



The Nature Conservancy

Policies Contributing to the Continuing Health
of Watersheds in the Chesapeake Bay

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Overview

- Identified 10 localities in 3 states: Maryland, Pennsylvania, and Virginia.
 - Localities must have been rated “Excellent” or “Good” by state definition.
- Conducted telephone interviews with localities.
- 80% of localities responded.



State Health Water Criteria

- Maryland
 - High biotic diversity; Brook trout watersheds; Cold water streams; Sentinel sites (highest quality, minimally disturbed freshwater streams); High fish production; Low impervious surface; Water quality protection
- Pennsylvania
 - Special Protection Waters (Exceptional Value and High Quality); Category 1 and 2 Waters (meeting all or some of designated uses)
- Virginia
 - INSTAR Healthy Watersheds:
 - High ecological integrity (stream habitat, storm water inputs, invasive species, and natural flows); Broad biodiversity; High native predators; Presence of migratory fish species; Low incidence of disease or parasites that provide ecosystem services and social and economic benefits

State Healthy Watersheds

MARYLAND:

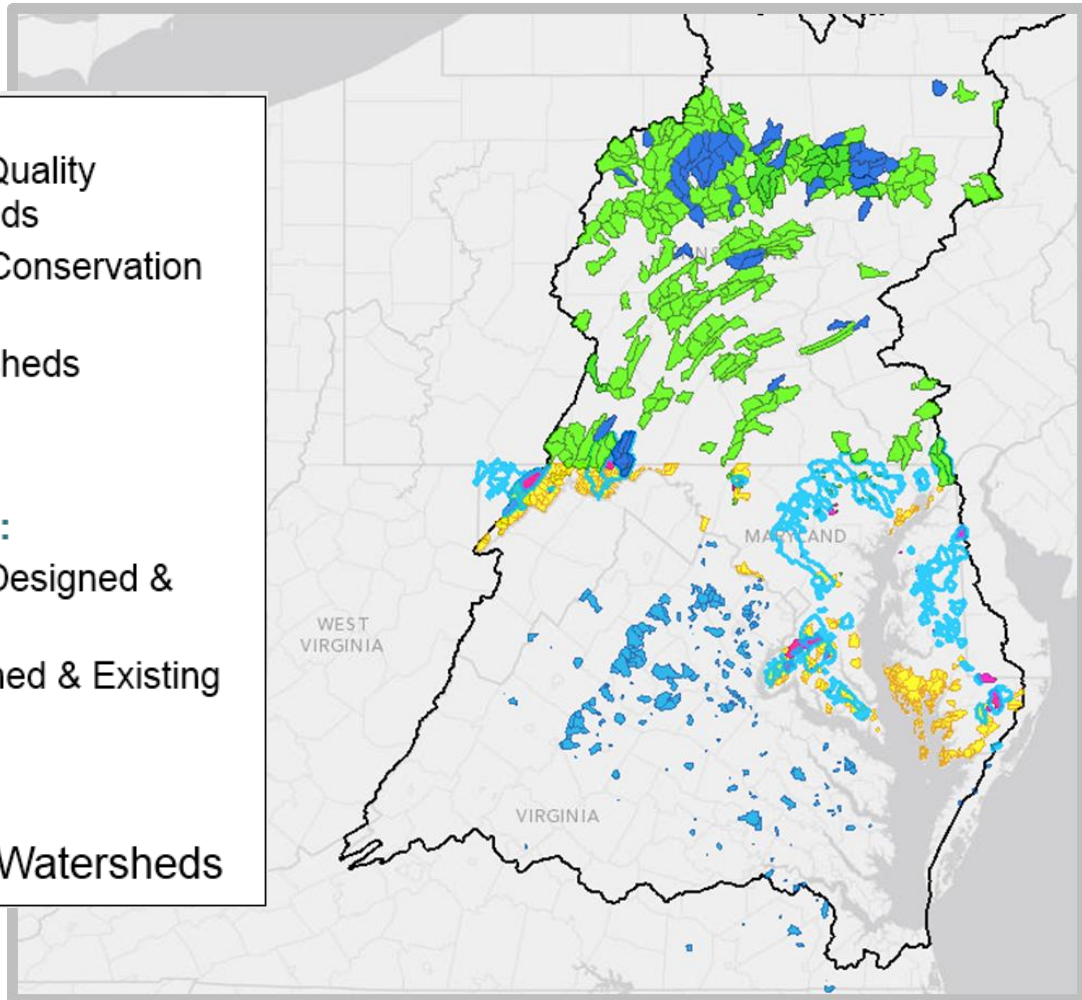
- High Priority Water Quality Protection Watersheds
- Priority Cold Water Conservation Areas
- Sentinel Site Watersheds
- Tier II Catchments

