wastewater treatment plants, industrial facilities, etc.) should also be done.

Protected areas
Localities and their residents are concerned about land conservation and open space. The percentage of land under permanent protection, such as conservation easements or parklands, should be noted and mapped.

Recreational uses
Fishing, hiking and boating, as well as existing and projected access points for the activities, should be noted and mapped.

Significant sites
Historically or culturally significant sites, such as canal locks, dams and Native American encampments, should be noted and mapped.

Data Collection

Collecting environmental and land use data needed for a comprehensive watershed management plan may seem daunting, but existing local resources can provide a wide range of relevant data and expertise, and augment state data sources. Local government staff, for example, has years of experience with environmental and land use planning issues.

Staff in the public works department can provide data about flooding frequency, undersized road culverts or areas suffering from extreme erosion. Staff from engineering and/or water treatment plants has information about streams and reservoirs suffering from high rates of nutrient overenrichment. The local parks department may be able to produce water quality data, while the regional forestry department may have data about streams that require forested riparian buffer areas. These professionals may have knowledge not captured by a central database.

Similarly, there are many groups and individuals that can contribute data and technical expertise, including staff from local nature centers, fishing and canoe clubs, volunteer water monitoring groups and school environmental clubs. The core watershed planning team also should serve as a valuable information source. Appendix E lists data and planning resources that can help localities and communities collect and evaluate data. Tables 1 and 2 briefly list several state, federal and local information sources.

Section Five

Data Evaluation and Goal Setting

Set realistic natural resource goals based on reliable data evaluation.

Evaluating Watershed Challenges and Opportunities

With an inventory of the watershed's physical characteristics in hand, along with an understanding of local, state and federal program responsibilities, data can be evaluated to identify resource needs and set specific goals to accomplish the stated watershed vision. Much like the data collection process, the evaluation process should make use of a range of available staff and volunteer resources to identify natural resource conditions in the watershed. Evaluating data can best be accomplished through data-driven, geographical information system (GIS) mapping. This approach yields a "picture" of the watershed's health and highlights which resources to protect, restore and better use.

Current conditions

The first step is to understand the current state of natural resources in the watershed. Answers to the following questions begin to define existing conditions within the watershed:

- Where are large areas of forest? Are they connected with forested corridors? What are the dominant species? How are the forested lands utilized? Timber management? Off-road recreational vehicles? Livestock grazing?
- Where is the farmland? Are there sufficient acres to support a viable agricultural community? What are the typical farm operations? Grain? Livestock? Fruit? Vegetables?
- Where are the other land uses in the watershed? Urban? Residential? Industrial?
- What is the extent and quality of riparian buffers in the watershed? Are they at least 35 feet wide? Are they made up of mixed and native species?
- What do water quality monitoring data reveal about the water resource? Where are permitted discharges, known pollution sources (such as abandoned mined land), potential pollution sources (such as land application of biosolids)? Impairments?
- Where eroding stream channels? Where are flood-prone areas? 100-year flood plain? Known rates of shoreline erosion?
- What concerns stakeholders most about the conditions within the watershed?

Future conditions and trends

The next step is to evaluate how current zoning, population and trends in employment will shape the watershed's future. Answers to the following questions will aid in this evaluation.

- Based on current zoning, what is the expected "build-out" of the watershed in 15 years?
- Where will most growth or loss occur? What kind of growth or loss is predicted? New residential? Loss of industrial base? Increases in impervious cover? Retail expansion?
- What new demands on water resources are expected in the next 15 years? Are new highways planned for the watershed?
- What new environmental or other regulations are anticipated in the next 5 to 10 years?

Identify critical watershed issues and needs

Once current and future conditions have been assessed, the collected information can be used to determine these concerns:

- Which streams or springs show the most stress?
- Which streams or springs show the least stress?
- What are the watershed's risk factors, and which bodies of water are most at risk?
- Which bodies of water have unique resources or habitats that should be protected?
- Which bodies of water are most likely to benefit from better management?
- Are wetlands threatened by current development patterns?
- Which streams have adequate riparian buffers?

This is not an exhaustive list of possible concerns. Other concerns may become apparent as available data are evaluated.

Setting Goals

An effective watershed plan states clear goals and measurable objectives needed to achieve them. In turn, objectives can be broken down further into very specific actions, such as a project to replant a stretch of riverbank or to collect additional data concerning a suspected source of pollution.

Goals for an effective watershed plan should address desired outcomes. For example, if the community identifies drinking water protection as a primary need, streams that could serve as future water supplies could be targeted for protection.

Other examples of specific goals that watershed plans could address include:

- meeting regulatory standards
- protecting historic or ecological resources
- addressing flood risks and property damage
- promoting tourism and recreation and
- ntegrating local ordinances to ensure comprehensiveness of watershed planning

The detail and complexity of the watershed plan will depend on several factors. These factors include the extent and characteristics of watershed problems, resources available to address problems, the scale of inter-jurisdictional coordination, and the size and number of sub-watersheds addressed by the plan.

Sample Plan Goals

- Protect and restore ecological health of the watershed.
- Enhance economic value.
- Provide recreational opportunities.
- Protect current or future water supplies.
- Protect sinkhole buffer areas and spring heads.

Evaluating land use patterns and trends

In addition to assessing a watershed's environmental health, future land use patterns that may affect the watershed should be considered in watershed planning. Land use changes or planned developments that may significantly modify land use, stormwater management, or the stream/corridor system should be evaluated and mapped. When evaluating future land use impacts for a watershed, the assessment should address:

- The percentage of the watershed's area zoned for future development and the type of development (e.g., parks or shopping malls) allowed under that zoning
- The potential increase in impervious surfaces created by future development, including roads, parking lots and rooftops
- Future demands on water supply, such as new power plants, planned drinking water impoundments or new wells
- Estimated increases or decreases in population and employment levels, which may have an impact on storm water flows and impervious surface area

Section Six

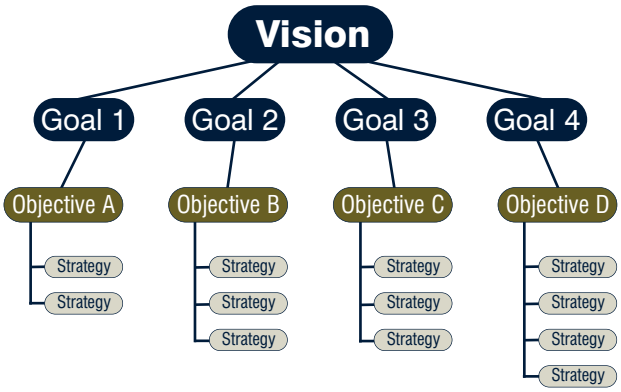
Objectives and Implementation Strategies

To meet the plan's goals, establish clearly defined objectives and actions that detail responsibility and timeframes.

Setting Objectives

Once a watershed plan's goals are set, objectives to achieve them must be written. For example, how will water quality goals be attained – through restoration, enforcement and/or new zoning approaches? To be effective, objectives should reflect and support the intent of the related goals.

Elements of a Watershed Plan



Sample watershed protection objectives

Critical habitats: Define and identify sensitive ecological zones needed to maintain the ecological integrity of the watershed, e.g., sensitive wetlands, headwaters, significant caves, wildlife corridors, communities of native plants and trees, stream buffers and slopes subject to erosion.

In-stream habitat: Protect and restore in-stream habitats, including streambanks, in-stream substrate, aquatic plants, riparian vegetation and stream cover.

Stream form and function: Preserve or restore the natural stream morphology consistent with local conditions to ensure that stable streambanks and habitat are preserved.

Riparian habitats: Protect and restore stream buffers.

Water quality: Set standards for allowed uses or discharges that will maintain or improve existing water quality.

Stream flows: Ensure adequate stream flow for animals, fish and recreation. Prevent extreme stormwater flows by keeping impervious cover to less than 15-25 percent of land surface area and providing additional infiltration areas.

Access: Identify, protect and improve existing access points and provide new appropriate access points for people or animals.

Floodplain: Restrict or prevent development within the 100-year floodplain and protect floodplain habitats.

Wetlands: Protect and restore riparian and non-tidal wetlands to ensure preservation of water filtering and storage, and habitat.

Sinkhole buffers: Protect and restore sinkhole buffers.

Developing Strategies to Achieve Objectives

The watershed management plan must identify specific strategies – the "how" of the plan – to achieve objectives. The strategies should be realistic and rely on available resources. Identify realistic timeframes and parties responsible for achieving each strategy. An objective may require several strategies. Monitor each to ensure that it is implemented. For example, if there is an objective to restore stream buffers to improve water quality, specific strategies should identify where, when and how stream buffers will be restored.

Integrating Land Management Tools

Development of a watershed plan offers localities the opportunity to incorporate new management tools and techniques, such as incentives to encourage low-impact development approaches that reduce impervious cover and maintain water quality. Management technology has evolved to address the quality and quantity of runoff, including such techniques as biofilters or rain gardens that trap runoff and filter pollutants.

