

A Sustainable Chesapeake

BETTER MODELS FOR CONSERVATION

Edited by David G. Burke and Joel E. Dunn

THE CONSERVATION FUND



The case study you have downloaded is highlighted below. Other case studies from this Chapter of *A Sustainable Chesapeake: Better Models for Conservation* can be individually downloaded. The editors encourage readers to explore the entire Chapter to understand the context and sustainability principles involved with this and other featured case studies. The full publication contains 6 Chapters in total: Climate Change Solutions, Stream Restoration, Green Infrastructure, Incentive Driven Conservation, Watershed Protection and Stewardship.

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Improving Codes and Ordinances

Building a Cleaner James River

The James River Association's watershed-wide analysis of local development codes and ordinances provides an effective solution for any organization seeking improved water quality and open space protection.

CASE STUDY SUMMARY

In recent years, many techniques and practices have been identified to reduce the impact of land development on streams and rivers while still meeting other social and economic goals. These environmentally sensitive development practices include minimizing impervious surfaces (pavement, rooftops, etc.) to reduce runoff, clustering development to preserve more open space, protecting riparian areas that act as natural filters, and directing stormwater to localized infiltration areas rather than channeling it directly to storm drains. Local codes and ordinances play a major role in determining the extent to which these techniques are applied; and it is the local codes and ordinances that have been identified as the greatest impediments to environmentally sensitive development.

In 2006-2007, the James River Association (JRA) conducted the first watershed-wide analysis of local development codes and ordinances in the nation. The analysis, called "Building a Cleaner James River," examined the development codes and ordinances of the 43 major counties and cities in the James River watershed for their ability to incorporate environmentally sensitive design

practices, known collectively as Better Site Design. The project was a unique joint effort of JRA and its project partners: Virginia Polytechnical Institute and State University (Virginia Tech), University of Virginia, Virginia Commonwealth University, and the Center for Watershed Protection.

JRA and its partners used model development principles to evaluate each locality's codes and ordinances, which were then given a percentage score based on their ability to support environmentally sensitive development. The scores ranged from a low of 17% to a high of 72% out of a possible 100%. A score below 80% indicated that significant opportunities exist to improve development rules. A score of less than 60% indicated that development codes are not environmentally friendly and in need of serious reform. The average score was 42%. Subsequently, JRA has worked with targeted, rapidly urbanizing jurisdictions to improve their scores and avoid future stormwater pollution.

The James River touches the lives of more Virginians than any other feature on the landscape; one-third of all Virginians make their homes in the 39 counties and 19 cities of its watershed. Development will largely

determine the future health of the James River and its continued role as a great asset to these communities. Therefore, local codes and ordinances that shape how development occurs are among the most important tools for protecting the river. It is imperative that obstacles to environmentally friendly development practices be removed and that incentives are established to reduce impervious surfaces and the associated stormwater runoff. There is only one opportunity to truly minimize the impacts of development. Once a site is developed, it is very difficult and very expensive to correct the associated watershed and water quality problems related to a given site. These factors make this profile and JRA's subsequent work to update codes and ordinances an important example for other communities in the Bay region.

RESOURCE MANAGEMENT CHALLENGE

The James River is Virginia's largest tributary to the Chesapeake Bay and its watershed encompasses approximately 10,000 square miles. After centuries of nurturing Virginians, the James River now needs nurturing in return.

Scientific studies show that the James River and its ecosystem have been fundamentally altered by human activity. More than 1,500 miles of the James River and its tributaries are listed on the U.S. Environmental Protection Agency's "dirty waters" list.¹ The impaired river recently scored 52%—a grade of C—on JRA's State of the James River.² Pollution in the form of nitrogen, phosphorus, and sediment is the greatest current threat to the James River and to the services and amenities it provides to the region. These pollutants cloud the water, blocking sunlight from vital underwater grasses, fouling critical aquatic habitat for fish, and fueling harmful algae growth that can become toxic to aquatic life and even humans. As harmful algae blooms die, the resulting decomposition consumes vast amounts of oxygen from the water, leaving little to support aquatic life.

