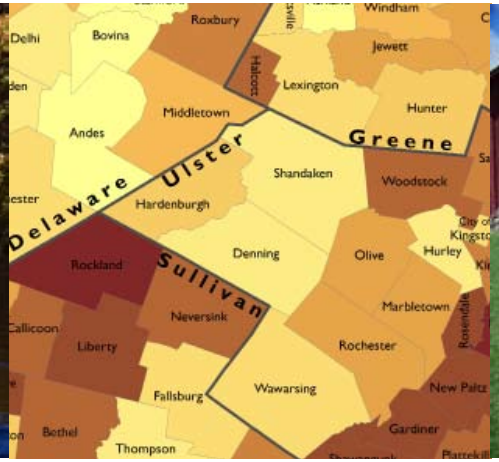
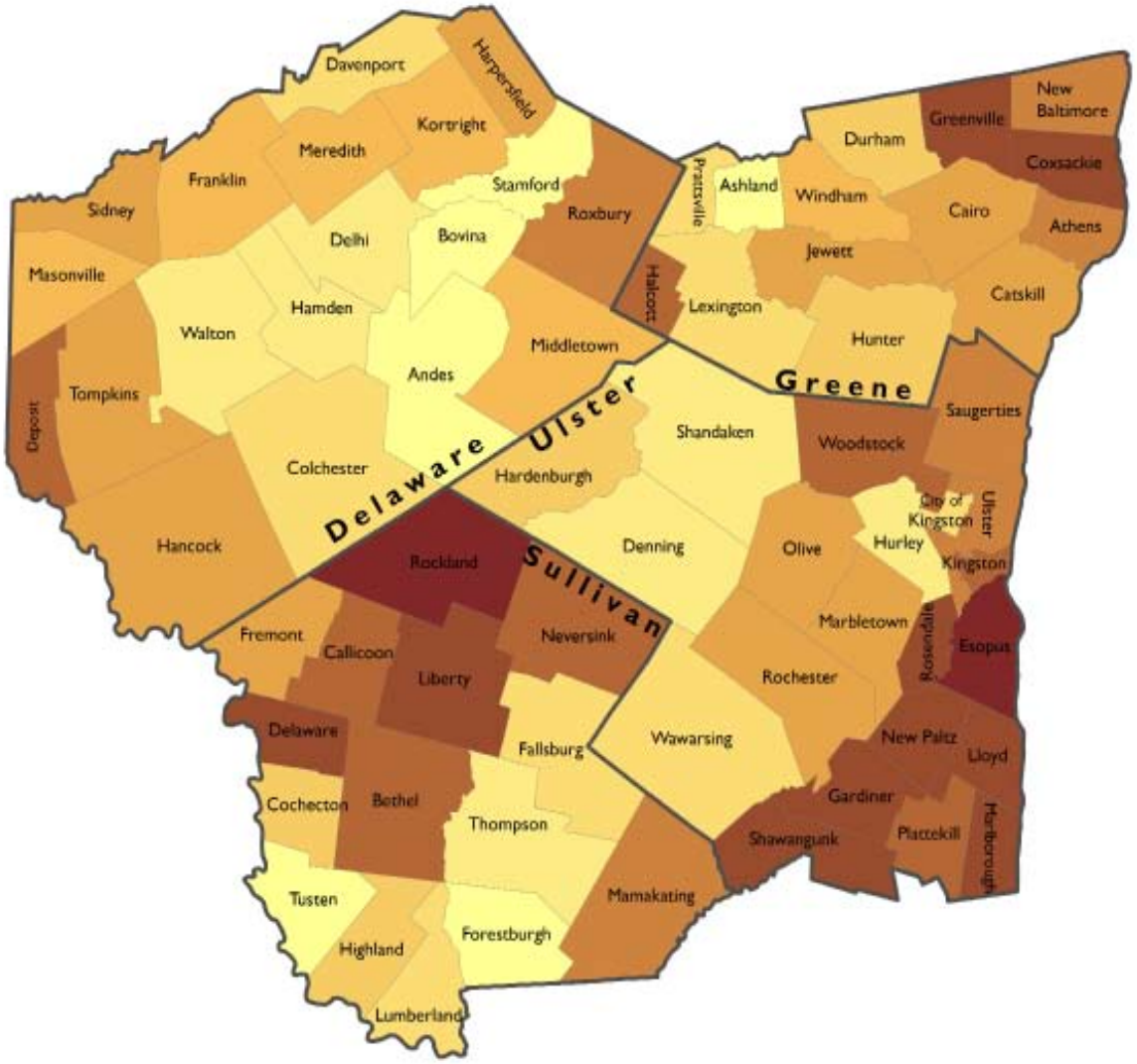
Open Space Institute

Private Lands, Public Benefits

Open Space Resources and Preferred Growth Areas in the Catskills



The four-county Catskill region is comprised of 68 towns and villages. This map, described within the report, illustrates the distribution of preferred growth areas in the region.



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Open Space Resources and Preferred Growth Areas in the Catskills

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Gillian Mollod, Open Space Institute GIS Specialist, was responsible for data collection and management as well as map design for the final report. We would like to thank the more than 15 organizations that provided GIS data layers for this analysis. These organizations are listed in the Methodology under Appendix A.

A special thank-you to OSI Trustee Felix Kaufman, whose generosity made this report possible.

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Table of Contents

The findings of this study and the GIS shape files used in the development of this report are available on OSI's website:

www.osiny.org/PrivateLands

PREFACE

The four-county Catskill region is a study in economic and ecological complexity. Rich in natural resources, the region contains productive farms, clean water, wildlife habitat and trails that provide abundant recreational opportunities. These resources are found on about 1.7 million acres, or approximately 65% of the 2.7 million-acre region. Despite these attributes, the Catskills region faces serious economic challenges stemming from a depressed economy, declining tax base and aging population. Although health care, tourism and agriculture provide substantial income, the region is losing both jobs and its working-age population.

This study shows that appropriately placed development can coexist with the region's natural resources, bolstering opportunities for reliable, year-round employment. It also indicates that the existing development footprint might quadruple, if appropriately sited, without compromising the economy or ecology of private farm and forestland resources. Planning and coordination are essential to secure a "win-win" in which development and open space complement each other.

OSI's work, both this study and our real estate transactions, underscores the importance of private landowners to the ecological health of the region. Private land buffers the publicly owned forestland in the Catskill Park and contains important natural resources. Two-thirds of all important farm, recreation, habitat and water quality resources, totalling more than one million acres, are privately owned.

NGOs and government can play an important role in sharing information with landowners and providing incentives for them to continue to steward these lands in a mosaic landscape that protects both ecological values and economic opportunities. Private landowners, along with town and county planners and other public decision makers, will play an important role in determining how land will be used in the future and in shaping the community well-being of the Catskill region.

Population projections from Cornell Center for Applied Demographics indicate that 20,000 to 40,000 acres of development may be needed to support population growth through 2035, despite a marked decrease in the workforce-aged population. Whether it is commercial, second-home or infill of villages and hamlets, development will be critical to the economic health of the region and to ensuring that private landowners can continue to afford to maintain their land as open space. With the right information and incentives, it will be possible to site this development in a manner that optimizes existing infrastructure, retains or creates jobs, and avoids degrading the Catskill's open space and natural resources.