PENNSYLVANIA:

- Exceptional Value (Designed & Existing Use)
- High Quality (Designed & Existing Use)

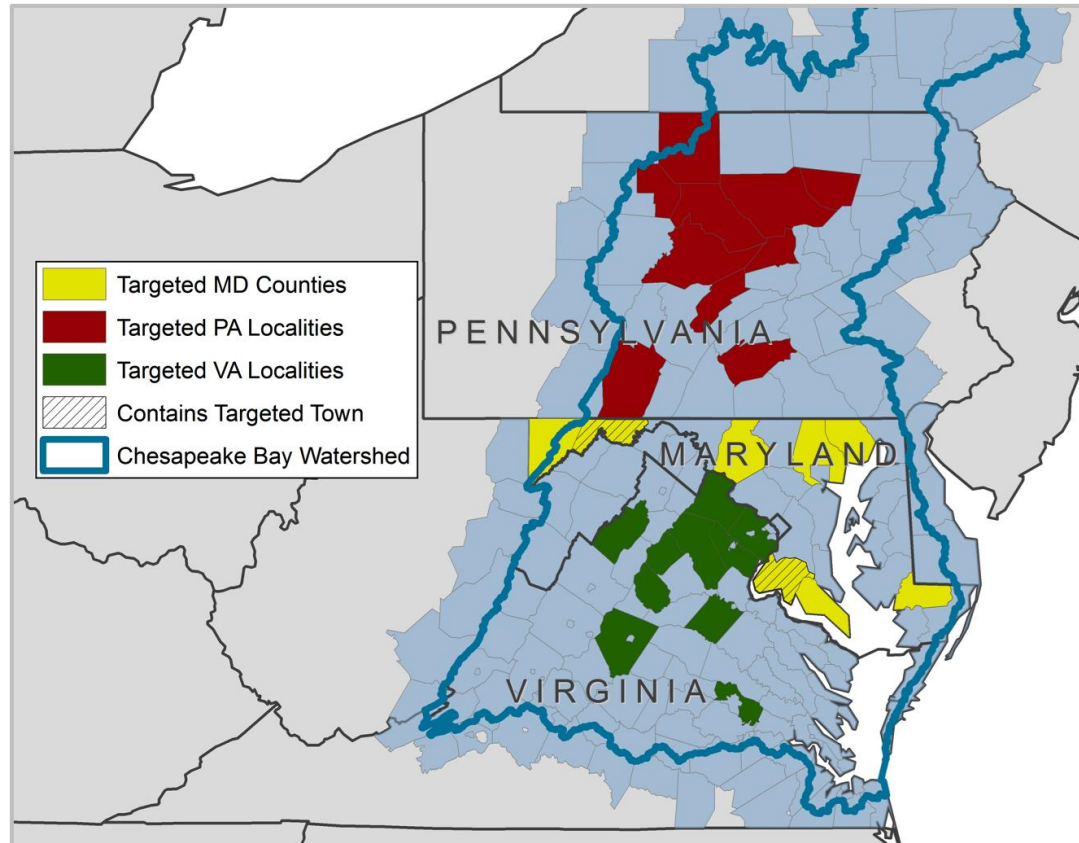
VIRGINIA:

- INSTAR Healthy Watersheds





Selected Localities





Survey Inquiries

- ◉ Identify healthy watersheds
- ◉ Determine to what extent locality:
 - ◉ Utilizes a watershed management plan
 - ◉ Assesses the health of the watershed
 - ◉ Utilizes planning and zoning pools
 - ◉ Utilizes regulatory or management programs
 - ◉ Partners with surrounding localities or other non-governmental organizations



Case Studies and Statewide Trends



Maryland

- Statewide Low Impact Development Standards and Stormwater Regulations
- Riparian Buffer Minimums
- Comprehensive and Minimum Standards for Local Critical Area Programs
 - Critical Area Commission