Landmark water quality actions recently taken or underway by the Virginia General Assembly focus primarily on addressing pollution from sewage treatment plants and other point sources and on implementing agricultural pollution reduction practices. Point sources and agriculture make up the two largest sources of current pollution in the James River. Efforts to address these pollution sources can provide the most cost-effective approach to reduce current pollution loads. However, the fastest growing source of pollution and the greatest impact to urbanizing streams and creeks stems from development and its associated stormwater runoff.³ Additional efforts are needed to ensure that stormwater pollution from future development does not negate the progress made on reducing current sources of pollution.

Stormwater pollution from development, both during and after construction, can have devastat-

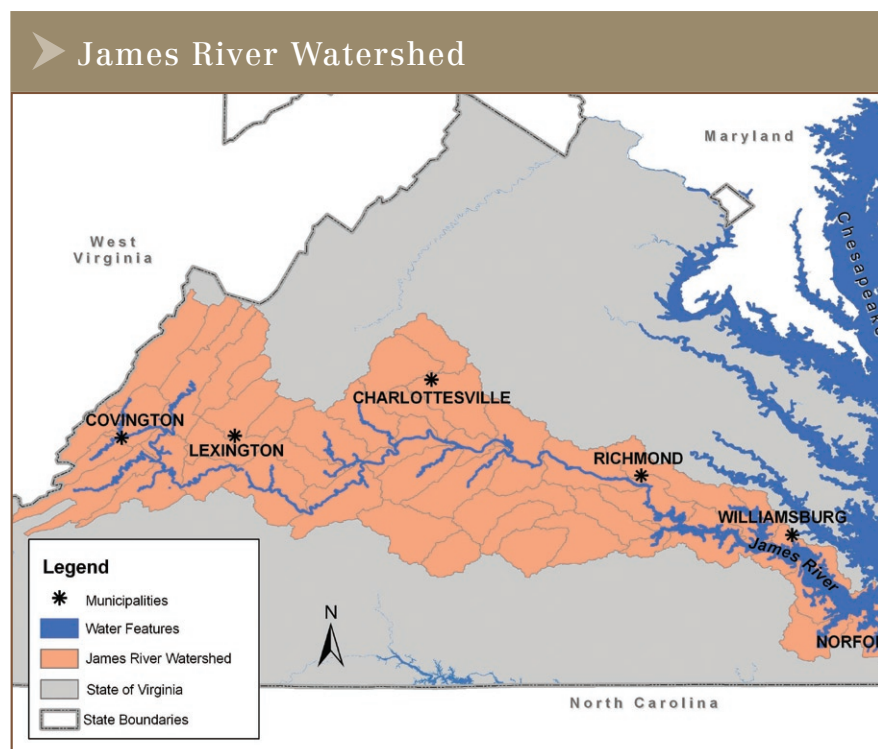
ing impacts to local streams and the James River. When land is cleared for development, increased erosion and sedimentation of downstream habitats results unless all necessary erosion and sediment control practices are installed properly and maintained vigilantly. After construction, development can continue to damage streams and the river by altering the natural hydrology to which the receiving stream is accustomed. The receiving stream's natural channel is overwhelmed by the increased volume and velocity of runoff, causing tremendous stream bank erosion and sending tons of pollution downstream. Better Site Design (BSD), including Low Impact Development (LID) practices, can protect natural areas, minimize land clearance, and maintain natural hydrology in order to protect local streams and rivers.

CONSERVATION VISION

The manner in which development occurs on the land is determined by a broad array of codes, ordinances, and regulations, most of them implement-

ed by the local government. Many of these local development rules are not specifically environmental regulations at all, but have a tremendous influence on the impact that development has on water quality. In recent years, an entire professional field has developed around the concept of LID. Local government codes and ordinances play a major role in determining the extent to which such techniques are applied (or accepted).