Below is a list of watershed management techniques.

Stormwater management

Biofilters (rain gardens): reduce or eliminate stormwater impacts by trapping and filtering pollutants

Green rooftops: trap and filter rooftop rainfall; reduce runoff through transpiration

Rain barrels: capture rooftop runoff and reduce peak stream flows and erosion rates

Grassed swales: retard and filter runoff

Riparian and sinkhole protection

Floodplain and riparian zone restoration: restores native tree and plant species and removes or mitigates harmful land uses

Removal of invasive and exotic species: allows restoration of native species and dependent fish and wildlife

Livestock exclusion: prevents streambank erosion by fencing off cattle

Reduction of fecal waste impacts: by inspecting and repairing failing septic systems, requiring pet waste removal in parks near streams

Remediation of sinkhole dumps: by removing material and disposing of it at licensed solid waste facility, and re-establishing vegetation with appropriate native species

In-stream mitigation

Bioengineering: prevents streambank erosion and revives habitat using natural materials to restore stream structure and stability

Fish habitat restoration: rebuilds fish habitats such as riffles, runs, pools and drops

Stream channel restoration: restores stream channel's natural sinuosity to reduce erosion and revive habitats

Lowhead dam removal: restores fish passage

Legal and land planning tools

Riparian easements: protect streamside buffers

Land purchase (fee simple or development rights): prevents incompatible development and can be used to acquire sensitive habitat lands

Re-zoning: changes zoning to permit uses compatible with protecting sensitive watershed areas

Overlay zoning: places additional restrictions on land uses in sensitive zones like riparian areas or wetlands

Water quality protection ordinances: can address specific watershed management needs, including open space protection, erosion and sediment control, clustered developments and stormwater management

Enhanced enforcement: may result in increased inspections, higher penalties for violations, public education about regulations

Incentives: awards for improved land and water condition, flexible avenues for reducing pollution, and showcasing innovative technologies and practices

In Reston, Va., efforts are underway to manage the headwaters of Difficult Run, Sugarland Run and Horsepen Run, all of which drain into the Potomac River, a tributary of the Chesapeake Bay. While Reston was being developed in the 1960s and throughout the 70s, stormwater management was uncommon. Now 25 percent of Reston's land area is impervious. Reston is attempting to learn from past mistakes to improve watershed conditions through a comprehensive watershed planning effort. Similarly, Fairfax County is beginning to develop watershed plans for the county's 10 major watersheds. The process will include the evaluation and implementation of innovative storm water management techniques, particularly for areas that have already been fully developed.

Examples of innovative watershed management tools are being practiced across Virginia. Fairfax and Albemarle counties have approved lists of best management practices for use in preventing or mitigating stormwater impact from new developments. Albemarle County also encourages developers to use bioengineering techniques, and the county has installed several projects.

Section Seven

Resource Needs

Clearly outline funding and technical support needs throughout the plan. Identify resource limitations that might prevent successful completion of the plan's implementation strategies.

Effectively Leverage Existing Resources and Mobilize New Resources

An effective watershed plan should identify existing resources for technical and financial assistance and work in tandem with existing programs. For example, instead of including a stand-alone roadway plan, the watershed plan would detail guidelines for existing road planning processes to help engineers and government officials understand how road design can mitigate potential watershed impacts. Similarly, if the watershed plan calls for protecting riparian areas, the plan can incorporate partnerships with existing local and state conservation easement programs rather than proposing creation of a new program.

The goals and objectives of a watershed's plan can mobilize new community resources to support local watershed management. For example, the draft watershed plan for Yarmouth Creek in James City County calls for creating a citizens advocacy group to mobilize volunteer and other community efforts on behalf of the watershed.

Planning for Ongoing Funding and Management

Plans frequently fail because of inadequate funding. To avoid this, each plan objective should identify a funding mechanism. Staff time also will be required to oversee, review and adapt. Monitoring and evaluating the plan may require additional resources from local engineering departments or necessitate hiring consultants.

Staff and resources required to monitor and evaluate the plan often are unavailable. This problem can be addressed several ways. For example, a volunteer water quality monitoring program can be implemented to collect data on stream health and habitat, morphology and buffer conditions. A university's planning and mapping class can develop a geographic information system map for the watershed. A local contractor can help with grading and tree planting. A local high school could develop and circulate newsletters and brochures about the health of the watershed. These are examples of real volunteer assistance that has been provided to Virginia localities. Enlisting partners' assistance with monitoring and implementation also builds political support.

In addition to enlisting volunteer help, budget and staff shortfalls can be addressed by tiered levels of funding to carry out plan objectives. For example, a stream buffer re-vegetation plan could include three levels of implementation based on available funds. Level I might include voluntary community planting in buffer areas, pursuing tree donations from local nurseries or obtaining leftover seedlings from federal nurseries. Level II might involve giving free trees and technical assistance to landowners. Level III might expand to enabling county parks staff to supply trees, and organizing and conducting the entire planting and monitoring effort. Create partnerships wherever possible. They save financial and staff resources and expand community ownership of the watershed among multiple stakeholder groups.

Finally, a locality could integrate the workload for implementing the watershed plan as part of the appropriate local departments' regular scope of work and budget. This may include pursuing funding for complementary projects in the locality's capital improvements program. Another option is to seek outside grants. Over-reliance on grant funds for watershed planning efforts can be problematic, however, as funding may vary from year to year. Outside grant funds may be a more appropriate resource for one-time costs. Examples include an initial watershed assessment, a stream bioengineering demonstration project or a watershed forum event.

Goal 1:
Improve the water quality of Muddy Creek to allow restoration of a healthy shad fishery.

Objective 1:
Restore riparian and in-stream habitats.

Implementation strategies:
Restore 120 linear yards of hardwood riparian buffer, 35' wide along the east side of Muddy Creek downstream from its confluence with Clear Run.

Responsible party: Soil and water conservation district (SWCD) with Earth Conservation Corps volunteers
Funding: DCR watershed grant and in-kind services of consulting engineer
Time: Fall 2004

Obtain agreement under the Conservation Reserve Enhancement Program (CREP) for 25 acres of agricultural land for reforestation, hardened cattle access and fencing at the McDonald Farm along Muddy Creek.

Responsible Party: USDA Natural Resources Conservation Service with SWCD
Funding: CREP/federal match
Time: Summer 2004

Conduct an inventory on main stem of Muddy Creek. Recruit volunteers from Blue Ridge Voyageurs to canoe entire length of main stem, noting on tax maps exact locations where erosion occurs along Muddy Creek. Link landowners with CREP and Virginia Agricultural Best Management Practices cost-share programs.

Responsible Party: SWCD with volunteers
Funding: SWCD
Time: Winter-spring 2004

Inventory and prioritize outfalls and impacts along upper tributaries of Muddy Creek for BMP retrofit and remediation.

Responsible Party: County public works department
Funding: Stormwater fees
Time: Spring 2005

Meet with all 17 landowners in the Muddy Creek headwaters tributaries of Briny Branch and Upper South Fork to form a "neighborhood river watch."

Responsible Party: Watershed association
Funding: Volunteer time, with local general fund support
Time: Fall 2004

Section Seven

Progress Benchmarks

Use benchmarks to evaluate and quantify progress at regular intervals. Update the plan to reflect changes identified through benchmarking.

Tracking and Evaluating Implementation

Community involvement, watershed assessment, and plan development and implementation are critical steps. Still, a completed watershed plan must be evaluated and updated over time to remain effective. Watersheds are dynamic living systems affected by changes in climate, land uses, management practices, and daily actions taken by people living there. The goals, objectives and strategies within the watershed plan must accommodate these changes.

Benchmarks, or standards, are necessary for evaluating the plan's overall implementation and for adapting the plan to make sure goals are achieved. A watershed plan should establish a timetable for implementing objectives, so activities can be monitored regularly. A core team can be established to track and manage the plan's implementation over time. The implementation schedule should allow anyone, including the core team, to review and quickly tell if goals have been met. It can be as simple as an annual checklist. The plan's benchmarks should provide a clear mechanism for evaluating whether or not it has been achieved.

Enlist new and diverse stakeholder groups when implementing the watershed plan. As new organizations emerge, such as a new non-profit "friends of the creek group" or a new land development association, tell them about the plan and invite them to participate in its implementation. Similarly, if the comprehensive plan is being updated or new zoning regulations are being considered, the watershed plan should be incorporated in those processes.

Review and Evaluation

Once a watershed plan is developed and implemented, localities need to ensure that it is adequately reviewed and evaluated over time in order to assess ongoing challenges, opportunities and successes. There are two steps of review and evaluation. First, study and evaluate individual goals and objectives and, second, review and assess the plan's overall implementation over time.