The methodology and findings of the study are described in the following pages. This study's purpose is to provide the data and background that landowners, decision makers and other stakeholders need to draw their own conclusions about the necessary balance between development and conservation. One of the sad realities of the recession is that it has left regions like the Catskills at an economic standstill. Yet, this pause in economic activity also gives key players in the public, nonprofit and private sectors time to move beyond gridlock to plan for and invest in the region's economic and ecological future. This report provides data that will assist with efforts to create a sustainable future for the special place that is the Catskills.

Kim Elliman
Chief Executive Officer
Open Space Institute

Camp 4-H Pines, Neversink, NY

INTRODUCTION

The Catskill region – here defined as Sullivan, Ulster, Greene and Delaware counties – is renowned for its open space, which includes an extensive underground aquifer system, the largest intact forest within a three-hour drive of more than 15 million people, and superb rainbow trout habitat. Although public agencies and NGOs assist with maintaining these resources, more than 60% of this land is privately owned and managed. Given that the fate of much of the region's open space resources lies with private landowners, OSI set out to identify how much land could be developed without affecting wildlife, water quality, recreation and farms.

Working with the Appalachian Mountain Club, which conducted the mapping analysis, OSI collected more than 20 regional data sets on farm, water, recreation and habitat resources (see Appendix A for a detailed methodology) to develop a single map of privately owned open space resources. Next, OSI identified and mapped regulatory controls and physical constraints on development. These data sets were used to identify "preferred growth" areas which at a regional scale represent a good estimate of how much land could be developed without compromising open space resources.

Finally, we used Cornell University population projections to compare the extent of preferred growth with anticipated demand for development. The following report summarizes the findings, maps and data produced from this research.

FINDINGS AND IMPLICATIONS

Open space resources

- Private landowners manage more than two-thirds (68%) of the region's water, wildlife, habitat, agricultural and recreation resources.
- Water resources, including aquifers, wetlands and forested streams, are overwhelmingly (more than 80%) on private lands.

Population and demographics

- One-fifth of the region (520,000 acres) is "preferred for growth." These privately-owned lands have no regulatory or physical limitations, don't contain regionally significant open space resources and are consequently lands that might be developed in a sustainable manner.
- Between 2005 and 2035, population growth will require 20,000 to 40,000 acres of land be developed. This represents a 15% to 30% increase in developed land over these 30 years.
- Developers currently anticipate that need for "empty-nester" and affordable housing for the elderly will drive growth on the fringes of existing urban centers in Ulster and Sullivan counties.
- Population predictions indicate that the region will experience a steep loss of the workforce-aged population (–13%), putting a premium on job creation and retention.

AUDIENCES AND POTENTIAL USES

- Towns and counties applying for grants for development or open space protection.
- Towns and counties updating and revising open space and development plans.
- Planners, towns and NGOs working with developers on conservation development plans.
- Developers seeking to find communities that can accommodate sustainable growth.
- Planning practitioners, zoning and planning boards conducting build-out scenarios or visualizations evaluating development proposals.
- Conservation organizations and New York State agencies revising protection priorities in the Catskills.
- New York State agencies and NGOs working on landowner outreach or best management practices.
- Private and public water authorities responsible for protecting local drinking water.

COUNTY SUMMARIES

See Appendix A for a complete breakdown of resources by town and county.

- Ulster County has the most existing development (7%) and the most conserved land (32%) leaving the least preferred growth area (11%).

- Sullivan County has both the highest percentage of its open space resources in private ownership (83%) and the greatest percentage of preferred growth area (30%), which is largely concentrated in the center of the county and coincides with significant, established infrastructure.

- Delaware County is the least developed (3%) and has the greatest limitations due to the presence of regulatory, physical and open space restrictions (62%). These limitations still leave enough room to increase development more than six times without compromising open space resources or triggering land use regulations.

- Greene County is 24% conserved and 6% developed and has enough preferred growth area to triple existing development.

BROADER ECONOMIC IMPLICATIONS

- Sustainable development, including commercial, second home and infill in villages and hamlets, will be critical to the economic health of the region.

- Agriculture ranks third in generating income for the region's economy (after health care and tourism). Both conservation groups and proponents of economic development recognize its importance and can find common ground in ensuring that farming in the Catskills remains viable.

- Recreation on public lands provides significant economic income to the region. There are more than 500,000 visitors to the Catskill Park and nearly 400,000 to the Shawangunks each year. Private recreation resources (27% of all recreational resources), including private open lands, camping, lodging and waterfront activities, are a critical complement to public resources.

- Despite extensive win-win opportunities for conservation and development, sustainable growth will depend on such factors as access to mass transit, growth in the workforce and incentives to attract desirable businesses.

DEFINITIONS

Preferred Growth

Undeveloped, privately owned land that does not have physical impediments or regulations against development. Development on these lands would avoid direct effects on agriculture, water, recreation and wildlife habitat.

Preferred growth does not account for the feasibility of or market demand for development.

Recreation

There are varying degrees of public access. For this analysis, recreation resources include all New York City watershed lands and waters, as well as public campgrounds.

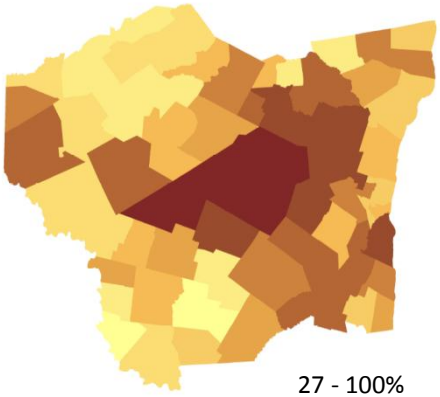
This analysis does not include hunt clubs or other private-access clubs, though these lands do play an important role in the region.

Sustainable Development

Meeting the economic and growth requirements of the population while protecting the natural environment.