When local governments are not familiar with BSD or LID techniques and their codes and ordinances are antiquated, it can sometimes be more difficult to build environmentally sensitive developments. Developers who seek to implement low impact practices often find that the lack of clarity and adoption of environmentally friendly development standards results in extensive delays in project approval, thereby sending developers back to traditional, more damaging approaches that can be approved relatively quickly. Also, counties seeking to implement new environmentally sensitive ordinances may have codes



BETTER SITE DESIGN

The Center for Watershed Protection developed a process called Better Site Design (BSD), in which local governments review and modify local zoning codes and ordinances to permit new development practices that preserve more pervious areas and lessen environmental impacts. BSD incorporates the principles of Low Impact Development (LID) and Conservation Design.

BSD allows communities to continue to realize the economic benefits of new development while improving their ability to protect the local environment.⁴ At the core of the BSD process is a set of model development principles that focus on the design of streets, parking areas, and building lots in new developments. They are designed to be used as benchmarks for local government officials to investigate where existing codes and ordinances could be revised to reduce the impacts of development.

Studies in Maryland and Illinois indicate that new residential developments using BSD principles pertaining to stormwater saved \$3,500 to \$4,500 per lot when compared to new developments with conventional stormwater controls. In addition, each site discharges less stormwater runoff than conventional developments.⁵



A low impact development biofilter, built into parking lot landscape island.

that conflict with the new ordinances. The purpose of the JRA codes and ordinances analysis was to assess each locality on the degree to which local development codes protect water quality and to work with them to on possible improvements.

IMPLEMENTATION RESOURCES

Project funding totaled \$150,000 from federal, state, and private sources. These included the U.S. National Oceanic and Atmospheric Administration, Virginia Coastal Zone, Virginia Department of Conservation and Recreation,

and The Keith Campbell Foundation. An unofficial cost-effectiveness analysis was conducted for this study. To hire a consultant or firm to take on the hundreds of hours required to complete this project would have cost JRA upwards of \$500,000.

Costs associated with the project included stipends to the three universities (Virginia Tech, University of Virginia, Virginia Commonwealth University); JRA staff time and travel; planning and hosting a symposium to present the results; printing and distributing the final report; meeting with individual localities for in-depth review of codes that resulted in recommendations for new or modified code language. The majority of the research was conducted by graduate and undergraduate students at the three universities. While each school received a stipend for their time, the actual work was conducted by student volunteers and their professors. Technical assistance was also provided by the Center for Watershed Protection. Ongoing implementation of the model development principles is an essential part of JRA and its partners' continued efforts to restore the James River watershed.

CONSERVATION STRATEGY

In order to assess the degree to which BSD techniques are allowed or encouraged in local counties, JRA coordinated an analysis of the codes and ordinances for 43 cities and counties with major amounts of land within the James River watershed. This analysis was a significant first step in increasing awareness and understanding of these techniques and increasing their use. The second step was to approach the counties and suggest areas where they could make improvements to their codes and ordinances.





James Riverkeeper Chuck Frederickson explains the importance of land use decisions to Goochland County leaders.

The James River analysis represents the first comprehensive and systematic assessment conducted at a river-basin scale. Breaking ground once again, JRA tackled the project by forming a first-of-its-kind academic partnership with the University of Virginia, Virginia Commonwealth University, and Virginia Tech. Each participating university conducted one class in the 2006 spring semester that focused on analyses for approximately one-third of the 43 localities. Working with a professor or team of professors with expertise in watershed management or land use planning, each student or team of students analyzed a particular locality. To assist them in the analysis, contact was made with local planning officials to ensure the applicable codes and ordinances were identified.