To monitor and evaluate a plan's individual goals and objectives, include guidelines for these processes in the plan itself. For example, if one plan goal is to protect fish habitat, evaluate existing fish habitat and fish species before developing specific habitat restoration objectives. Objectives and action plans should contain measurable targets for achieving habitat protection or improvement. Contingency plans can address objectives that are not achieved.

Specific components for monitoring and evaluating the plan's goals and objectives include:

- Monitoring methods and targets to measure achievement of plan objectives such as improved water quality
- A clear methodology, timeframe and parties responsible for conducting monitoring
- Monitoring before and after plan implementation to track improvements
- A reporting mechanism to indicate who receives and reviews monitoring results
- A formal plan assessment for ongoing evaluation and updating goals and objectives that were not met

An effective watershed plan needn't contain a detailed monitoring program, but it should have the components described above to ensure that watershed-related challenges, opportunities and successes are adequately addressed. For example, if a specific management practice, such as a riparian buffer, is installed as part of a watershed protection strategy, then the buffer's performance should be monitored. Tree survival rates should be measured at least annually, preferably biannually. In-stream water quality should be evaluated to make sure the forested buffer is improving habitat and water quality.

Intermediate indicators and milestones

Intermediate indicators and milestones are important to effective monitoring and evaluation. These in-process, evaluation points highlight interim achievements (an increase in fish populations) and indicate that a goal or objective has reached a certain stage (30 percent increase in spawning population). For example, because brook trout are sensitive to pollution, a sample objective for improving water quality habitat might identify the presence of the fish as an intermediate indicator of success. A final milestone might be the tripling trout numbers by 2010. Remedial action should be taken if either the indicator or the milestone is not met.

State environmental agencies may be able to assist with water quality and biological monitoring needs. If a locality or county government lacks funds needed to implement such monitoring, a state agency might be able to include the given watershed in its next monitoring cycle. Alternatively, a partnership with a nearby university or volunteer monitoring program can provide people, equipment and laboratory facilities for stream assessment. For example, entomology students at the Virginia Polytechnic Institute and State University collaborate with Virginia Save Our Streams to monitor streams.

A Mechanism for Ongoing Watershed Assessment

An effective watershed plan is not a report to be written and left unchanged over time. Because natural systems and land use change over time, watershed planning should be understood as an iterative process that needs to be revisited and updated on a regular basis.

Build a case for action based on impacts

Effective watershed plans allow for alteration should goals and objectives not met. For example, if periodic assessments show that water quality goals were not met, document the situation and take corrective action. To prepare, the watershed plan might include a series of detailed scenarios that establish prospective courses of action. For example, a plan could designate resources for teaching developers about voluntarily using low impact development techniques to reduce stormwater runoff and pollution. If monitoring shows that pollution remains high and storm flows are unabated, the plan could stipulate other tools, such as an updated stormwater ordinance or extensive stormwater retrofits.

Happy Trout Creek Watershed Plan

Goal 1: Restore water quality in Happy Trout Creek.
Objective 1: Re-establish riparian buffers.
Strategy 1: "Restore riparian buffers to 20 linear miles of Happy Trout Creek by fall 2008."
Interim Benchmark:
Fifty percent of trees and shrubs planted in buffer should survive at least two years after installation.

Intermediate Indicators and Milestones:
Using planting plan, establish sample plots and monitoring schedule to evaluate buffer condition. Conduct monitoring and record the areas where buffer is not meeting 50 percent survival rate. Assess reasons for failure (e.g., mowing of young trees by maintenance department) and address problem or replant.

Section Nine

Conclusions

Developing and implementing watershed plans makes sense. The protection and restoration of local watersheds improves Virginia's environment. It also results in a variety of benefits for Virginia's communities, including access to clean, healthy water supplies, abundant recreation and public safety. The plans help localities meet new state and federal water quality requirements, and provide a framework for citizen involvement in local water quality issues.

Effective local watershed management planning gives communities a new set of tools to address policy challenges and new planning opportunities that extend beyond meeting minimum regulatory requirements. Watershed management helps ensure that surface and ground water supplies do not degrade over time, drinking water supplies are sustained, soil and stream bank erosion are reduced, and wildlife habitat is restored.

Whether large or small, rural or urban, a locality can play a critical role in shaping the health of its watershed and communities. In developed urban watersheds, there are many new tools, like rain gardens or brownfield redevelopment, to mitigate watershed challenges. And there are many similar opportunities in rural watersheds to identify critical areas and channel growth so that natural resources and water supplies are protected.

Leaders in Virginia's communities understand that well planned natural resource protection is needed for the sake of future generations and a sustainable local economy. Local watershed planning can make a difference in conserving and protecting Virginia's natural resources.

Putting It All Together: Sample Steps for Developing a Watershed Strategy

Happy Trout Creek Watershed

1. Establish a goal for the watershed plan

Improved water quality in Happy Trout Creek. Project goal is based on assessment of current watershed conditions.

2. Establish specific objective(s)

Objective A: Restore 35-foot-wide riparian forest buffers on both sides of the stream with native trees and shrubs along 20 linear stream miles.

3. Establish specific tasks to achieve objective

- Implement riparian easement and planting program with county landowners.
- Purchase lands from those unwilling to donate easements.
- Assess and plant buffers as needed, to improve
- pollution removal and wildlife habitat.

4. Establish an implementation and monitoring plan

- Monitoring Baseline: Measure and establish a current baseline of trees and shrubs for each project area. Devise a plan to restore trees and shrubs (with review and approval by project sponsors, as required).
- Implementation: Install plants and record location, number and species of trees and shrubs.
- Ongoing monitoring: Revisit site at six-month intervals and record survival rates (this can be done for the entire area or for predetermined sample plots intended to represent the entire plot).
- Maintenance plan: For losses greater than 60 percent, repair and replant as needed, according to maintenance plan.
- Consider providing funds or contingency plans to repair or reinstall if the project is deemed unsuccessful. Establish a project endpoint, as appropriate. For example, will five years of successful buffer re-vegetation be considered a success, or is the project to be inspected in perpetuity?

Appendices

Appendix A: **Watershed Management Planning Checklist**

Appendix B: **Technical, Regulatory and Financial Assistance Programs**

Appendix C: **Virginia Planning Initiatives**

Appendix D: **Data and Planning Resources**

Appendix E: **Visioning Process**

Appendix F: **Resource Bibliography**

Appendix A

Watershed Management Planning Checklist

Taking Stock: Planning Checklist

1. List the documents that comprise the watershed management plan(s):

2. Do the planning documents identify specific watersheds or hydrologic units as the geographic management unit?

If yes, go question 3 and then to Watershed Management Planning Components below.
If no, the planning process and documents must be revisited to focus on identified watersheds or hydorologic units.

3. List the watersheds or hydrologic units addressed in the watershed management planning documents listed above:

Compare the listed planning documents for each watershed or hydrologic unit with the following watershed management planning components to determine if the planning process meets the watershed management planning criteria and to identify opportunities for further effort.

Watershed Management Planning Components

1. Community involvement: Community involvement helps ensure that a plan has the necessary support to be implemented. Involvement can be formal (participants had decision-making roles) or informal (participants provided information or ideas).

Who was involved?	Formal	Informal
non-government stakeholder groups		
local/regional government agencies		
state/federal government agencies		
general public		
economic and business interests		
other (describe)		
Who is coordinating community involvement actions as part of the planning process (specific local government unit/office, local SWCD, others)?		

NOTE: Representatives from each category must be present to meet the criteria for community involvement

Which participants have endorsed the plan?	Yes-all	Yes-some	No	Don't know
local governments in watershed				
regional commission or planning district commission				
soil and water conservation district				
contributing non-government stakeholder groups				
economic and business interests				
other (describe)				

NOTE: Acceptance by the appropriate local government(s) is necessary to meet the criteria for community involvement. For more information on community involvement, see Section 3.

Was a vision statement developed for the watershed?	Yes	No
Was the vision statement developed by collaborative efforts of the stakeholders?	Yes	No

NOTE: A watershed vision statement must represent the shared values of the community and must be a product of a stakeholder process. For more information on vision statements, see Section 3 and Appendix B.

2. Environmental Inventory: An environmental inventory describes or characterizes the various features that comprise the watershed. The inventory may go beyond describing features and may include an assessment of their conditions.

Do the listed planning documents contain an environmental inventory?	Yes	No

If no, an inventory must be undertaken. See Section 4 for assistance.

Do the listed planning documents include inventories with the following information?	Yes	Includes Assessment	WS- Based	No
Riparian System				
*available chemical water quality monitoring data				
*available biological monitoring data				
identification of major natural habitats				
rare, threatened or endangered species				
Physical Attributes				
*drainage areas				
*floodplains				
*wetlands				
*erosion potential				
karst features				
riparian buffers				
stream sinuosity				
buffer widths				
vegetation type				
tree canopy coverage				
springs				
water budget				
Existing land use/cover				
*land uses				
*existing land uses				
*future uses				
*major forested areas				
disturbed areas				
flood mitigation areas				
runoff potential				
*potential pollution sources				
*permitted point sources				
*identified nonpoint sources				
protected areas				
recreational uses/areas				
significant sites				
Identification of missing or needed data				
Other				

**NOTE: Items with asterisk are readily available in Virginia and represent the minimum amount of data needed to develop a meaningful environmental inventory. For more information on conducting an environmental inventory, see Section 4.*

3. Institutional and Regulatory Framework: This component outlines mandated and/or agreed upon roles and responsibilities within the watershed(s) and sets up the framework for implementation efforts.