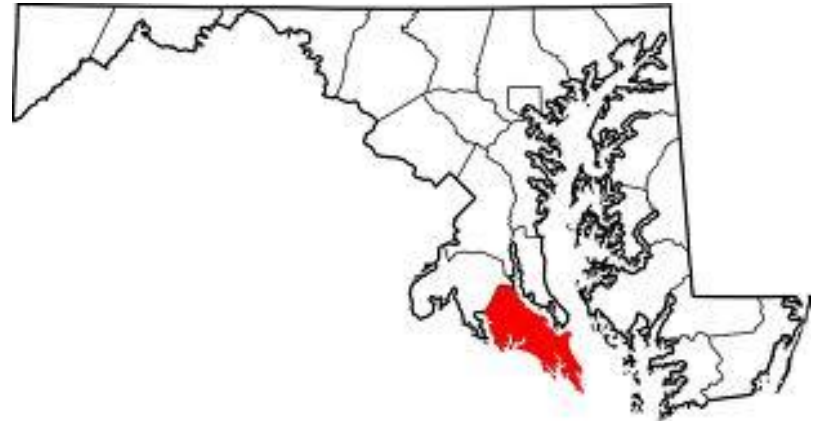
Maryland Localities

Locality	Population	Area (sq mi)	Median Household Income
Allegany County	75,087	424	\$37,747
Charles County	149,130	458	\$88,825
Garrett County	30,079	656	\$32,238
La Plata	8,753	7	\$80,129
Frederick County	236,746	667	\$60,276
Baltimore County	809,941	682	\$50,667
Harford County	246,489	526	\$57,234
St. Mary's County	105,151	357	\$80,053
Worcester County	51,454	695	\$40,650
Westernport	1,888	576	\$23,681



St. Mary's County, MD

- Located on the Chesapeake Bay
- Specific Plans for Breton Bay, St. Mary's River, and Wycomico River
- Focus on Infill and Community Redevelopment
- Unique TDR Programs
- Strong Regulatory Requirements for Riparian Buffers and Cluster Development
- Focus on Education
- Monitoring by Local Non-Profits and Colleges





Pennsylvania

- Variance between rural and developed municipalities within each county
- Layers of regulation and protection
 - Regional Councils of Government, Counties, Municipalities, Conservation Districts, and Non-Profit Organizations
 - Potential for inefficiencies and duplication
- State Monitoring of Watershed Quality
- Act 167 Stormwater Management Plans Required for Each Locality
- Riparian Buffer Minimums
- Conservation Plan Required for All Farmers



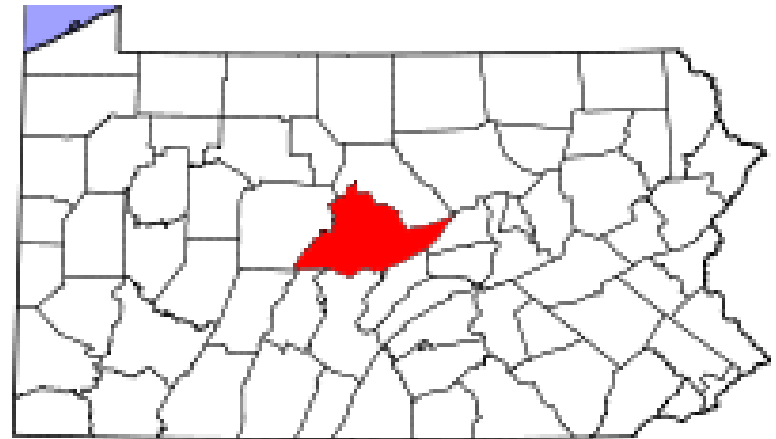
Pennsylvania Localities

Locality	Population	Area (sq mi)	Median Household Income
Mifflin County	46,682	415	\$37,539
Elk County	31,751	832	\$43,745
Centre County	154,722	1,112	\$47,016
Lycoming County	116,747	1,244	\$42,689
Cameron County	5,085	399	\$39,773
Sullivan County	6,479	452	\$36,250
Potter County	49,739	1,015	\$40,249
Dauphin County	14,801	438	\$45,240
Union County	44,847	317	\$45,474
Tioga County	42,419	1,137	\$40,338



Centre County, PA

- Individual Assessments of Each Stream
- Extensive Use of Conservation Easements, Funded by Federal Match Program
- Emphasis on Voluntary BMPs in the Agricultural Sector
- Active Citizens Groups and Local Universities





Virginia

- ◉ Riparian Buffer Minimums
- ◉ Recently Expanded Stormwater Regulations
- ◉ State Level Monitoring of Water Quality
- ◉ Different Focus of Developed and Undeveloped Localities