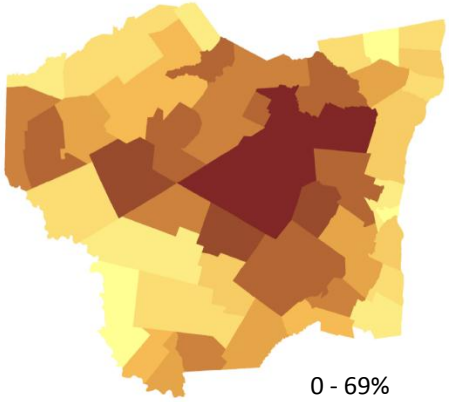
Results and Analysis

1 All open space resources



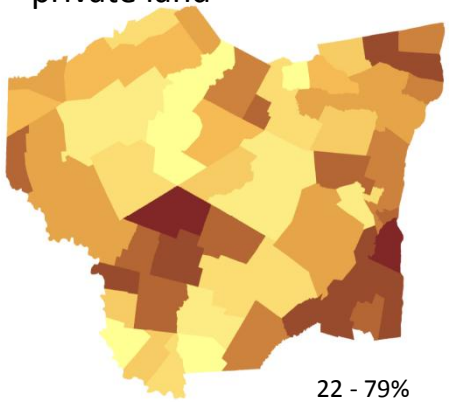
27 - 100%

2 Open space resources on conserved land



0 - 69%

3 Open space resources on private land



22 - 79%

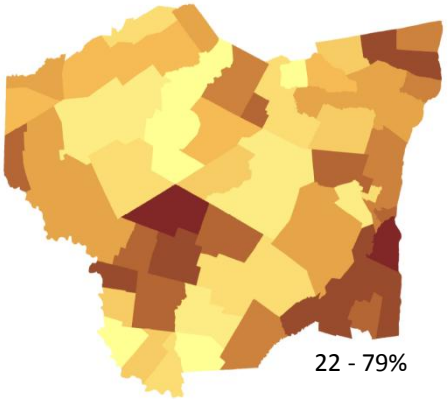
= Greatest coverage

= Least coverage

- We compiled more than 20 data sources on regionally important open space resources from public agencies and NGOs in order to create a single map showing which lands are critical for maintaining water quality, recreation, agriculture and wildlife habitat (1).
- Then we eliminated conserved land (2) so we were left with a map of where privately owned open space resources are located (3).
- The dark colors in each map represent towns with the largest amount of any given resource. The percentages below each map indicate the range in values for the towns.

Which open space resources are concentrated on private land?

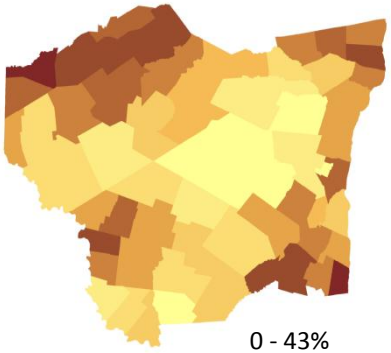
All open space resources



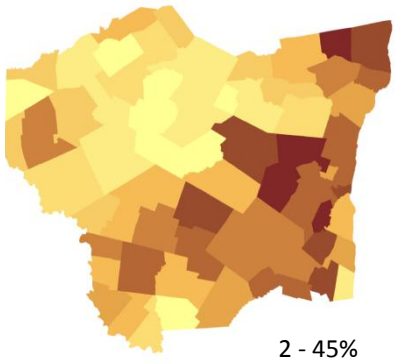
= Greatest coverage

= Least coverage

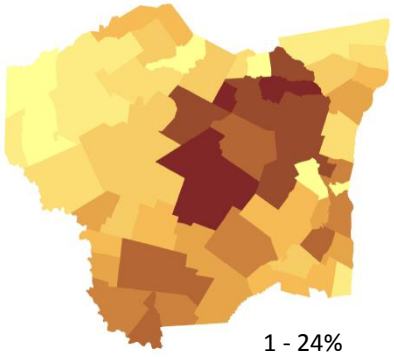
Agriculture



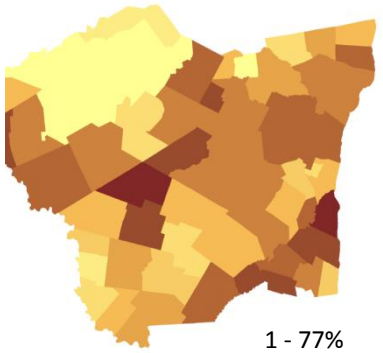
Water



Recreation



Habitat

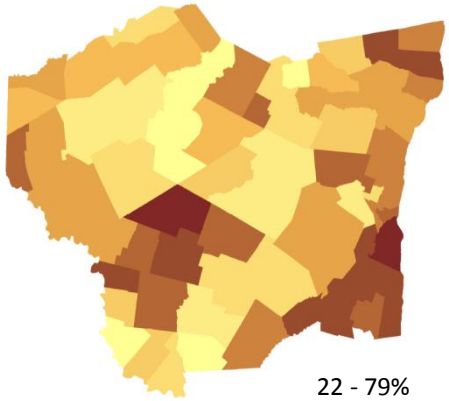


Which open space resources are concentrated on private land? (continued from previous page)

	All Open Space Resources (% of county, acres)		- Conserved Open Space Resources		= Privately Owned Open Space Resources	
Sullivan	54%	346,976	9%	58,195	45%	288,781
Delaware	52%	483,973	15%	141,221	37%	342,752
Greene	64%	270,603	23%	95,932	42%	174,671
Ulster	76%	564,538	32%	234,500	44%	330,038
Total	61%	1,666,090	19%	529,848	41%	1,136,242

Percent of open space resources on private lands	68%
Percentage of private lands that contain open space resources	55%

Open space resources on private land



22 - 79%

- We found that just over 60% of the Catskill region contains regionally important open space resources, of which 32% are conserved and 68%, or 1.14 million acres, is in unencumbered private ownership.
- Less than 10% of all conservation land is in private (encumbered) ownership.
- The 1.14 million acres of privately owned open space resources constitute just over half (55%) of all private, undeveloped land.
- By town, these resources cover anywhere from 22 to 79% of the land base.

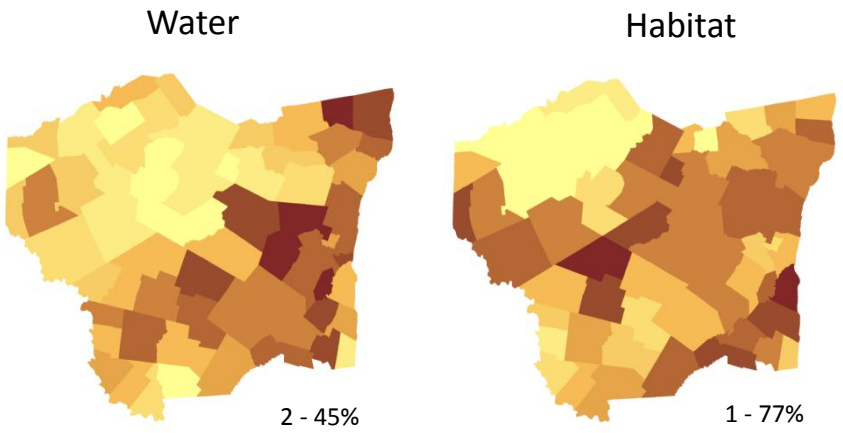
Which open space resources are concentrated on private land? (continued from previous page)

	Agriculture (% in Private Land, acres)		+ Water Quality		+ Wildlife Habitat		+ Recreation		= Privately Owned Open Space Resources	
Sullivan	95%	80,499	85%	120,597	78%	154,382	46%	36,704	83%	288,781
Delaware	93%	179,609	55%	88,962	64%	140,172	21%	22,043	71%	342,752
Greene	97%	56,299	66%	75,201	53%	96,965	26%	29,897	65%	174,671
Ulster	93%	95,911	59%	171,989	49%	204,964	23%	58,295	58%	330,038
	94%		65%		59%		27%		68%	1,136,242

- Agricultural open space resources are nearly all (94%) privately owned.
- Recreation resources have the least land in private ownership (27%).
- Nearly two-thirds of habitat (59%) and water resources (65%) are privately owned.
- Privately owned water quality resources are concentrated outside the New York City drinking water supply area (see map on previous map and page 12).
- Prime agricultural lands form a ring around the region, providing an important buffer to recreation and habitat resources located in the center (see map on previous page).