Do the planning documents	Yes	No
identify agencies/organizations with mandated responsibilities?		
identify opportunities for coordination among agencies and organizations?		
outline existing environmental regulations and ordinances? (ie. CBPA, VPA, erosion and sediment control program, TMDLs, MS4 stormwater permits, comprehensive plan, overlay districts, etc.)		
identify areas where complementary efforts can be coordinated?		
identify gaps in institutional responsibilities?		
identify known financial resources? (capital improvement programs, grants, etc.)		
identify potential financial resources?		

NOTE: Identifying mandated and regulatory responsibilities is necessary to meet the minimum criteria for this component. For more information on related state and federal programs, see Section 5.

4. Data Evaluation and Goal Setting: This component establishes a link between the environmental inventory and desired goals for the watershed(s).

Do the planning documents	Yes	No
analyze data collected in the environmental inventory to develop goals?		
document clearly articulated goals based on local and watershed factors?		
Have goals aimed at improving, enhancing and protecting:		
water quality		
watershed habitats		
wetlands		
stream corridors		
riparian buffer areas		

NOTE: At a minimum the the identified plan goals should clearly reflect the watershed vision and address water quality and habitat. For more information on data evaluation and goal setting, see Section 6.

5. Implementation and Resource Needs: This component establishes resource limitations that will affect successful implementation of the plan(s).

Do the planning documents	Yes	No
*contain strategies or identify tools for achieving goals?		
*assign implementation responsibilities?		
*identify sources of funding for specific goals?		
assign projects to the local government(s) capital improvement program(s)?		

NOTE: Items with asterisk are critical to assuring overall success of planning. For more information on setting implementation goals and evaluating resource needs, see Sections 7 and 8.

6. Progress Benchmarks: This component identifies the review and evaluation process critical to successfully implementing any planning effort.

Do the planning documents	Yes	No
establish a process for tracking accomplishments?		
establish a time-line for achieving milestones?		
establish a horizon for re-evaluation?		
What is the planning horizon?		

NOTE: This component is critical to assuring overall success of the planning effort. For more information on establishing progress benchmarks, see Section 9.

Understanding the Results of the Planning Checklist

If the comparison of planning documents to these criteria shows that the documents in question have not met the minimum standard for each component, the next step in watershed management planning is to complete missing or incomplete components.
If the comparison reveals that the planning documents collectively meet the minimum criteria, the planning documents represent a successful watershed managment planning effort and steps should be taken locally to formalize the effort. Opportunities to re-evaluate the watershed management planning effort to more fully meet the criteria can be pursued.

Appendix B

Technical, Regulatory and Financial Assistance Program

Programs and Initiatives Addressing Agricultural Land Uses

Virginia Agricultural Best Management Practices (BMPs) Cost-Share Program
This program encourages farmers to voluntary install practices that protect water quality and conserve soil. The program provides incentives for the installation of BMPs on a flat per-acre rate, up to 75 percent of the estimated cost, or a combination of flat rate and 75 percent of estimated component costs. The maximum amount an applicant can receive in a program year is $50,000.
Visit: http://www.dcr.virginia.gov/sw/costshar.htm
or contact your local soil and water conservation district, or call **(804) 371-7330**

Virginia Agricultural Best Management Practices Loan Program
The program, administered by DEQ, is a source of low interest financing to encourage the use of specific BMPs that reduce or eliminate agricultural nonpoint source pollution in Virginia's waters. The minimum allowable loan is $5,000, and repayment periods range from one to ten years.
Visit: http://www.deq.virginia.gov/cap/aghome.html

Virginia Agricultural Best Management Practices (BMPs) Tax Credit Program
This program encourages voluntary installation of BMPs that will address Virginia's nonpoint source pollution water quality objectives by allowing individuals engaged in agricultural production for market to take a tax credit for agricultural BMPs installed to improve water quality. The tax credit is 25% of the first $70,000 expended for the agricultural BMPs by the individual or corporation against the imposed state income tax. The amount of the tax credit shall not exceed $17,500 or the total amount of state income tax obligation for the individual. If the amount of the credit exceeds the taxpayer's liability for such a taxable year, the excess may be carried over for credit against income taxes in the next five years or until they have taken the total of the tax credit.
Visit: http://www.dcr.virginia.gov/sw/costshar.htm
or contact your local soil and water conservation district, or call **(804) 371-7330**

Conservation Reserve Enhancement Program (CREP)
CREP is a unique partnership of state, local and federal agencies, and private conservation groups. It aims to improve water quality and wildlife habitat by offering financial incentives to farming landowners who voluntarily restore riparian buffers, native warm season grass filter strips and wetlands. Partners include the state departments of Conservation and Recreation, Forestry (DOF), and Game and Inland Fisheries (DGIF); soil and water conservation districts (SWCDs); Virginia Cooperative Extension; USDA Natural Resources Conservation Service (NRCS) and Farm Service Agency (FSA); U.S. Fish and Wildlife Service; Chesapeake Bay Foundation; and Ducks Unlimited.

Funding is available for fencing to keep livestock out of streams and rivers to reduce fecal coliform and sediment; well-drilling and alternative watering systems to support agricultural production; wetland restoration; and riparian buffer planting to filter nitrogen, phosphorus and sediment.

Conservation practices installed under CREP receive 50 percent cost-share reimbursement from FSA and up to 25 percent from DCR through SWCDs. Also, the Chesapeake Bay Foundation and Ducks Unlimited contribute to wetland restoration efforts and enhanced buffer plantings. The program offers yearly rental payments for 10- or 15-year federal contracts. Through DCR, a $500/acre incentive is available for CREP enrolled acres placed under a permanent open space easement.
Visit: **http://www.dcr.virginia.gov/sw/crep.htm**

Conservation Reserve Program (CRP)
Similar to CREP, the CRP provides annual rent payments to landowners with highly erodible land to allow them to remove that land from production and plant it with conservation species for at least 10 years. It provides cost-share funds for planting trees and other vegetative cover. To be eligible, the cropland must have been planted with commodity crops two of the five most recent crop years.
Visit: http://www.nrcs.usda.gov/programs/

Wildlife Habitat Incentives Program (WHIP)
WHIP is a voluntary program through which cost-share and technical assistance are provided to private landowners to develop and improve fish and wildlife habitat. Participants who own or control land write and implement a wildlife habitat development plan. The program is managed by the Natural Resources Conservation Service (NRCS). Duration of the assistance is from five to ten years.
Contact: Cooperative Extension Service, local conservation district;
Visit: http://www.ftw.nrcs.usda.gov/pl566/WHIP.html

Environmental Quality Incentives Program (EQIP)
EQIP provides technical, educational and financial help to eligible farmers and ranchers to address soil, water and related natural resource concerns on their lands in an environmentally beneficial and cost-effective manner. This is done through implementation of a conservation plan that includes structural, vegetative and land management practices. Contracts run from five to ten years, and cost-share provisions are possible.
Contact: USDA Natural Resources Conservation Service;
Visit: http://www.nrcs.usda.gov/programs/

Wetland Reserve Program (WRP)
WRP is a voluntary program to restore and protect wetlands on private property. It offers three options:

Permanent easements: Landowners receive the agricultural value of the land, up to a maximum cap, plus 100 percent of the cost of restoring the land.
30-year easements: Landowners receive 75 percent of the easement value and 75 percent cost-share on the restoration.
Restoration cost-share agreements with a minimum 10-year duration: Landowners receive 75 percent of the restoration cost.

Visit: http://www.nrcs.usda.gov/programs/wrp

Emergency Watershed Protection Program
This program, administered by NRCS, provides direct technical aid to restore streams in response to natural disasters. Debris removal, stream bank reshaping, and the reseeding of damaged areas are examples of practices the program covers. A local sponsor must submit a request for assistance.
Visit: http://attra.ncat.org/guide/a_m/ewp.html

Agricultural Stewardship Program
The Agricultural Stewardship Act (ASA) enables farmers to voluntarily correct water quality problems before enforcement action is taken. Water quality problems concerning nutrients, sediment and toxics from agricultural activities are reported to the Virginia Department of Agriculture and Consumer Services (VDACS). The program aims to educate farmers about environmental stewardship and identify real water-quality problems. Through the program, farmers are directed to soil and water conservation districts for help in correcting problems in a common sense manner, accommodating both the farmer and the environment.
VDACS Office of Policy, Planning and Research - **(804) 786-3538.**

Programs and Initiatives Addressing Non-Agricultural Land Uses

Erosion and Sediment Control Law and Regulations
DCR implements the state Erosion and Sediment Control (ESC) Program according to the Virginia Erosion and Sediment Control Law, Regulations and Certification Regulations. The program's goal

is to control soil erosion, sedimentation and nonagricultural runoff from regulated *land-disturbing activities* to prevent degradation of property and natural resources. The regulations specify minimum standards, which include criteria, techniques and policies, that must be followed on regulated activities.