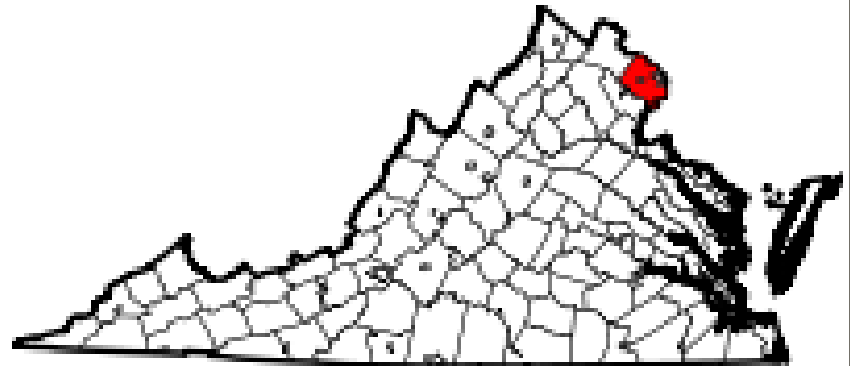
Virginia Localities

Locality	Population	Area (sq mi)	Median Household Income
Henrico County	310,445	234	\$60,114
Rappahannock County	7,444	266	\$62,117
Fairfax County	1,100,692	391	\$105,416
Albemarle County	100,553	721	\$64,847
Loudoun County	312,311	521	\$115,574
Shenandoah County	42,289	509	\$50,171
Spotsylvania County	124,327	402	\$76,574
Prince William County	419,006	348	\$91,098
Fauquier County	66,071	647	\$83,877
Richmond County	9,220	191	\$42,182



Fairfax County, VA

- Extensive and Frequent Assessment
- Downzoning
- Emphasis on Community Infill and Redevelopment
- Carrot of Zoning Approval for Developers
- Focus on Education and Outreach
- Active Citizens Groups