Each class collected the data using worksheets provided by JRA and its partners. The worksheets included 28 BSD principles that addressed codes and ordinances, erosion control, and stormwater. The BSD principles were divided into four categories:

1. **Residential Streets and Parking Lots** – The transportation network associated with development creates large amounts of paved, impervious surfaces that contribute to stormwater runoff and pollution. The impact of roads and parking lots on water quality can be reduced by minimizing their width and length, reducing the number of parking spaces required, avoiding curbs and gutters, and encouraging stormwater infiltration and treatment areas.
2. **Lot Development** – The manner in which houses and buildings are

situated on lots can help reduce impervious surfaces and stormwater pollution. Clustering homes and buildings or reducing setbacks and frontages can minimize the road lengths needed to service them. Alternative designs for driveways and sidewalks can reduce impervious surfaces while still achieving pedestrian and parking needs. Stormwater runoff can also be reduced by directing rooftop runoff to landscape areas for infiltration rather than directly to storm drains.

3. **Conservation of Natural Areas** – Retaining forests and meadows, particularly along streams and other water bodies, can reduce stormwater runoff and help filter out pollutants before they enter the waterbody.
4. **Stormwater and Erosion Control** – In Virginia, local governments play an important role in prevent-

LOCALITY CLASSIFICATION

Urban Impacted localities show a decrease in population but still maintain a significant amount of existing or new development; in some cases, typically in cities, the locality is largely built-out.

Urbanizing Rapidly localities were the top population gainers between 2000 and 2004 with increases in population greater than 10% and/or they grew faster during the timeframe of 2000 to 2004 than 1990 to 2000.

Urbanizing localities exhibit a moderate level of existing development, but a relatively high level of development pressure.

Rural Unprotected localities typically have an agricultural economy and modest median income. They have experienced low to moderate development pressure to date and the land within the county is generally unprotected. Existing zoning often promotes sprawling development and in many cases there is potential development pressure from nearby metropolitan areas.

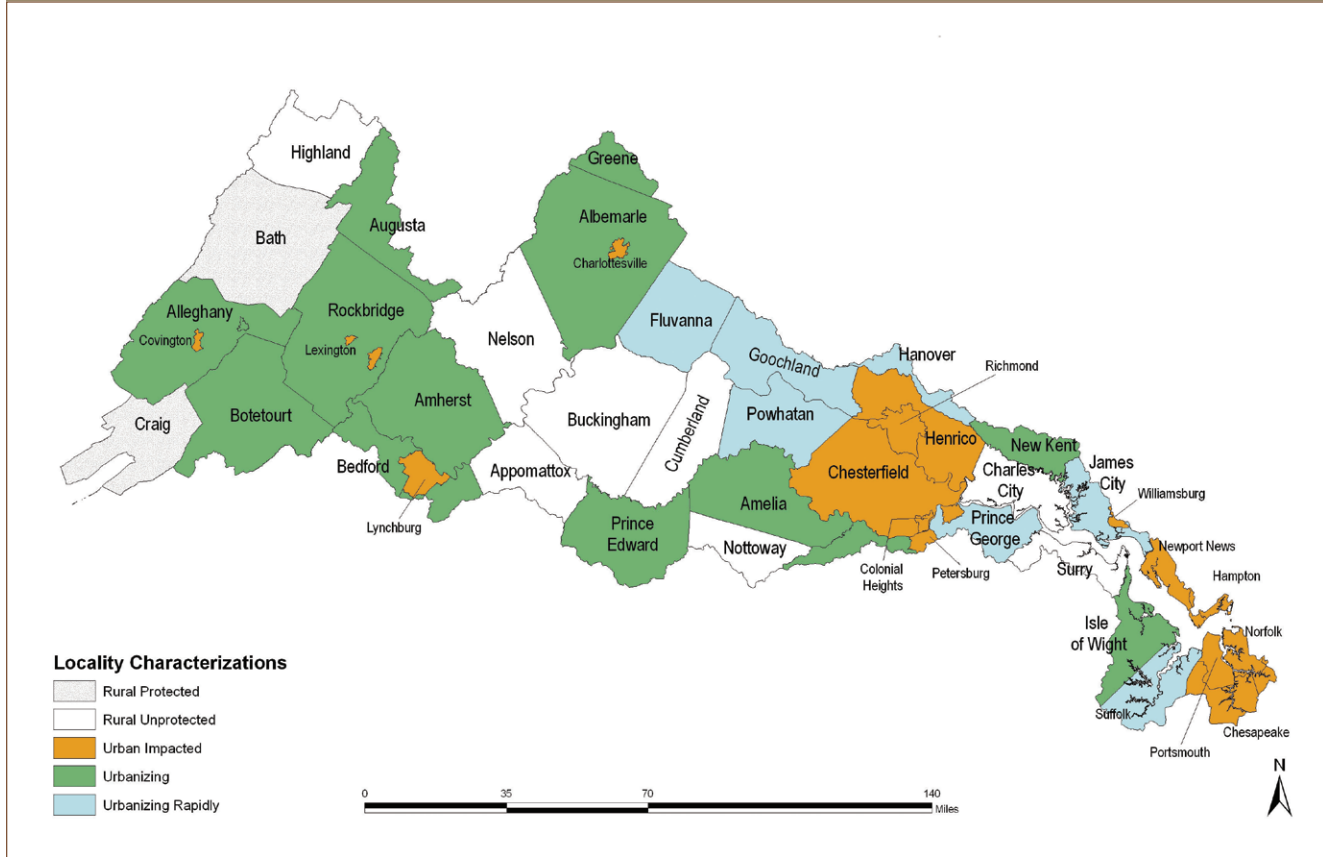
Rural Protected localities have relatively low development pressure and very limited local government resources to handle development issues. Population growth is projected to be minimal and a significant amount of acreage is already under some form of local, state, or federal protection.