Most private projects involving land disturbance are regulated through local government-operated ESC programs whereas DCR's ESC staff oversees state and federal activities. While property owners are ultimately responsible for ESC plan approval and implementation, responsibility for ensuring compliance extends to the developer, contractor, consultant and Virginia's citizenry. The success of ESC programs affects various interests, from those who own, rent or develop property to those who reside or recreate on lands or waters adjacent to or downstream from land-disturbing activities.

Visit: http://www.dcr.virginia.gov/sw/e&s.htm or call local government

Stormwater Management

Stormwater Management Legislation passed by the 2004 General Assembly created a statewide, comprehensive stormwater management program related to construction and post-construction activities. DCR administers the Virginia Stormwater Management Program (VSMP), including the Municipal Separate Storm Sewer System (MS4) Program, under the federal Clean Water Act. The MS4 program requires urbanized areas with certain population thresholds to develop stormwater management plans and obtain discharge permits for stormwater outfalls. Any locality within Tidewater Virginia, as defined by the Chesapeake Bay Preservation Act, and any locality designated as an MS4 must adopt a local stormwater management program under the VSMP by July 1, 2006. Other Virginia localities may elect to adopt and administer a local stormwater management program for land disturbing activities under the VSMR Localities adopting VSMP local programs receive a portion of the state permit fees to defray costs. In situations where localities are not required or have not elected to adopt a local program, DCR administers the VSMP.

Visit: http://www.dcr.virginia.gov/sw/stormwat.htm or call local government

Programs and Initiatives Addressing General Watershed-Based Implementation

Catalog of Federal Funding Sources for Watershed Protection

The Catalog of Federal Funding Sources for Watershed Protection website is a searchable database of financial assistance sources (grants, loans, cost-sharing) available to fund a variety of watershed protection projects. Users can use either of two searches to select funding programs for particular requirements. One is based on subject matter, the other on keywords. Criteria searches include the type of organization (e.g., nonprofit groups, private landowner, state, business), type of assistance sought (grants or loans) and keywords (e.g., agriculture, wildlife habitat). Searches yield a list of programs by name and detailed information on the funding source.

Visit: http://www.epa.gov/watershedfunding

Virginia Coastal Program

The Virginia Coastal Program was established in 1986 as a network of state agencies and local governments dedicated to preserving, protecting and restoring the natural beauty and ecological function of our coastal zone while fostering appropriate economic growth and development. The Coastal Program achieves this balance and spirit of cooperation by supporting projects and programs throughout Tidewater Virginia that address coastal issues. Funding is periodically available for implementation of projects and polices that support the program's 10 goals.

Visit: http://www.deq.state.va.us/coastal/

Watershed Roundtables

A watershed roundtable consists of people who have a vested interest in their communities and are concerned about local water quality. In Virginia, watershed roundtables are known by a variety of names, such as the Big Sandy River Basin Coalition, the Rappahannock River Basin Commission and the Pure Water 2000 Forum. A roundtable can be the driving force in the watershed, providing education, outreach and solutions to restore and protect water quality. Roundtables generally involve a diversity of participants. Their activities address many common

community water quality concerns by hosting forums to present watershed issues on local water quality and land use, educating citizens about water quality, seeking grants, donations and other funding sources, coordinating workshops, collecting and analyzing water quality data, participating in the TMDL planning, and planning and implementing watershed-wide water quality goals. Each major watershed in Virginia has a roundtable.
Contact: 1-877-42WATER or call local **DCR Watershed Office**
Visit: http://www.dcr.virginia.gov/sw/wsheds.htm

Chesapeake Bay Restoration Fund (License Plate Program)
In 1992, the Virginia General Assembly established the Chesapeake Bay preservation license plate. The colorful plate reads, "Friend of the Chesapeake." The assembly's Virginia Division of Legislative Services administers revenue from license plate sales. Grants are available to state agencies, local governments, schools and nonprofit groups for environmental education and restoration projects.
Contact: Division of Legislative Services at (804) 786-3591

Water Quality Improvement Fund
The Water Quality Improvement Act of 1997 established cooperative programs for nutrient reduction and other point and nonpoint sources of pollution. The Water Quality Improvement Fund (WQIF) was created to provide water quality improvement grants to local governments, soil and water conservation districts and individuals. A primary objective is to fund projects that reduce the flow of excess nitrogen and phosphorus into state waters. DEQ manages point source grants, and DCR handles nonpoint source grants.
Visit: http://www.deq.state.va.us/bay/wqif.html or **(804) 698-4466**
Visit: http://www.dcr.virginia.gov/sw/wqia.htm or **(804) 371-8984**

Coastal Nonpoint Source Pollution Control Program
States like Virginia, with approved coastal zone management programs, are required to focus NPS pollution control efforts to restore and protect coastal water quality by applying economically achievable BMPs. These are implemented through enforceable state policies and mechanisms.
The federal government defines state-enforceable policies and mechanisms as state and local regulatory controls and/or non-regulatory incentive programs combined with a state enforcement authority. DCR is the lead state agency for the Coastal Nonpoint Source Pollution Control Program.
Visit: http://www.dcr.virginia.gov/sw/czreauth.htm or call **(804) 692-0839**

Scenic Rivers
The Virginia Scenic Rivers Act was passed in 1970 to protect and preserve certain rivers or sections thereof possessing natural or pastoral beauty. Nineteen rivers or river segments have been designated, including one State Historic River. Ten more, which have been evaluated and found to quality for designation, are identified in the 2002 Virginia Outdoors Plan. Local support is necessary for the designation of scenic river status, and the state legislature and governor must approve each addition to Virginia's Scenic River system. The scenic rivers system comprises tidal and non-tidal rivers and extends from the coastal Virginia to the mountains. Inclusion in the scenic rivers system provides a framework whereby the river's preservation is encouraged.
DCR works with localities and citizens to study potential scenic rivers and encourages their participation in evaluation. Following evaluation, the locality is notified whether or not the river qualifies. If the river qualifies, DCR informs citizens and government officials about the program and their roles in resource management.
Visit: http://www.dcr.virginia.gov/lanm_sum.htm

Appendix C

Virginia Planning Initiatives

Planning Element	Watershed Management Plan (WMP)	TMDL Implementation Plan	Tributary Strategies Plan	Local Stormwater Management Program	Local Comprehensive Plan
Lead Responsibility	local government or community watershed organization	state or federal agency, local government, college/university, community organization	state government in cooperation with Chesapeake Bay Progam	local Eastern Virginia government or MS4 owner local governments adopting program DCR in all other localities	local government
Purpose	local protection, conservation and restoration of stream corridors, riparian forest buffers, and wetlands to improve habitat and water quality	implement NPS load allocations to restore the beneficial use of the resource	achieve and maintain the nutrient and sediment loading goals assigned to each tributary in order to restore bay living resources	to protect the quality and quantity of state waters from the potential harm of unmanaged stormwater	guide and accomplish coordinated, adjusted and harmonious development of land within jurisdiction Eastern Virginia – incorporate the protection of the quality of state waters
Scale	one to several hydrologic units	small watershed up to several hydrologic units	entire watershed of each bay tributary, including multiple jurisdictions and hydrologic units	one to several hydrologic units within jurisdiction	local government jurisdiction – one to several hydrologic units
Detail	specific to identified water quality and land use issues	specific to water quality impairment	specific to nutrient and sediment reductions for entire watershed	specific to stormwater discharges issues	specific to the physical development of the jurisdiction. Controls the general or approximate location, character and extent of each physical feature (roadways, utilities, etc.) Eastern Virginia – specific to a) physical constraints to development b) protection of water supply c) shoreline erosion control d) public-private waterfront access e) water quality improvement potential from redevelopment
Stakeholder Involvement	yes, watershed-wide	yes, watershed-wide	yes, at basin level	yes, jurisdiction-wide, may be by watershed	yes, jurisdiction-wide