How much of the wildlife and water resources are privately owned?

Wildlife and water resources are sensitive to human activities and are largely concentrated on private lands. Although permanent protection of all of these lands is not realistic, working with landowners and providing incentives for continued private stewardship of these resources is essential.



Ecological resource	Total	Private	% Private
Wetlands	140,863	125,050	89%
Aquifers	262,100	230,753	88%
Riparian Areas with Forest Cover	157,679	130,211	83%
Trout Unlimited Priority Streams (miles)	379	255	67%
Lakes and Reservoirs	61,047	34,672	57%
Forest Blocks Greater than 2500 acres	640,285	319,396	50%
TNC Intact Habitat Blocks	585,632	280,031	48%
DEP Conservation Priorities 1 and 2	241,780	104,515	43%
Natural Heritage Species and Community Occurences	409,210	150,375	37%
Audubon Important Bird Areas	455,897	166,020	36%

Aquifers are the major source of local drinking water and largely unprotected.

Forest cover over streams improves water quality. More than 80% of streams with natural cover are in private ownership. Encouraging best management practices among landowers is therefore essential.

Outside of the Catskill Park, Audubon Important Bird Areas and TNC forest blocks are largely unconserved.

The region's lakes are largely in private ownership. Partnerships and economic incentives could help ensure these waters continue to provide quality public recreation and aquatic habitat.

How do resources within the NYC DEP watershed compare with the area outside the watershed?

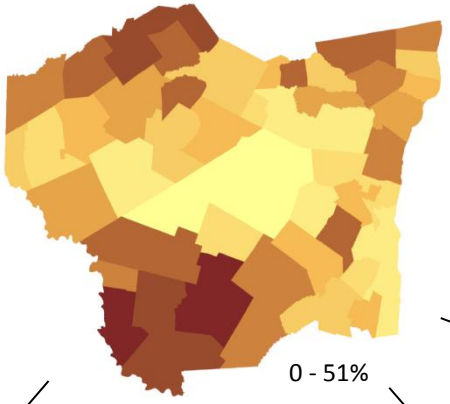
	Four-County Region		Watershed (40% of region)		Non-watershed (60% of region)	
Private Lands, Undeveloped	2,054,879	75%	686,803	63%	1,368,076	83%
Conserved Lands	551,099	20%	371,351	34%	179,748	11%
Steep slopes and unstable soils	821,694	30%	367,840	34%	453,854	27%
Habitat	578,482	21%	203,155	19%	375,327	23%
Water Quality	456,749	17%	159,482	15%	297,267	18%
Agriculture	412,318	15%	131,125	12%	281,193	17%
Preferred Growth Areas	516,451	19%	128,321	12%	388,130	23%
Recreation	146,940	5%	97,631	9%	49,309	3%
Moderately Regulated Lands	223,972	8%	56,295	5%	167,677	10%
Strictly Regulated Lands	204,998	7%	51,632	5%	153,366	9%
Developed Lands	133,904	5%	28,420	3%	105,484	6%

- To evaluate the resources of towns critical to New York City's water supply, we distinguished between "watershed towns," here defined as those whose land area is at least 50% inside the watershed, and "non-watershed towns" those with less land inside the watershed.
- The watershed towns are 3% developed on average and the towns outside the watershed are 6% developed on average.
- There are more privately owned water resources outside the watershed (18%) than inside (15%) because of the extensive unprotected wetlands, rivers and aquifers along the Hudson River and in Sullivan County.
- The watershed towns are 34% conserved, and 10% of their land base is under DEP, state and federal development regulations. The towns outside the watershed are 11% conserved, and 19% of their land base is under development regulations.
- The towns within the New York City watershed contain half as much preferred growth area (12%) as the region outside the watershed (23%).

Which towns can sustain significant growth without compromising natural resources?

Methods: The entire Catskill region is 2.7 million acres. Conserved land covers 530,000 acres, developed land covers 140,000 acres, and an additional 1 million acres are difficult to develop because of regulatory controls or physical features. This leaves almost 1 million acres of private, undeveloped land, of which 480,000 acres are regionally important open space resources.

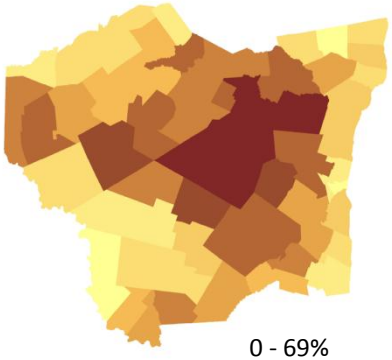
Preferred areas for growth



0 - 51%

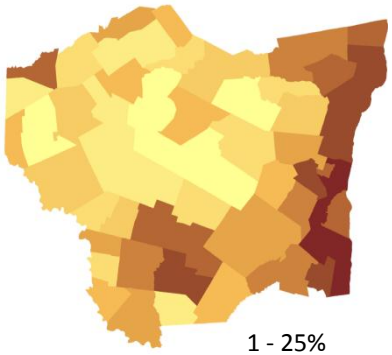
Finding: The region contains 520,000 acres where development can occur without direct impacts to open space resources. Given 140,000 acres of land are currently developed, we conclude that the region could hypothetically quadruple development before directly developing the open space resources.

Conserved land



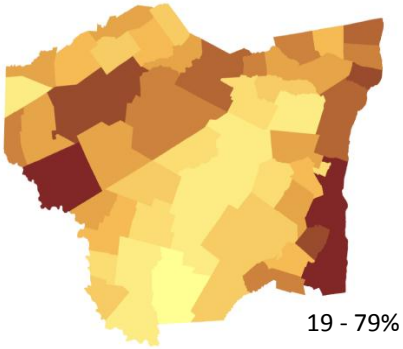
0 - 69%

Existing development



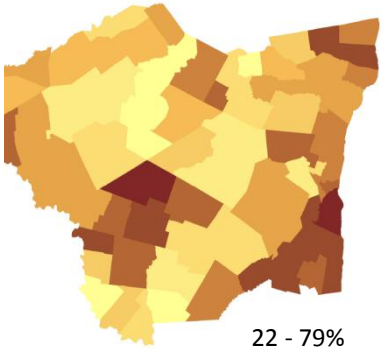
1 - 25%

Regulatory and physical constraints to development



19 - 79%

Open space resources on private land



22 - 79%

How do open space resources affect the opportunities for growth in the region?

Development can quadruple before needing to replace regionally identified open space resources or butt up against regulatory or physical impediments to development. This suggests that a win-win for conservation and development is possible.