Cross-State Trends and Analysis

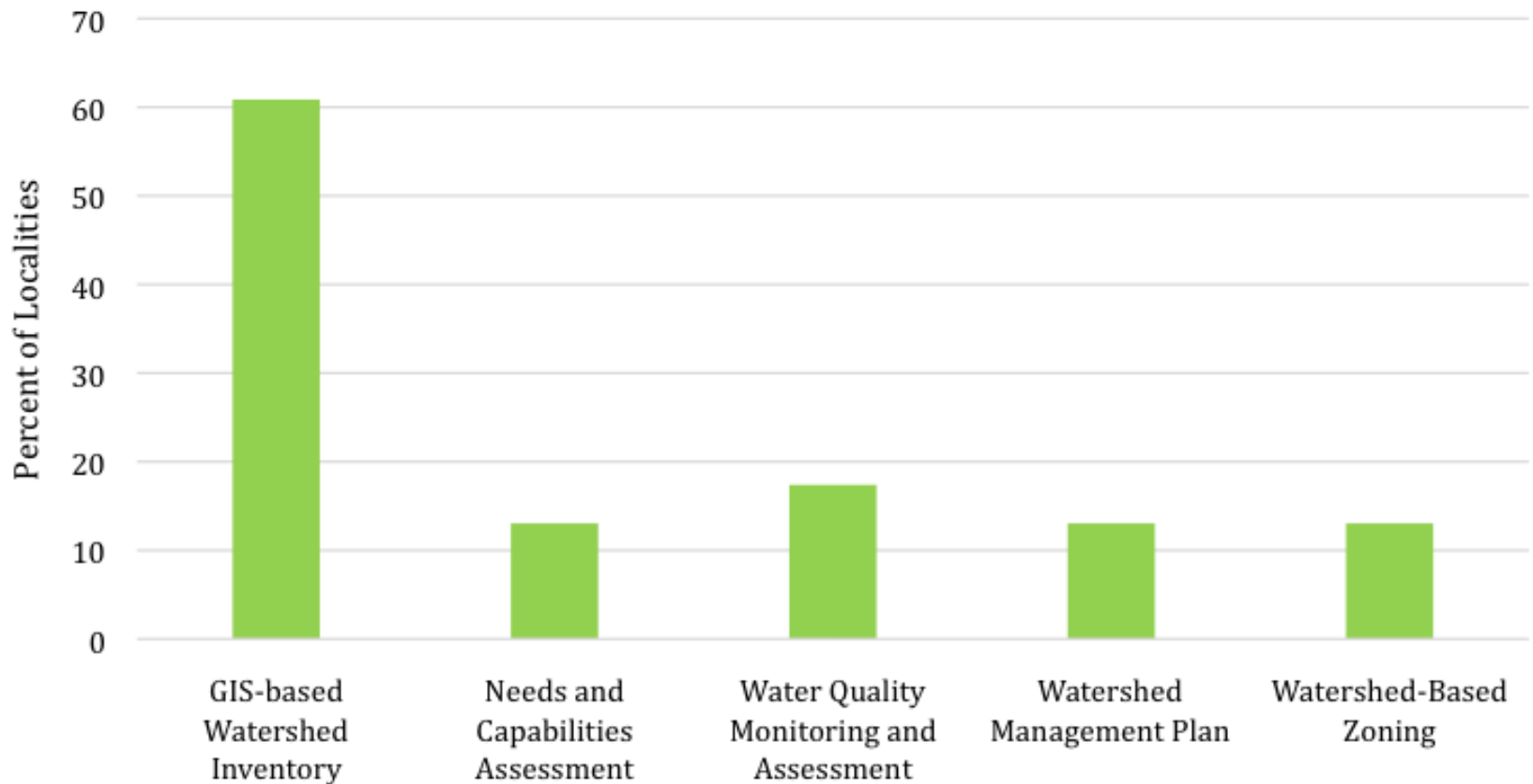
Tool Categorization

Table 1. Categorization of Policies

Watershed Management	Zoning Ordinances	Development Management	Natural Resources Protection
GIS-based Watershed Inventory	Cluster Development Ordinance	Infill and Community Redevelopment	Critical Area or Special Protection of Lands Adjacent to Water Bodies
Needs and Capabilities Assessment	Floating Zones	Low-Impact Development Standards	Landowner Stewardship Programs
Water Quality Monitoring and Assessment	Impervious Cover Limits	Transfer of Development Rights	Long-term Conservation Programs
TMDL Implementation/ Monitoring Plan	Overlay/ Special Use Zoning Districts	Urban Growth Boundaries	Voluntary Best Management Practices
Watershed Management Plan	Riparian Buffer Limits		
Watershed-Based Zoning	Steep Slope Ordinance		