Planning Element	Watershed Management Plan (WMP)	TMDL Implementation Plan	Tributary Strategies Plan	Local Stormwater Management Program	Local Comprehensive Plan
Watershed Goals	yes, watershed-wide and addressing all water quality issues	yes, specific to water quality impairment	yes, specific to nutrient reductions	not required	not required Eastern Virginia - required for purpose of protecting the quality of state waters
Environmental Inventory and Evaluation	yes, watershed-wide and addressing all land use & water quality issues	yes, specific to water quality impairment	yes, specific to CBP model parameters and nutrient and sediment reductions	yes, specific to stormwater discharge issues	permissive components for: conservation flood-plains drainage the designation of areas for implementation of reasonable ground water protection measures Eastern Virginia - specific checklist items to protect quality of
Analysis of Stakeholder Roles and Responsibilities	detailed by stakeholder	detailed by stakeholder	broadly assesses responsibilities	describes permit holders' responsibilities	describes local govern-ment's responsibilities Eastern Virginia - broadly assesses other agency responsibilities
Implementation Strategies and Actions	yes, specific actions, timeframes and costs	yes, specific to sources, targeted and phased restoration activities	yes, broad, basin-wide	yes, specific stormwater actions, timeframes and costs	specific locations, character and extent of each physical feature such as roadways Eastern Virginia - strategies and actions to protect water quality
Identification of Needed Resources	yes, actual costs	yes, actual costs for both implementation and technical assistance	yes, broad, basin-wide	yes	no but may include costs in capitol improvement program Eastern Virginia - yes - part of the action plan
Commitment to Implement	yes, by planning participants	yes, when federal money is available	yes	yes	yes
Monitoring and/or Tracking	yes	yes	yes	yes	yes Eastern Virginia oversight by CBLAD
Deadlines	2010	2010	2004	July 2006	ongoing – updated and revised every five years
Information for this table was provided by:	DCR Chesapeake Bay Office and C2K Commitment 2.2.1	DCR TMDL Program, WQMIRA	CBP website, memo to Russ Baxter	Stormwater Management Act of 2004	Code of VA 15.2-2223-2228 and 15.2-2232

Appendix D

Data and Planning Resources

The programs described below provide technical and/or financial help for watershed management planning..

Abandoned Mine Land Program
The Abandoned Mine Land (AML) Program of the Virginia Department of Mines, Minerals and Energy, Division of Mined Land Reclamation (DMLR), was established in the late 1970s to abate pre-federal act coal mine related problems adversely affecting public health, safety, general welfare and the environment. Problems related to abandoned mine land include landslides, stream sedimentation, hazardous structures, dangerous highwalls, subsidence, loss of water, acid mine drainage and open mine portals. Virginia maintains an AML inventory of abandoned mine problems throughout the state. These high priority projects pose the greatest threat to public health and safety and the environment.

Virginia's AML Program is widely recognized as among the nation's best. It provides technical assistance and, when available, funding for projects that eliminate highwalls, cover and re-vegetate eroding outslopes and abate acid mine drainage problems.
Contact: (276) 523-8206 or visit: **http://www.dmme.virginia.gov/dmm**

Chesapeake Bay Preservation Act
The Chesapeake Bay Preservation Act and Regulations established a cooperative program between state and local governments to improve water quality in the Chesapeake Bay and its tributaries by promoting the application of sound land use planning and management practices on environmentally sensitive lands. The act requires local governments to incorporate general water quality protection measures into their comprehensive plans, zoning ordinances and subdivision ordinances. Although Tidewater localities are required to adopt and implement the act, local governments outside of Tidewater may also adopt bay act programs. Adopting and implementing a local program requires localities to map environmentally sensitive lands, develop or amend ordinances to implement performance criteria, amend comprehensive plans to address water quality, and evaluate their local ordinances and policies to identify and address any conflicts and barriers to protecting water quality.

Effective July 1, 2004, The Virginia Department of Conservation and Recreation took over responsibility for implementing act. The former Chesapeake Bay Local Assistance Department is now part of DCR.

DCR provides technical and financial assistance to local governments in developing and implementing their programs. The agency also provides advice on better site design and low impact development.
Contact: CBLAD, 1-800-CHES-BAY, or visit: **http://www.dcr.virginia.gov**

Chesapeake Bay Program
The Chesapeake Bay Program, created in 1983 by the first Chesapeake Bay Agreement, is a unique regional partnership leading and directing restoration of the Chesapeake Bay. Partners include Maryland, Pennsylvania, Virginia, the District of Columbia, the Chesapeake Bay Commission (a tri-state legislative body), the EPA and citizen advisory groups. In June 2000, partners signed Chesapeake 2000, a comprehensive and far-reaching agreement guiding efforts to restore and protect the bay through 2010. Chesapeake 2000 outlines 93 commitments critical to restoring the bay watershed's health. More than in previous agreements, Chesapeake 2000 commitments recognize the importance of locally driven initiatives to restore and protect the bay. About one-third of the commitments address actions at the local government level.
The Chesapeake Bay Program has developed a wide range of data and tools to help state and local governments and community organizations restore the bay.
Contact: Chesapeake Bay Program

410 Severn Avenue, Suite 109
Annapolis, MD 21403
Call **(410) 267-5700** or **(800) YOUR-BAY,** or visit: **http://www.chesapeakebay.net**

Forest Management and Preservation Programs
The Virginia Department of Forestry has numerous programs to promote sound forest management and preservation including urban and community forestry initiatives, water quality reference stream initiatives, a riparian buffer initiative and an extensive geographical information system with links to other useful planning databases.
The riparian buffer initiative aims to ensure that adequate buffer protects all streams and shorelines in the state through agency partnerships with organizations, businesses and private landowners to establish, enhance and maintain riparian buffers. The program also seeks to conserve existing forest buffers and enhance program coordination and accountability. The Riparian Buffer Implementation Plan was published in July 1998.
Contact: **http://www.dof.virginia.gov/resinfo/index.shtml** (resource data)
http://www.dof.virginia.gov/rfb/index.shtml (riparian forest buffers)

Rivers and Trails Conservation Assistance Program
The Rivers, Trails and Conservation Assistance Program, a.k.a. the Rivers and Trails Program, or RTCA, is a community resource of the National Park Service. Program staff works with community groups, localities and state governments to conserve rivers, preserve open space, and develop trails and greenways. The RTCA program developed a community toolbox, suitable for community organizations and professional planners, to facilitate community-based watershed projects, including planning.
Visit: **http://www.nps.gov/phso/rtca/**
http://www.nps.gov/sero/rtca/se_rivers.htm

Virginia Nonpoint Source Pollution Management Program
DCR coordinates and directs programs and services to prevent degradation of the state's water quality and quantity. Statewide nonpoint source pollution control programs and services support individual stewardship, and lend assistance to local governments with watershed-based resource management. Technical and financial assistance, education and research are enhanced by funds from the federal NPS Pollution Control Program and the Chesapeake Bay Program. A statewide system of 494 watersheds analyzed for NPS pollution potential drives how these activities are targeted. Services are delivered to local governments, special interest groups and citizens by staff in eight regional watershed offices.
Contact: **1-877-42WATER,** visit: **http://www.dcr.virginia.gov**

Virginia Water Monitoring Council (VWMC)
The VWMC inventories Virginia's various water monitoring programs including data collected by agencies, local governments, colleges, citizen groups, etc. The inventory is posted on the VWMC's website: **http://www.VWMC.vt.edu/vwmc** Users search the inventory by major watershed,monitoring parameter, county/city and organization type. Links to websites of water monitoring programs are also posted.

Because VWMC members represent state and federal agencies, local governments, environmental consulting firms. faculty at universities, citizens and others, the organization has an extensive collective knowledge of technical and practical information about watersheds and watershed planning, as well as water monitoring). The VWMC shares information through workshops, its websit, e-mail, and to individuals.

The following DCR programs support local watershed management planning:

Conservation Lands Database
The database includes mapped boundaries and certain characteristics of public and certain private lands in Virginia that have conservation, recreation and open-space. Included are many federal and state lands, parks and undeveloped or partially developed lands owned by localities. Also, lands owned as preserves by nonprofit conservation organizations such as The Nature

Conservancy, and conservation easements held by the Virginia Outdoors Foundation, land trusts and others, are covered. This geographic information system (GIS) is in ArcView shape file format and can be viewed, queried and manipulated using appropriate GIS software.
Contact: http://www.dcr.virginia.gov/olc/

Virginia Floodplain Management Program
DCR coordinates the National Flood Insurance Program at the state level. The agency's floodplain management staff works with localities to establish and enforce floodplain management zoning. Localities use the program's model ordinances, which set minimum federal standards, to write and enact their own floodplain management ordinances. Local governments can set more restrictive standards for greater protection in flood hazard areas. Floodplain zoning regulates development within floodplains. A city, town or county must participate in the National Flood Insurance Program for its business and residential properties to be eligible for national flood insurance purchase.
Visit: http://www.dcr.virginia.gov/sw/damsafty.htm

Stream Restoration and Corridor Protection
DCR has developed the Virginia Stream Restoration and Stabilization Best Management Practices Guide to help community groups, local governments, state and federal land management agencies, environmental regulatory agencies and watershed management planners develop stream corridor protection, conservation and restoration components of watershed management plans. DCR also has staff to provide limited technical assistance. Contact the local DCR Watershed Office or call **1-877 42WATER** for details.
Visit: http://www.dcr.virginia.gov/sw/index.htm to download the guide.