	Town Acres (acres)	- Conservation Lands (% of county, acres)		- Developed Lands		= Private Lands, Undeveloped		- Regulatory and Physical Limitations to Development		= Preferred Growth		Ratio, Preferred Growth Area to Existing Development
Sullivan	637,430	10%	61,574	5%	32,152	85%	543,703	55%	351,533	30%	192,170	6:1
Delaware	938,860	16%	151,599	3%	27,264	81%	759,997	62%	583,974	19%	176,023	6.5:1
Greene	420,841	24%	99,795	6%	23,554	71%	297,492	54%	227,747	17%	69,745	3:1
Ulster	742,750	32%	238,130	7%	50,934	61%	453,686	51%	375,174	11%	78,512	1.5:1
									1,538,428		516,451	4:1

Sullivan County has the greatest percentage of its land base available for development

Ulster County has the most conserved land and the most developed land, leaving the least space for expanding development.

Though Delaware County has the most regulatory and physical limitations to development, these impediments still leave room for increasing development more than 6.5 times.

How much land will be developed over the next 25 years?

We defined development growth in terms of acres per person based on average land consumption rates for near by rural areas. Modest growth results in 1.5 acres of development per new person. High growth is an increase of 3 acres per person.

	2009 Development (acres)	2005 Population	Population Increase, 2005 to 2035 (%, persons)		Modest Development Growth, 2005 to 2035 (%, acres)		OR	High Development Growth, 2005 to 2035		Compared with	Preferred Growth (acres)
Sullivan	33,037	75,539	5%	4,017	18%	6,026		40%	13,215		192,170
Delaware	28,431	46,842	-23%	-10,844		n/a			n/a		176,023
Greene	24,125	48,946	5%	2,210	14%	3,315		40%	9,650		78,512
Ulster	52,761	181,423	4%	7,136	20%	10,704		32%	16,883		69,745
Total	138,354	352,750	4%	13,363	14%	20,045	OR	29%	39,748		516,451

- Data from the Cornell Program on Applied Demographics indicate that Sullivan, Greene and Delaware Counties can expect an average 4% growth between 2005 and 2035. Delaware County is expected to loose 23% of its population and is therefore excluded from the total and the development growth analysis.
- In rural areas, each additional person often results in 1.5 to three acres of development. Therefore, we might expect between 20,000 acres and 40,000 acres of development to result. This represents a 14% to 29% increase in development from a 4% increase in population.
- Planners should consider that significant growth may occur as second home development, which tends to have a larger footprint and to be located near streams, lakes and views.
- If carefully placed, development resulting from projected population growth can be easily accommodated within preferred growth areas.

What kind of development will be needed to accommodate the growth?

	Population growth or decline by age range, 2005 to 2035		Increase in second-home population (% of total popluation)	Compared with	Increase in year-round population
	0 to 60	60 to 85+	2001 to 2007		2000 to 2009
Sullivan	-8%	44%	5%		2.5%
Delaware	-43%	21%			
Greene	-8%	38%			
Ulster	-9%	44%			
	-13%	39%			

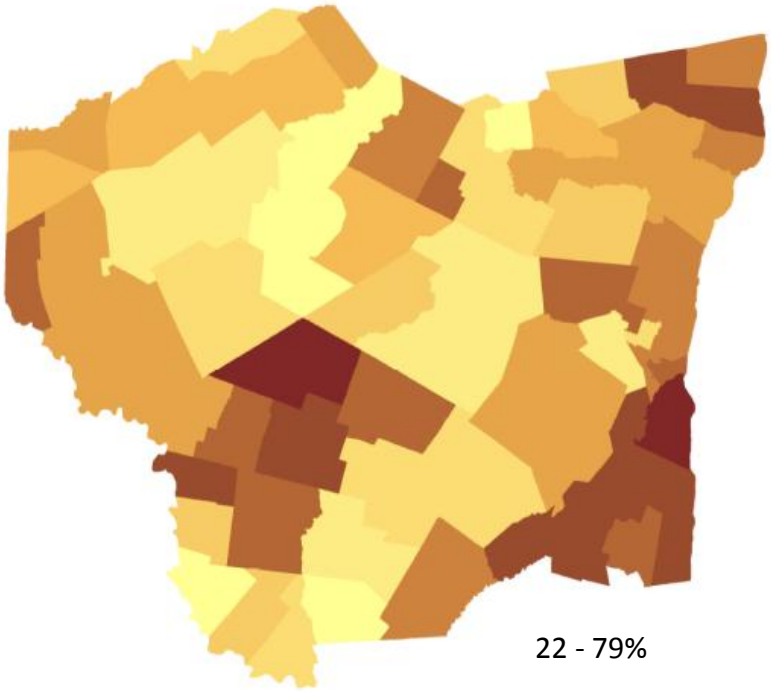
Equivalent to a 65% growth in the second-home population

It will be critical to attract sustainable development to the region to overcome projected declines in the working-age population. Economic activity in the region will help assure private landowners can continue to afford to maintain their land as open space.

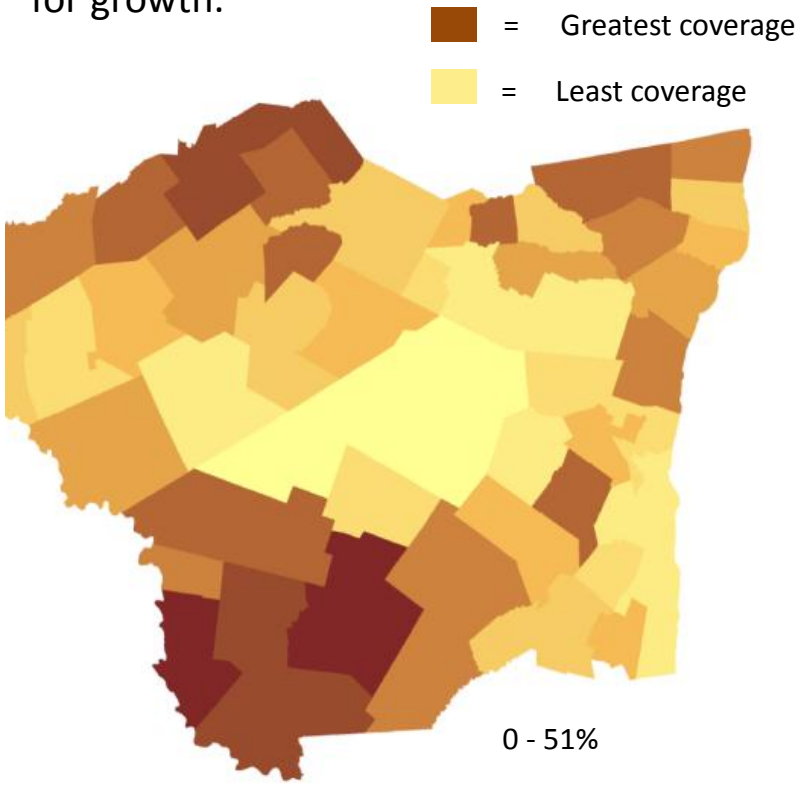
- Separating population projections by age shows a steep decline in the working-age population. This is likely to coincide with a decline in jobs and economic development.
- Data for Sullivan County show that the second-home population, which grew by 65% between 2001 to 2007, accounts for 5% of the growth in total population. This is twice as fast as the growth in the year round population during a similar time period.
- Conversations with developers indicate development will be driven by “empty-nester” and affordable, elderly housing on the fringes of a few existing urban centers, largely in Ulster and Sullivan counties.