Watershed Management

Figure 2. Watershed Management

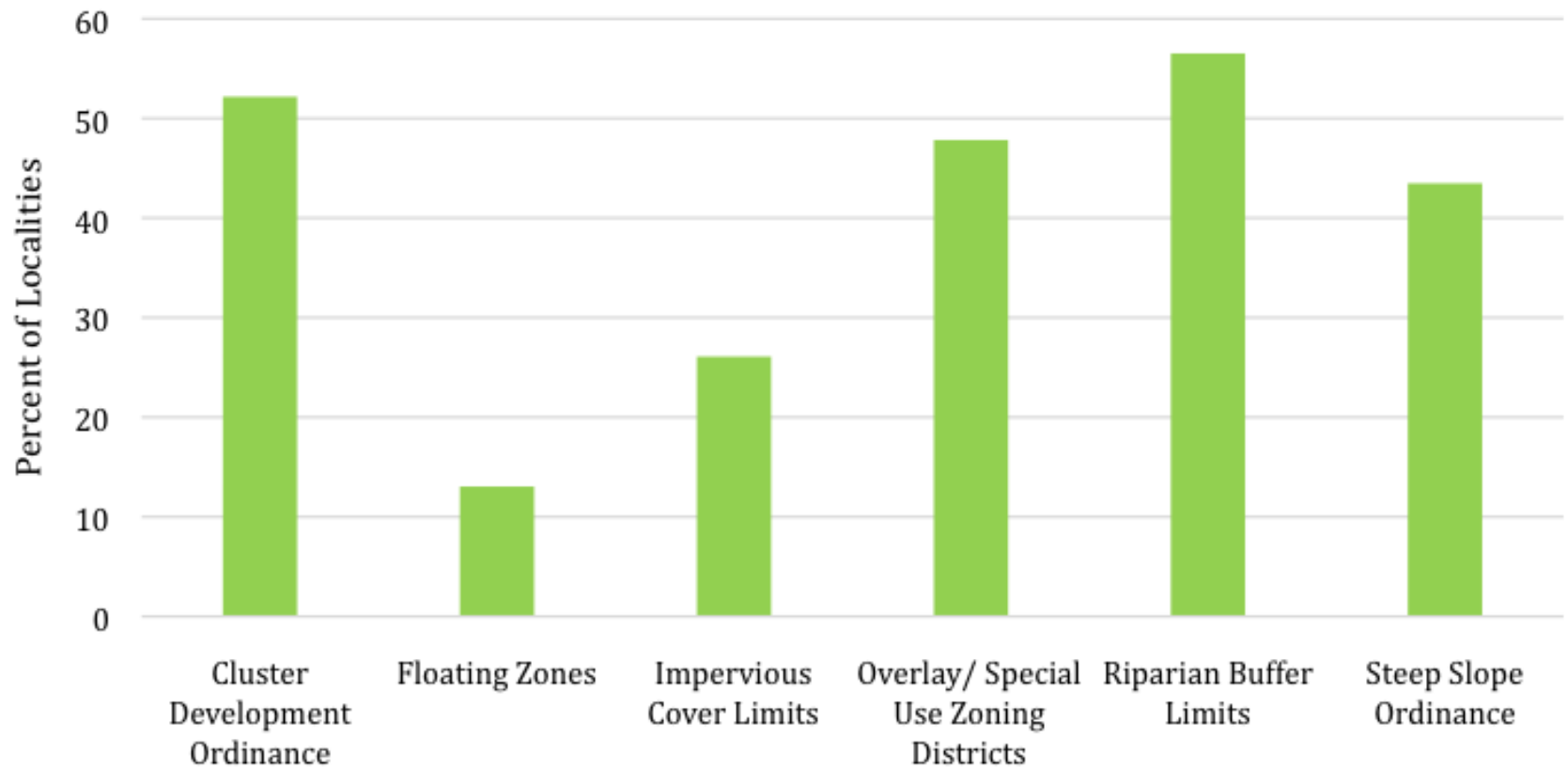


Policy Recommendations

- *Complete a countywide watershed management plan. Several counties had watershed management plans for specific watersheds but not necessarily all of its watersheds.*
- *Integrate the watershed management plan into the comprehensive plan. In order to enhance effectiveness, the locality's countywide watershed management plan should be incorporated into the comprehensive plan and contain specific goals and requirements that will give teeth to the locality's watershed protection strategy. The best watershed management plans were completed on a countywide basis and were well incorporated into the comprehensive plan.*
- *Utilize community resources. By coordinating with the instrumental non-profit watershed associations and watershed councils, localities can take advantage of community resources and better inform the development of countywide policies.*
- *Implement watershed-based zoning. There appears to be a need among localities for incorporating watershed-based zoning into the development approval process. Many local governments have a wealth of GIS data on a subwatershed level and could easily transition to steering development away from the most critical subwatersheds.*