Virginia Karst Program
This program addresses nonpoint source pollution in Virginia's 27 counties that contain karst landscapes. It provides on-call technical assistance to localities, businesses, individuals and other groups. The staff specializes in watershed delineation, sinkhole and sinking stream protection, erosion and sediment control, and stormwater and nutrient management. The state karst education coordinator conducts workshops for various audiences provides Project Underground curriculum used to train teachers and other environmental educators, who then pass the knowledge on to their students. Call **(540) 831-4056.**

Virginia Outdoors Plan
The Virginia Outdoors Plan (VOP) is the state's official conservation, outdoor recreation and open space plan. It guides all levels of government and the private sector. Implementing its recommendations can ensure that Virginia's rich outdoor heritage is passed on to future generations. The plan also meets criteria for participation in various land conservation grant programs.
Contact: 1-804-786-5046 or visit: http://www.dcr.virginia.gov/prr/vopfiles.htm

The following DEQ programs support local watershed management planning:

Virginia Water Programs
DEQ administers the federal Clean Water Act and enforces state laws to improve the quality of Virginia's streams, rivers, bays and ground water for aquatic life, human health and other water uses. Permits that take into account physical, chemical and biological standards for water quality are issued to businesses, industries, local governments and individuals. Water quality monitoring, assessment and planning are used to determine how clean Virginia's waters are and if they are as clean as it should be.
Contact: 1-800-592-5482 or visit: http://www.deq.virginia.gov

Virginia Coastal Program
The Virginia Coastal Program, established in 1986 as a network of state agencies and local governments, is dedicated to preserving, protecting and restoring the natural beauty and ecological function of Virginia's coastal zone while fostering appropriate economic growth and development. This balance is achieved through the cooperation of supporting projects and programs throughout

Tidewater Virginia that address coastal issues. One example is development and implementation of Special Area Management Plans (SAMPs) – long-term, locally supported planning and implementation projects. SAMPs are rooted in the principle of coordinating multi-level planning to protect significant natural resources through the development and implementation of enforceable policies.
Visit: http://www.deq.state.va.us/coastal/

Virginia Total Maximum Daily Load Program
Total maximum daily load (TMDL) describes the amount of pollution a stream can receive and still meet Virginia's water quality standards. TMDLs are required for water bodies considered "impaired" by Virginia's water quality assessment procedures. The Virginia TMDL program is governed by a federal court order Consent Decree that lays out a schedule for TMDL development through 2010. Local watershed management planning that involves an impaired segment of waterway or a completed TMDL should be coordinated with the TMDL process.
Visit: http://www.deq.virginia.gov/tmdl/

Virginia Citizen Water Quality Monitoring Program
The Virginia Citizen Water Quality Monitoring Program is a public-private partnership among the Alliance for the Chesapeake Bay, DCR, DEQ, and Virginia Save Our Streams. The program provides assistance to organizations and local governments identifying available monitoring data. It can be an avenue to connect active stakeholders to watershed planning. It provides technical and, when available, financial assistance to community groups for the collection and use of meaningful water quality monitoring data.
Visit: http://www.deq.virginia.gov/cmonitor/

Water Quality Assessment Activities
The DEQ extensively tests Virginia's rivers, lakes and tidal waters for pollutants. Waters are tested for more than 130 pollutants to determine if the waterways can be used for swimming, fishing and drinking. Most rivers, lakes and estuaries in Virginia meet standards as described in biennial Water Quality Assessment Reports. Waters that do not meet standards are reported to the citizens of Virginia and the EPA in the Impaired Waters Report. This information is available online for local planning initiatives.
Visit: http://www.deq.state.va.us/water/reports.html
http://www.deq.virginia.gov/wqa/

Water Quality Management Plans
Water Quality Management Plans are being written under the 'Continued Planning Process' established by Section 303(e) of the Clean Water Act. These plans will serve as a repository for TMDL plans and for TMDL implementation as approved by the State Water Control Board.
Visit: http://www.deq.state.va.us/watersheds/programs.html

Other Useful Websites:

Virginia Cooperative Extension
http://www.ext.vt.edu

Virginia Department of Game and Inland Fisheries
http://www.dgif.virginia.gov

Virginia Economic Development Partnership
http://www.yesvirginia.org

Virginia Marine Resources Commission
http://www.mrc.virginia.gov

Appendix E

Visioning Process

At the outset of a visioning process, goals and priorities may differ, but, more often than not, those involved have common values. Such shared values may be the importance of a clean water supply, abundant recreational offerings or natural beauty. All may not agree on how to achieve these goals or how natural resources should be protected, but a shared community understanding of the watershed's role and significance can still be developed.

A community-based watershed visioning process can involve a survey to gauge community awareness and interest, and meetings and other venues wherein people can share ideas and develop mutual understanding and shared outcomes. The community vision is then used to guide development of watershed planning goals.

Key elements for an effective vision statement should:

Be only one or two sentences
Describe the desired condition
Identify issue(s) (e.g., clean water, healthy communities) of concern

Optional vision statement elements:

May set a timeframe (e.g., by 2020) or simply state the "future"
It should inspire and identify the importance, urgency and uniqueness of the issue (e.g., protecting the last-remaining, most unique, exceptional, etc.)

Elements to avoid:

Don't be overly general, e.g., "Protecting all waters for the future," or rely on jargon such as "Achieving community sustainability." While important, these are too general to provide direction.

Sample Vision Statement:

"The Fluvial River shall flow freely and support an abundant and diverse ecology of native plants, fish and animals for future generations of citizens."

This vision statement describes a future where the river is not dammed, supports a diverse native ecology, and provides for public use and enjoyment. A vision statement does not need to be achievable in the short term; it is an ideal to strive for. Residents in Madison County, Va., developed six vision statements to address different aspects of their community. Their environmental vision stated, "We visualize our region and communities as 'places of beauty' – vistas of rural farms, orchards, historic places and unspoiled scenic beauty, as well as protected habitats and areas of natural resources for retreat, discovery and recreation."

Initiating a Visioning Process

Community surveys and meetings are two ways to initiate the visioning process.

Community Vision Surveys

Some communities initiate visioning by conducting surveys in which citizens are asked to rank items to get a sense of the knowledge and community priorities concerning the watershed. Professional assistance may be needed to design the survey. Additionally, if statistically significant results are needed, survey professionals can design the sample area, size and method. However, a qualitative survey may be enough to gain an initial understanding of community values. There are many references available on survey methodology and design.

The survey can:

Provide a starting point of initial interests and priorities for developing the vision

Show current community awareness regarding watershed issues and reveal what additional education is needed

Help community members consider assumptions and values about the watershed

Community Visioning Meetings

Community forums are another way to engage the public in a visioning process. These forums work best when preceded by widespread community outreach. This ensures that a diverse cross-section of the community attends. For example, hosting an evening meeting in the local library may only reach those who regularly attend public meetings. To attract a broader constituency, consider a community picnic or festival instead.

At any visioning session, give those attending information about the watershed's status. If a community watershed survey was used, present those findings to be used to develop a vision for the watershed.

People can creatively voice ideas through plays, poems… even singing or dancing. The key is to get people communicating. One community forum began with a woman singing an original song about the river, past and present, while images depicting its many unique facets flashed on a screen behind her. Students performed a river dance, and local residents and historians told tales about the river they remembered from the 1930s and 1940s and values and uses they hoped to restore. A biologist described the ecological state of the river. All the presentations engaged the participants and broadened their perspectives before they were asked for opinions and ideas.

Facilitators from outside the community can run the forum so that community members accept the process as neutral, one in which they can more freely share ideas. If the group has more than 40 people, break it into smaller groups so that everyone has a chance to speak. Divide groups so that various interests are spread throughout the groups (e.g., don't have all farmers in one group).

Developing the Watershed Vision

If a survey was used, findings can form the basis for an initial discussion to develop a vision. The questions below will help frame a discussion about concepts and values that can form the basis of the community's watershed vision. Facilitators can ensure that no one dominates the discussion and that all views are heard and recorded.

1) What image comes to mind when you think of the Little Mill Creek Watershed, e.g., a degraded urban ditch, a pristine escape from the urban world, an unseen treasure, etc.? (Note: If a survey was conducted, use it to determine if residents agree or disagree with the findings.)

2) What are the strengths, weaknesses, opportunities and threats to the protection of the watershed? List these on a four-column table. This approach is called a SWOT analysis.)

3) What would you most like preserved in this watershed – for the land, people and natural functions? Or, "Why did I move here and why do I stay?"

4) Which of those identified in question 3 are the top three things?

5) Based on the SWOT analysis, which are most in danger of being lost?

6) What should be preserved, protected, sustained or restored? Or think of it this way: When your great-grandchildren visit the watershed, what should they find? Which of these ideas should form the basis for a vision statement?

7) Which ideas from question six do you think are key aspects of a watershed vision for the watershed? What key phrases should be considered for a vision? List them.