Summary

Towns in the darkest shade have the most privately owned open space resources.



Towns in the darkest shade have the most land preferred for growth.



Win-win opportunities for conservation and development exist in the Catskills. Finding these opportunities will determine the economic and ecological integrity of the open space resources in the region.

Appendix A.
Methodology

Background

The Appalachian Mountain Club (AMC) conducted GIS analyses in support of Open Space Institute's "Private Lands, Public Benefits" project, including an evaluation of the extent and spatial distribution of important open space resource values, developed areas, protected lands, areas regulated for development, steep slopes and unstable soils, and preferred growth areas. The methodology below is a basic outline of how this information was developed.

Open Space Resources

There are four open space resources data layers: agriculture, water quality, recreation and wildlife habitat.

Agriculture

The agriculture data layer is composed of the following:

1. Prime farmland soils, from the Natural Resources Conservation Service's Soil Survey Geographic (SSURGO) Database, 2008
2. Crop and pasture land, classifications from NOAA Land Cover Data, 2005

Water

The water quality resources data layer is composed of the following:

1. New York City Department of Environmental Protection (NYC DEP) protected lands, 2009
2. NYC DEP priority 1 and 2 watersheds (areas within 60 days of the water source)
3. New York State aquifers, the NYS Department of Health, Center for Environmental Health, Bureau of Public Water Supply Protection
4. Wetlands, NOAA Land Cover Data, 2005
5. Water bodies (lakes, ponds, marshes and reservoirs) from National Hydrography Data set (NHD),
6. Trout Unlimited streams with high Conservation Success Index (CSI equal to or greater than 60). Streams include 25-ft. buffers (50-ft. corridor).

Recreation

The recreation resource data layer is composed of the following:

1. Hiking trails including 25-ft. buffers (50-ft. corridor), data set was developed by AMC for this study from several sources including web, atlas and digital, 2007
2. Water access sites including 25-ft. buffers (50-ft. corridor) - data set was developed by AMC for this study from several sources including web, atlas and digital, 2007
3. Camping sites including 150-ft. buffers (300-ft. corridor) - data set was developed by AMC for this study from several sources including web, atlas and digital, 2007
4. Fishing sites including 25-ft. buffers (50-ft. corridor) - data set was developed by AMC for this study from several sources including web, atlas and digital, 2007
5. Protected lands – aggregate data set showing public and private protected lands developed by AMC for this study. This data set includes protected lands from New York State Department of Environmental Conservation, Open Space Institute, New York City Department of Environmental Protection, The Nature Conservancy, Mohonk Preserve, New York State Office of Parks, Recreation and Historic Preservation (2009)
6. Scenic byways including 25-ft. buffers (50-ft. corridor)
7. Trout Unlimited streams including 25-ft. buffers (50-ft. corridor)
8. The National Hydrography Data set (NHD), lakes, ponds and reservoirs
9. Open Space Institute and Adirondack Mountain Club recreation conservation priorities, 2008

Wildlife Habitat

The wildlife habitat resource data layer is composed of the following:

1. New York State Audubon Society, Important Bird Areas, 2007
2. Wetlands data set from the NOAA Land Cover Data, 2005
3. New York State Department of Environmental Conservation's Natural Heritage Program Element Occurrences for animal, plant and community areas.
4. Catskill peaks above 3,500 feet: The Catskill Center for Conservation and Development, 2002
5. Trout Unlimited Priority Watersheds
6. The Nature Conservancy's Forest Matrix Blocks

Protected Lands

The protected lands data layer is composed of information obtained from New York State Department of Environmental Conservation, Open Space Institute, New York City Department of Environmental Protection, The Nature Conservancy, Mohonk Preserve, and the New York State Office of Parks, Recreation and Historic Preservation.

Developed Lands

The developed lands data layer consists of the following:

1. Lands classified as development in the NOAA 2005 land cover
    a. development – high intensity
    b. development – medium intensity
    c. development – low intensity
    d. development – open space, (e.g. golf courses and parking lots)

2. Parcels less than or equal to 1.5 acres (does not exclude federal, state or town ownerships)
   Parcel data were only available for 65% of Sullivan County.

3. Due to the lack of roads represented in the NOAA 2005 land cover, road development was incorporated into this layer using the Accident Location Information System (ALIS), The ALIS data is a vector based file of public streets compiled from orthoimagery and other sources. This data is released by the New York State Office of Cyber Security (OCS), 2008.
    a. highways were buffered 20 meters
    b. primary and secondary roads were buffered 10 meters
    c. local roads were buffered 7 meters

Regulated lands and lands unfit for development

A data layer was developed to show areas where development is less likely given physical and regulatory constraints.

Three data layers were developed, one representing strict regulations, the second including regulations that are not as likely to be monitored and the third including all slopes and soils considered "very limited" for development.

All of the following data layers exclude developed lands.

1: Strictly Regulated Lands

1. DEP watershed regulations (outside designated hamlets) – only in the WOH Catskill and Delaware watersheds. Does not include lakes.
    a. 100 ft. buffer on streams
    b. 300 ft. buffer on reservoirs
    c. 300 ft. buffer on reservoir "stems" (section of any tributary to a reservoir within 500 ft. of that reservoir)
2. New York State Freshwater Wetlands Act
    a. DEC regulated wetlands with 100 ft. buffer
3. Clean Water Act
    a. All wetlands, no buffer - NOAA 2005 land cover data
    b. FEMA flood insurance regulations
        i. Floodways – The floodplains data should have an attribute for floodways as a distinct part of the floodplain. The floodway is in the center of the floodplain. In the attribute table under Floodway field select FW for floodways.
4. Open water (based on 1:24000 USGS DLG data) –lakes and reservoirs for the entire study area.

Note: Hamlet boundaries and flood zones are currently under review and will be altered within the next two years.

2: Moderately Regulated Lands

1. Floodplains and floodways
2. 100 ft. buffers on all water bodies
    a. All water bodies use the data layers developed for the Natural Resource Layers

3: Steep slopes and unstable soils

1. Slopes/soils that constrain development
    a. Soils/Slopes (based on NRCS SSURGO 2.2 data)
        i. Constrained soils - soil maps units that are rated as "very limited" in either one of the following two categories:
            1. Building site development - dwellings with basements
            2. Sanitary facilities - septic tank absorption fields

Preferred Growth

Preferred growth areas are identified because they do not overlap with the open space resources data layers (agriculture, water quality, recreation and habitat), protected lands, developed lands and regulated lands and steep slopes. At a regional scale, these areas represent a good estimate of available land for development that avoids direct impact on the open space resources.