ing pollution through stormwater management programs, erosion and sediment control, and septic regulation. Local governments also need to address sewage leaks and spills and ensure that development programs meet state and federal permit requirements for wetland and stream protection.

Each principle was scored and points were awarded on the worksheet. The overall score provides a general indication of the locality's ability to support environmentally sensitive development. The overall score is based on 120 possible points. The final score for each locality is generally based on the total points earned divided by the total points possible and multiplied by 100 to obtain a percentage. The overall scores can be seen below, under "Results."

Because the watershed localities are so varied in terms of need and

James River Watershed Locality Characterizations



Building a Cleaner James River Locality Scores		
Jurisdiction	Final Score	Category
Albermarle	65%	Urbanizing
Alleghany	42%	Urbanizing
Amelia	57%	Urbanizing
Amherst	38%	Urbanizing
Appomattox	19%	Rural Unprotected
Augusta	36%	Urbanizing
Bath	18%	Rural Protected
Bedford	24%	Urbanizing
Botetourt	41%	Urbanizing
Buckingham	15%	Rural Unprotected
Campbell	19%	Urbanizing
Charles City	60%	Rural Unprotected
Charlottesville	50%	Urban Impacted
Chesapeake	53%	Urban Impacted
Chesterfield	61%	Urban Impacted
Colonial Heights	43%	Urban Impacted
Craig	14%	Rural Protected
Cumberland	14%	Rural Unprotected
Fluvanna	40%	Urbanizing Rapidly
Goochland	44%	Urbanizing Rapidly
Greene	36%	Urbanizing
Hampton	60%	Urban Impacted
Hanover	60%	Urbanizing
Henrico	68%	Urban Impacted
Highland	28%	Rural Unprotected
Isle of Wight	63%	Urbanizing
James City	54%	Urbanizing Rapidly
Lexington	48%	Urban Impacted
Lynchburg	38%	Urban Impacted
Nelson	36%	Rural Unprotected
New Kent	36%	Urbanizing
Newport News	50%	Urban Impacted
Norfolk	67%	Urban Impacted
Nottoway	15%	Rural Unprotected
Petersburg	26%	Urban Impacted
Portsmouth	50%	Urban Impacted
Powhatan	31%	Urbanizing Rapidly
Prince Edward	18%	Urbanizing
Prince George	38%	Urbanizing Rapidly
Richmond	67%	Urban Impacted
Rockbridge	26%	Urbanizing
Suffolk	42%	Urbanizing Rapidly
Williamsburg	53%	Urban Impacted

capacity building, JRA separated the localities into categories to help with the analysis. These categories take into consideration population, growth pressure, land use, and potential or existing conservation lands. The five classifications derived from various data sources include: Urban Impacted, Urbanizing Rapidly, Urbanizing, Rural Unprotected, and Rural Protected.