Zoning Ordinances

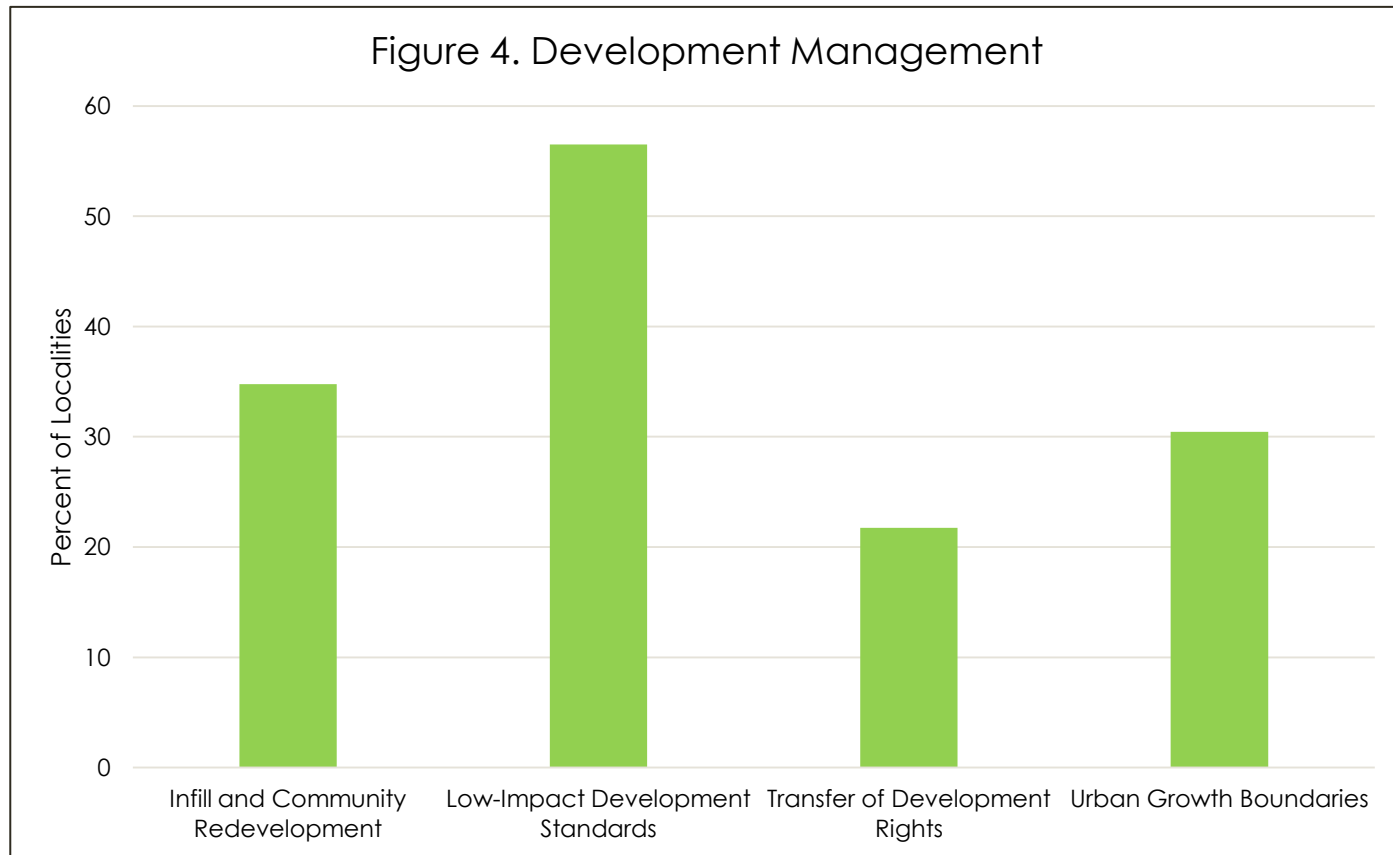
Figure 3. Zoning Ordinances



Policy Recommendations

- *Establish risk aversion measures.* Risk aversion measures, such as floodplain ordinances and strong erosion and sediment control regulation, can serve as successful watershed protection measures where public support for watershed protection cannot otherwise be gained.
- *Incentivize developers to reduce impervious cover.*