Appendix B: Resource Data by Town (Delaware and Greene County)

County	Town/ Village	Town Acres	Developed Lands		Private Lands, Undeveloped		Preferred Growth Areas		Conserved Lands		Agriculture		Water Quality		Habitat		Recreation		Strictly Regulated Lands		Moderately Regulated Lands		Steep slopes and unstable soils	
Delaware	Andes	72,002	1,299	2%	48,000	67%	8,701	12%	22,704	32%	8,479	12%	3,135	4%	6,495	9%	1,314	2%	2,826	4%	3,091	4%	30,313	42%
Delaware	Bovina	28,427	546	2%	25,208	89%	7,629	27%	2,673	9%	6,108	21%	1,514	5%	302	1%	458	2%	1,715	6%	1,656	6%	11,941	42%
Delaware	Colchester	90,916	1,786	2%	52,827	58%	5,236	6%	36,303	40%	5,779	6%	7,146	8%	23,540	26%	1,789	2%	1,382	2%	4,429	5%	34,919	38%
Delaware	Davenport	33,568	1,357	4%	31,099	93%	11,616	35%	1,112	3%	8,295	25%	5,655	17%	1,810	5%	811	2%	2,279	7%	3,318	10%	10,062	30%
Delaware	Delhi	41,342	1,542	4%	36,346	88%	8,443	20%	3,455	8%	10,673	26%	3,716	9%	521	1%	648	2%	2,720	7%	3,534	9%	19,534	47%
Delaware	Deposit	28,516	1,122	4%	22,029	77%	3,761	13%	5,364	19%	4,924	17%	3,527	12%	11,305	40%	385	1%	366	1%	2,694	9%	11,187	39%
Delaware	Franklin	52,162	1,363	3%	49,863	96%	16,550	32%	935	2%	17,583	34%	3,775	7%	1,021	2%	762	1%	1,420	3%	3,783	7%	16,722	32%
Delaware	Hamden	38,310	828	2%	34,098	89%	7,103	19%	3,383	9%	9,513	25%	2,368	6%	348	1%	529	1%	1,946	5%	2,430	6%	19,070	50%
Delaware	Hancock	103,412	3,148	3%	97,420	94%	20,016	19%	2,844	3%	8,123	8%	10,135	10%	33,061	32%	1,804	2%	3,271	3%	10,199	10%	57,953	56%
Delaware	Harpersfield	27,069	994	4%	25,923	96%	8,998	33%	152	1%	9,016	33%	3,613	13%	1,634	6%	672	2%	2,345	9%	2,605	10%	6,196	23%
Delaware	Kortright	40,004	1,022	3%	36,049	90%	11,094	28%	2,934	7%	12,944	32%	4,358	11%	1,020	3%	737	2%	2,581	6%	2,884	7%	12,136	30%
Delaware	Masonville	34,918	904	3%	26,000	74%	7,847	22%	8,014	23%	8,791	25%	662	2%	5,431	16%	389	1%	1,098	3%	2,157	6%	6,850	20%
Delaware	Meredith	37,313	853	2%	35,344	95%	12,780	34%	1,115	3%	13,402	36%	1,835	5%	1,126	3%	549	1%	2,162	6%	2,431	7%	9,326	25%
Delaware	Middletown	62,244	2,249	4%	46,684	75%	9,419	15%	13,311	21%	8,517	14%	5,015	8%	15,329	25%	7,890	13%	3,469	6%	3,756	6%	26,841	43%
Delaware	Roxbury	56,051	1,663	3%	43,769	78%	7,261	13%	10,618	19%	7,736	14%	4,181	7%	17,695	32%	1,145	2%	2,656	5%	2,647	5%	25,525	46%
Delaware	Sidney	32,280	2,571	8%	29,312	91%	8,047	25%	398	1%	12,425	38%	3,968	12%	872	3%	303	1%	1,418	4%	3,487	11%	10,322	32%
Delaware	Stamford	31,120	869	3%	21,947	71%	4,108	13%	8,305	27%	7,086	23%	2,204	7%	294	1%	324	1%	1,515	5%	1,719	6%	11,757	38%
Delaware	Tompkins	66,633	1,026	2%	44,818	67%	6,932	10%	20,789	31%	6,260	9%	14,171	21%	17,460	26%	700	1%	1,919	3%	2,709	4%	25,160	38%
Delaware	Walton	62,574	2,123	3%	53,261	85%	10,482	17%	7,190	11%	13,953	22%	7,984	13%	908	1%	832	1%	3,400	5%	4,415	7%	30,935	49%
Greene	Ashland	15,987	495	3%	12,736	80%	4,202	26%	2,756	17%	2,265	14%	2,199	14%	531	3%	142	1%	1,111	7%	1,196	7%	5,854	37%
Greene	Athens	18,508	1,940	10%	15,970	86%	3,224	17%	598	3%	3,714	20%	4,480	24%	4,337	23%	492	3%	3,286	18%	3,151	17%	6,462	35%
Greene	Cairo	38,480	2,737	7%	30,078	78%	8,703	23%	5,665	15%	4,719	12%	8,666	23%	9,826	26%	713	2%	5,551	14%	3,681	10%	9,718	25%
Greene	Catskill	40,970	4,715	12%	33,787	82%	8,738	21%	2,468	6%	7,222	18%	7,557	18%	10,017	24%	1,197	3%	7,516	18%	9,304	23%	10,410	25%
Greene	Coxsackie	24,555	2,543	10%	21,033	86%	3,337	14%	980	4%	7,482	30%	8,149	33%	7,365	30%	400	2%	4,453	18%	3,324	14%	5,897	24%
Greene	Durham	31,412	1,581	5%	29,189	93%	9,257	29%	642	2%	6,984	22%	4,627	15%	2,857	9%	436	1%	1,898	6%	2,838	9%	10,786	34%
Greene	Greenville	25,076	1,528	6%	23,448	94%	6,774	27%	100	0%	6,175	25%	11,169	45%	5,344	21%	326	1%	6,329	25%	2,947	12%	1,836	7%
Greene	Halcott	14,375	206	1%	10,359	72%	1,171	8%	3,810	27%	953	7%	510	4%	6,934	48%	2,771	19%	595	4%	666	5%	6,596	46%
Greene	Hunter	57,702	2,019	3%	23,492	41%	2,529	4%	32,191	56%	1,561	3%	5,166	9%	16,918	29%	6,478	11%	2,583	4%	2,035	4%	12,469	22%
Greene	Jewett	32,095	841	3%	21,634	67%	6,302	20%	9,621	30%	2,312	7%	4,230	13%	6,295	20%	6,103	19%	2,189	7%	2,227	7%	8,092	25%
Greene	Lexington	51,274	686	1%	22,144	43%	3,113	6%	28,445	55%	3,054	6%	4,377	9%	13,889	27%	6,948	14%	1,695	3%	2,014	4%	14,156	28%
Greene	New Baltimo	27,547	2,295	8%	24,631	89%	6,466	23%	621	2%	5,445	20%	7,784	28%	4,652	17%	345	1%	4,852	18%	3,307	12%	9,063	33%
Greene	Prattsville	13,851	431	3%	10,497	76%	2,377	17%	2,924	21%	1,823	13%	1,930	14%	2,102	15%	211	2%	895	6%	1,036	7%	5,765	42%
Greene	Windham	29,009	1,538	5%	18,495	64%	3,554	12%	8,976	31%	2,590	9%	4,358	15%	5,900	20%	3,335	11%	2,060	7%	1,696	6%	9,652	33%

Appendix B: Resource Data by Town (Sullivan and Ulster County)