The facilitator can help the group begin drafting a statement using these key words and ideas, or the ideas can be given to the watershed's planning team to create a vision statement. If there is a steering committee, it can use these ideas to devise a vision statement.

Once a draft vision statement is developed, circulate it to other groups and other forums. The community's vision statement should be publicized and updated over time. Ongoing work is required to raise awareness of the vision in the community and to seek buy-in from new residents and elected officials. The vision may need to change periodically, to incorporate new information and perspectives.

In summary, an effective vision statement addresses what you have, where you're headed and the future you want for your community, your watershed and yourselves.

It can give direction to a locality's comprehensive plan, local watershed plans, and planning for parks and recreation. It can be used to consider choices on growth and development. Be sure to write a vision statement people can understand, support and sustain over time.

Appendix F

Resource Bibliography

Here are additional resources for watershed planning and community involvement.

"Applied River Morphology." 1996. This technical publication outlines the fundamental principles of river function and the classification of natural rivers, depicting major stream types. It's useful for watershed management, ecosystem assessment, fish habitat evaluation, river restoration and non-point source pollution reduction. Source: Wildland Hydrology Books, 1481 Stevens Lake Rd., Pagosa Springs, CO 81147. Call (970) 264-7100. ($89.95 plus shipping and handling)

"Better Site Design: An Assessment of Better Site Design Principles for Communities Implementing Virginia's Chesapeake Bay Preservation Act." Source: Center for Watershed Protection, 8737 Colesville Rd., Suite L105, Silver Spring, MD 20910. Call (410) 461-8323 or e-mail mrrunoff@usapipeline.com. ($35)

*"Check Your Success."*A guide to developing indicators for community based environmental projects, useful for benchmarking and measuring progress. Source: Virginia Tech, Department of Urban Affairs & Planning and USEPA.
Available online at http://www.uap.vt.edu/checkyoursuccess/manual.html.

"Clean Water in Your Watershed: A Citizens Guide to Watershed Protection." Provides a process for citizen-based watershed project planning. Source: Terrene Institute, 1717 K Street, NW, Suite 801, Washington, DC 20006 Call (202) 833-8317, http://www.terrene.org.

"Collaboration: A Guide for Environmental Advocates." 2001. This guide is useful for determining if a collaborative approach is appropriate for resolving environmental issues. It includes processes and tips for designing and implementing collaborative approaches. Source: Institute for Environmental Negotiation, 164 Rugby Rd, P.O. Box 400179, University of Virginia, Charlottesville, VA 22904-4179. (Free PDF copies available online at: http://www.virginia.edu/ien/; Bound copies $8)

"Community Watershed Assessment Handbook." 2003. Source: Chesapeake Bay Program, 410 Severn Ave., Suite 109, Annapolis, MD 21401. Call (800)YOURBAY. (Free PDF copies available online at www.chesapeakebay.net)

"Community Watershed Forums: A Planner's Guide." 2002. This guide describes how to plan and host community forums to engage your community in watershed planning. Source: Institute for Environmental Negotiation, 164 Rugby Rd, P.O. Box 400179, University of Virginia, Charlottesville, VA 22904-4179. (Free PDF copies available online at http://www.virginia.edu/ien/) Paperback $25)

"A Framework for Analyzing the Hydrologic Condition of Watersheds." This document details technical procedures for analyzing existing conditions in a watershed. The procedures detail yield, timing and quality of water. Source: USDA-Forest Service and USDI-Bureau of Land Management, June 1998. Item numbers BLM Technical Note 405 and BLM/RS/ST-98/004+7210

"Getting In Step: A Guide to Effective Outreach in Your Watershed." Provides tools and approach to develop and implement an effective watershed outreach plan. Source: Council of State Governments, PO Box 11910, Lexington, KY 40578-1910 Call (859)244-800. (Free PDF copies available online at http://www.epa.gov/owow/watershed/outreach/documents)

"Getting In Step: Engaging and Involving Stakeholders in Your Watershed." This guide provides tools needed to effectively engage stakeholders to restore and maintain healthy environmental conditions through community support and cooperative action. Source: Tetra Tech, Inc. (Free PDF copies available online at http://www.epa.gov/owow/watershed/outreach/documents)

"Guidance Manual for Total Maximum Daily Load Implementation Plans." A must-have for any local watershed management planning that includes a TMDL planning effort. Source: Virginia Department of Conservation and Recreation, TMDL Program Manager. Call: (804) 786-3199.

"Know Your Watershed Guides." This series provides guides for watershed partnerships. Source: http://www.ctic.purdue.edu/KYW/kyw.html

"The Practice of Watershed Protection: Techniques for Protecting and Restoring Urban Watersheds." A compilation of 150 articles on all aspects of urban watershed protection from the journal, Watershed Protection Techniques. Source: Center for Watershed Protection. Call (410) 461-8323; copies available online at http://www.cwp.org. ($80)

"Rapid Watershed Planning Handbook." This handbook includes a comprehensive approach for developing a cost-effective watershed plan. It covers management options, analysis tools and watershed plan case studies. Source: Center for Watershed Protection. Call (410) 461-8323 or copies available online at http://www.cwp.org. ($40

"Restoring Streams in Cities: A Guide for Planners, Policymakers and Citizens." 1998. The book covers urban stream restoration concepts for use by citizens, mayors, county commissioners, flood control engineers and others interested in improving local waterways. Source: Island Press, Box 7, Department 2NET, Covelo, CA 95428 Call (800) 828-1302. ($35 paperback)

"Stream Channel Reference Sites: An Illustrated Guide to Field Technique." This is a 61-page technical guide on establishing permanent reference sites for gathering data about physical characteristics of streams and rivers. Source: U.S. Forest Service, Rocky Mountain Forest and Range Experiment Station, Publications, 3825 E. Mullberry, Fort Collins, CO 80524. Call (970) 498-1100 and ask for General Technical Report 145. (Free)

"A Stream Corridor Protection Strategy for Local Governments." 2002. This handbook contains the cumulative wisdom of watershed experts from across the Chesapeake Bay watershed and covers stream protection strategies and tools, such as stream buffers and zoning overlays, and resources for conducting a protection strategy. Source: Institute for Environmental Negotiation, 164 Rugby Rd, P.O. Box 400179, University of Virginia, Charlottesville, VA 22904-4179. (Free PDF copies available at: http://www.virginia.edu/ien/stream%20guide_final.pdf%202; bound copies $8)

"Water in Environmental Planning." 1978. Technical reference for watershed planning principles. Source: W.H. Freeman and Co., 4419 West 1980 South St., Salt Lake City, UT 84104. Call (800) 877-5351. ISBN No. 07167-0079-4. ($87.95, plus shipping and handling)

"Living With Karst – A Fragile Foundation." This book vividly illustrates what karst is and why karst-rich areas are important. It covers karst-related environmental and engineering concerns, guidelines for living with karst and sources of additional information. Source: American Geological Institute, 4220 King Street, Alexandria, VA 22302. (703) 379-2480. www.agiweb.org Copies also available through the Virginia Karst Program.

"Living on Karst – A Reference Guide for Landowners in Limestone Regions." This guide helps residents of karst areas learn about how day-to-day activities affect their groundwater and fragile ecosystems. Source: Cave Conservancy of the Virginias, 13131 Overhill Lake Lane, Glen Allen, VA 23059. Available online at: www.caveconservancy.org.

Acknowledgment

The impetus for this document was the emphasis placed on watershed management and planning in the Chesapeake Bay Agreement – Chesapeake 2000. However, over the course of developing this guide, it became clear that many Virginia localities are involved in watershed planning in some form or fashion, and that the voluntary principles of watershed management planning could benefit water quality and localities statewide. Therefore, this guide is intended to provide guidance and consistency to watershed planning efforts across Virginia.

Many were involved in the guide's development: the Virginia Watershed Advisory Committee and their publication, Local Watershed Management Planning in Virginia, developed the Virginia approaches, structure and appendices in the guide. The University of Virginia Institute for Environmental Negotiation provided much of the text and detail.

We hope the results will be useful.

Virginia Watershed Advisory Committee member organizations
Virginia Department of Conservation and Recreation, Chair
Alliance for the Chesapeake Bay
Canaan Valley Institute
City of Chesapeake
Chesapeake Bay Foundation
Fairfax County
Friends of the Rappahannock
Hampton Roads Planning District Commission
Northern Virginia Regional Commission
Office of the Secretary of Natural Resources
US Department of Agriculture, Natural Resources Conservation Service
Virginia Association of Counties
Virginia Association of Soil and Water Conservation Districts
Virginia Department of Environmental Quality
Virginia Department of Forestry
Virginia Department of Game and Inland Fisheries
Virginia Municipal League
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Virginia Department of Conservation & Recreation
State Parks • Soil & Water Conservation • Natural Heritage
Chesapeake Bay Local Assistance • Land Conservation
Outdoor Recreation Planning • Dam Safety & Floodplains