Following the initial assessment and report of local codes and ordinances, JRA worked to improve development policies in targeted jurisdictions and collaborated with conservation partners to make policy improvements in additional jurisdictions.

JRA targeted the six “Urbanizing Rapidly” jurisdictions in the watershed. Of the five categories, JRA determined that these localities are at a critical stage of development. They have a history of low development pressure and, as a result, typically do not have codes in place to curb or prevent unnecessary impervious surfaces or promote BSD principles. Each Urbanizing Rapidly locality is under development pressure from adjacent urban areas. As the population and development demands increase, these local governments need to be ready to protect the watershed for both economic and environmental viability.

RESULTS

Study Results: The results for the 43 localities of the James River watershed are presented in the table at left.⁶ Key findings include the following:

- Scores ranged from 14% to 72%.
- Average watershed score was 42%.

Twenty-three of the 28 BSD principles were met by at least one locality.

- Incorporating the best codes from all of the localities would achieve a score of 95%.



View of the James River in Virginia.

- Rural localities generally scored lower because they have not had the need to address many of the principles; thus, they do not have certain codes in place.
- Changes to Virginia Department of Transportation standards can improve scores of every locality.

Staff and elected officials from each of the localities were provided with the results, which spurred a lot of discussion among and between local government officials as well as state, federal, and non-government organizations.

Policy Changes: With the implementation of the model development

principles, communities can see improvements in local conditions. Potential benefits to the natural environment, the economy, and the community at large include:

- Protection of water quality of local streams, lakes, and estuaries
- Reduced pollutant loads in stormwater
- Reduced erosion during construction
- Reduced development costs
- Increased property values
- Creation of more pedestrian-friendly neighborhoods

- Provision of open space for recreation
- Allowance for more sensible locations for stormwater facilities
- Protection of sensitive forests, wetlands, and habitats from clearing
- Increased local property tax revenues

In an effort to incorporate BSD principles into county codes and ordinances, JRA first worked with Goochland County. Goochland is a largely rural county that is on the western fringe of the Richmond metropolitan area. JRA and the county convened a roundtable with representatives from developers, architects, soil and water conservation districts, county planning commissions, and interested citizens. The roundtable reviewed the findings of the study and developed recommendations for improving county policies to encourage BSD principles and achieve at least 80% in the Building a Cleaner James River score. The county adopted the recommendations in the 2008 update of its comprehensive plan and is finalizing an associated riparian buffer ordinance.

JRA has initiated similar work with Powhatan County and Fluvanna County. In Fluvanna County, JRA has partnered with the Rivanna Conservation Society, which has a goal of

JRA's Bill Street facilitating a discussion at the Building a Cleaner James Symposium.





improving its five adjoining jurisdictions' environmental performance to a score of 90% or better. The Rivanna Conservation Society has worked with the Southern Environmental Law Center and the University of Virginia Environmental Law Clinic to formulate and introduce policy recommendations for the City of Charlottesville and Albermarle County. The Potomac Conservancy also has used the Building a Cleaner James River model to begin a strategic approach to improve development policies in the Potomac River basin.

To help localities that would like to improve their environmental performance and encourage conservation, JRA has assembled a Low Impact Development Policy Manual⁷ that provides examples of codes and ordinances, mostly from Virginia

jurisdictions, that meet the principles and criteria of the Building a Cleaner James River analysis. JRA has also used its experience and findings to help the Virginia Department of Conservation and Recreation to develop a similar scoring method for the Chesapeake Bay Preservation Act. Through this process, the Department will review the codes and ordinances of the 84 Virginia jurisdictions that are subject to the Preservation Act and ensure that performance standards are met.

PHOTOS AND FIGURES

All photos and figures by James River Association

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