Development Management

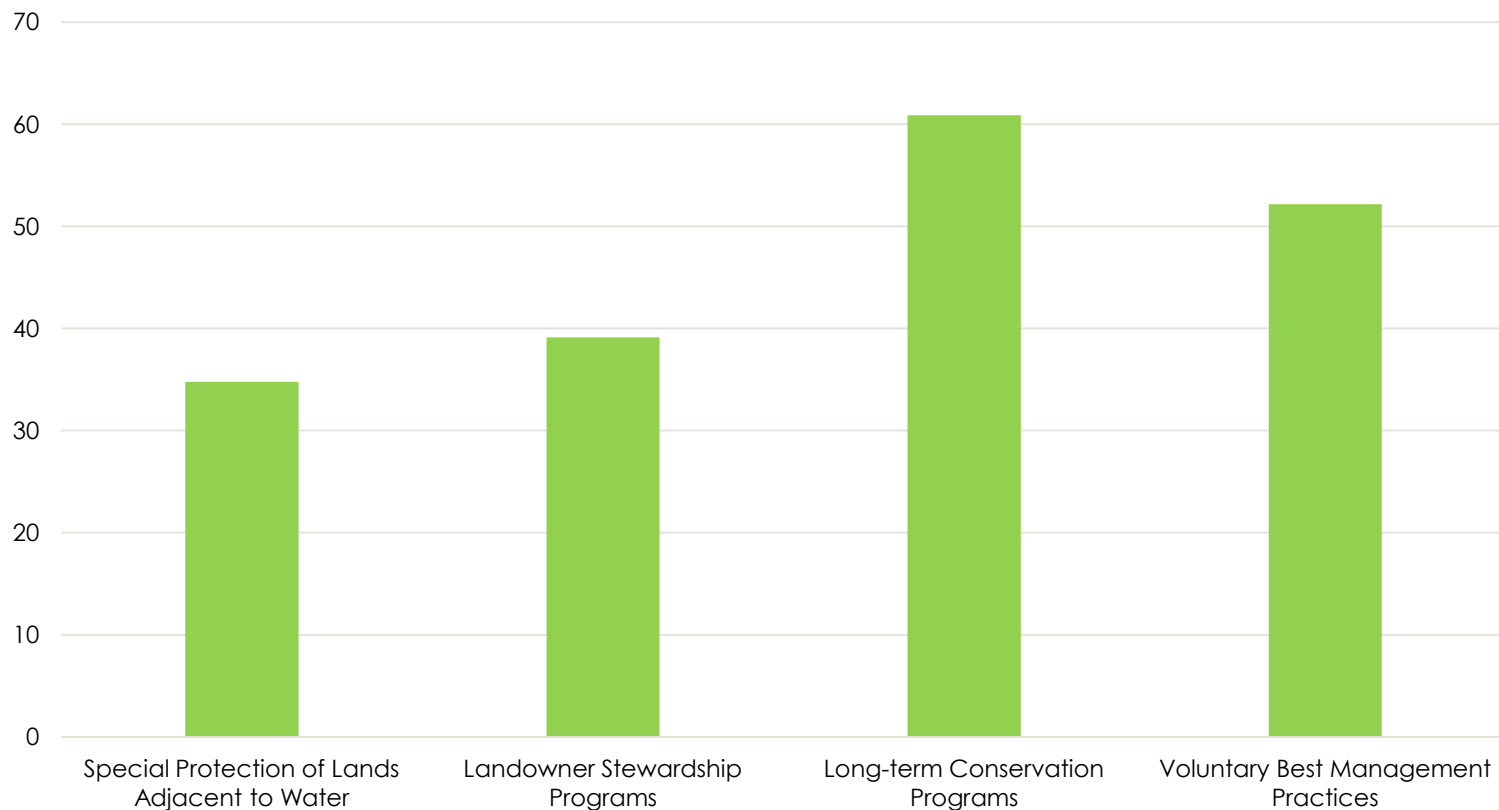


Policy Recommendations

- Rural localities can achieve success in limiting urban growth simply by limiting their service provision.
- A few counties found notable success leveraging zoning approval to gain desired concessions from developers in the absence of explicit requirements—this capacity would likely translate to other localities where explicit zoning measures have been difficult to pass.
- Engaging agricultural interests could aid TDR programs as these interests as most of our localities noted that agricultural development was allowed to some extent on land gained through TDR.

Natural Resources Protection

Figure 5. Natural Resources Protection



Policy Recommendations

- The Counties with the most success acquiring conservation easements found creative ways of doing so, through mitigation strategies or by seeking outside funding through federal match programs. Searching for cost-effective ways of protecting localities' watersheds by utilizing resources that are already available is perhaps the most important effort counties can undertake.
- Counties with the strongest watershed protection policies also made concerted education efforts, both specific to the agricultural sector and the broader public. This trend suggests the importance of such efforts not only in guiding individual behavior, but also in gaining public support for watershed protection.
- Counties that gained buy in from agricultural and other landowners or developers seemed to be more successful at protecting the watershed. Buy in seemed greatest when the county offered advice and incentives for voluntary practices.

Summary Statistics

Table #. Summary Statistics				
Variable	Mean	Std. Dev.	Min	Max
Average IBI Index Score <i>= avgibi</i>	38.37	13.21	16.68	60.62
Percent of Watersheds with Good or Excellent IBI Index Scores <i>= goodexcibi</i>	51.77%	37.45%	0.00%	100.00%
Percent of Watersheds with Fair, Good, or Excellent IBI Index Scores <i>= fairtoexcibi</i>	84.05%	25.33%	25.00%	100.00%
Persons per Square Mile <i>= personssqmi</i>	322.76	599.58	12.80	2,766.80
Percent of Population 25 Years or Older with Bachelor's Degree or Higher <i>= bachelorshghr</i>	28.29%	12.94%	9.80%	58.00%
Median Household Income <i>= medianhhinc</i>	\$63,947	\$23,228	\$37,747	\$115,574
Percent of Watershed Management Policies In Effect <i>= wtrdsmgmt</i>	33.75%	24.70%	0.00%	75.00%
Percent of Zoning Ordinances In Effect <i>= zoningords</i>	50.83%	25.64%	0.00%	83.33%
Percent of Development Guidelines In Effect <i>= devmgmt</i>	51.25%	32.92%	0.00%	100.00%
Percent of Natural Resources Protection Policies In Effect <i>= natrsrscsprot</i>	66.25%	28.42%	0.00%	100.00%
Number of observations: 20				

OLS Results

Table 1. OLS Regression Results for Watershed Health Measures			
Variable	Average IBI Index Score	Good or Excellent Watersheds	Fair to Excellent Watersheds
Persons per Square Mile	-0.007876 (0.31)	-0.000262 (0.21)	-0.000011 (0.93)
Bachelor's Degree or Higher	-39.73856 (0.40)	-1.33912 (0.28)	-1.642588 (0.04)**
Median Household Income	0.000119 (0.68)	0.000006 (0.40)	0.000005 (0.26)
Watershed Management	-1.563700 (0.94)	-0.181333 (0.74)	-0.036432 (0.91)
Zoning Ordinances	12.58814 (0.48)	0.543738 (0.26)	0.480166 (0.10)*
Development Management	-26.29020 (0.17)	-0.924759 (0.08)*	-0.288006 (0.33)
Natural Resources Protection	19.27137 (0.33)	0.797206 (0.14)	-0.144837 (0.63)
** Significant at 5% level; * Significant at 10% level			



Cooperative Relationships

- Other Localities
 - Surrounding Localities
 - Localities that contribute to the health of the watershed
 - Localities that have formed a watershed association
- Non-Governmental Organizations
 - Watershed- or Locality-Specific Planning and Protection Organizations
 - College and University Programs
 - Trout Unlimited Chapters
 - Pennsylvania Senior Environmental Corps
 - The Nature Conservancy
 - Adopt-A-Stream
 - Ducks Unlimited Chapters
 - League of Women Voters Chapter



Limitations

- Small sample size
- Varying levels of enforcement and regulatory teeth
- Varying levels of ability to innovate when adopting and implementing regulation
- Difficult to measure effectiveness of specific policies



Questions.