County	Town/ Village	Town Acres	Developed Lands		Private Lands, Undeveloped		Preferred Growth Areas		Conserved Lands		Agriculture		Water Quality		Habitat		Recreation		Strictly Regulated Lands		Moderately Regulated Lands		Steep slopes and unstable soils	
Sullivan	Bethel	57,562	3,695	6%	52,465	91%	19,114	33%	1,402	2%	10,037	17%	14,821	26%	11,514	20%	4,601	8%	5,074	9%	6,235	11%	6,485	11%
Sullivan	Callicoon	31,286	885	3%	30,221	97%	8,365	27%	181	1%	7,695	25%	5,210	17%	5,396	17%	638	2%	903	3%	2,693	9%	9,899	32%
Sullivan	Cochecton	23,718	666	3%	23,051	97%	10,978	46%	0	0%	4,807	20%	3,961	17%	1,629	7%	872	4%	1,580	7%	2,536	11%	3,531	15%
Sullivan	Delaware	22,783	1,034	5%	21,694	95%	5,467	24%	54	0%	7,900	35%	4,944	22%	2,896	13%	524	2%	787	3%	2,227	10%	6,636	29%
Sullivan	Fallsburg	50,608	4,216	8%	43,952	87%	22,437	44%	2,441	5%	5,686	11%	12,032	24%	4,940	10%	1,625	3%	3,206	6%	4,473	9%	5,840	12%
Sullivan	Forestburgh	36,155	767	2%	27,500	76%	14,012	39%	7,888	22%	1,593	4%	1,924	5%	7,618	21%	1,704	5%	1,710	5%	1,633	5%	3,948	11%
Sullivan	Fremont	32,731	853	3%	31,375	96%	9,707	30%	503	2%	5,957	18%	4,328	13%	5,884	18%	999	3%	1,103	3%	2,354	7%	10,910	33%
Sullivan	Highland	32,559	1,438	4%	28,637	88%	13,137	40%	2,485	8%	2,510	8%	5,091	16%	5,770	18%	1,575	5%	1,789	5%	2,869	9%	5,062	16%
Sullivan	Liberty	51,628	3,926	8%	47,366	92%	13,802	27%	336	1%	8,862	17%	10,355	20%	18,228	35%	1,461	3%	3,735	7%	4,605	9%	9,156	18%
Sullivan	Lumberland	31,738	1,554	5%	26,722	84%	12,146	38%	3,463	11%	3,276	10%	3,198	10%	7,109	22%	2,193	7%	1,347	4%	3,018	10%	4,901	15%
Sullivan	Mamakating	62,969	2,238	4%	54,227	86%	15,549	25%	6,504	10%	7,439	12%	11,747	19%	18,369	29%	1,891	3%	3,113	5%	5,333	8%	16,911	27%
Sullivan	Neversink	55,144	1,532	3%	33,245	60%	4,156	8%	20,367	37%	3,836	7%	19,162	35%	8,206	15%	12,149	22%	2,450	4%	2,700	5%	12,344	22%
Sullivan	Rockland	60,946	1,431	2%	45,270	74%	0	0%	14,245	23%	4,819	8%	9,734	16%	46,701	77%	1,240	2%	3,466	6%	4,297	7%	15,727	26%
Sullivan	Thompson	55,919	6,745	12%	47,471	85%	27,135	49%	1,703	3%	4,168	7%	8,515	15%	7,035	13%	3,784	7%	5,389	10%	5,228	9%	3,152	6%
Sullivan	Tusten	31,682	1,172	4%	30,508	96%	16,166	51%	3	0%	1,913	6%	5,574	18%	3,086	10%	1,449	5%	2,004	6%	3,051	10%	6,872	22%
Ulster	Denning	65,429	449	1%	20,679	32%	493	1%	44,302	68%	298	0%	9,880	15%	17,639	27%	12,054	18%	1,463	2%	2,017	3%	14,749	23%
Ulster	Esopus	26,839	2,437	9%	23,186	86%	1,048	4%	1,215	5%	3,105	12%	4,361	16%	19,166	71%	1,161	4%	3,743	14%	4,995	19%	15,414	57%
Ulster	Gardiner	27,968	1,459	5%	21,546	77%	3,590	13%	4,962	18%	9,481	34%	5,973	21%	8,327	30%	564	2%	4,841	17%	2,442	9%	5,015	18%
Ulster	Hardenburgh	51,756	320	1%	18,222	35%	0	0%	33,214	64%	1,044	2%	2,029	4%	18,541	36%	12,517	24%	1,133	2%	1,640	3%	13,811	27%
Ulster	Hurley	23,091	2,163	9%	13,021	56%	3,568	15%	7,907	34%	1,515	7%	5,753	25%	2,893	13%	239	1%	3,143	14%	1,933	8%	5,661	25%
Ulster	Kingston	4,715	329	7%	2,781	59%	845	18%	1,605	34%	180	4%	908	19%	382	8%	737	16%	447	9%	232	5%	882	19%
Ulster	Kingston Tov	5,578	3,085	55%	2,489	45%	245	4%	4	0%	1,619	29%	1,610	29%	959	17%	37	1%	395	7%	1,462	26%	2,435	44%
Ulster	Lloyd	21,399	3,018	14%	17,914	84%	1,328	6%	467	2%	3,665	17%	3,934	18%	9,787	46%	755	4%	4,069	19%	4,027	19%	11,541	54%
Ulster	Marbletown	35,197	2,163	6%	29,287	83%	9,883	28%	3,747	11%	7,053	20%	8,949	25%	5,741	16%	778	2%	5,615	16%	3,494	10%	8,108	23%
Ulster	Marlborough	16,992	2,719	16%	14,166	83%	1,016	6%	107	1%	7,405	44%	1,317	8%	2,205	13%	224	1%	1,595	9%	2,322	14%	9,361	55%
Ulster	New Paltz	22,140	2,924	13%	16,633	75%	2,077	9%	2,583	12%	5,095	23%	7,024	32%	7,986	36%	1,360	6%	6,162	28%	4,183	19%	5,827	26%
Ulster	Olive	41,735	1,683	4%	20,990	50%	2,683	6%	19,061	46%	1,814	4%	15,823	38%	10,608	25%	5,682	14%	2,508	6%	1,944	5%	10,399	25%
Ulster	Plattekill	22,765	2,514	11%	20,056	88%	3,608	16%	195	1%	5,233	23%	6,520	29%	5,965	26%	572	3%	7,103	31%	1,477	6%	8,624	38%
Ulster	Rochester	57,098	2,764	5%	37,310	65%	8,443	15%	17,023	30%	9,107	16%	12,577	22%	13,511	24%	1,384	2%	6,457	11%	5,058	9%	11,755	21%
Ulster	Rosendale	13,266	1,820	14%	9,999	75%	722	5%	1,446	11%	1,725	13%	5,674	43%	3,948	30%	486	4%	2,502	19%	2,192	17%	5,876	44%
Ulster	Saugerties	43,533	5,377	12%	36,135	83%	9,861	23%	2,021	5%	8,319	19%	9,989	23%	12,474	29%	729	2%	9,681	22%	7,481	17%	9,376	22%
Ulster	Shandaken	78,875	2,044	3%	22,013	28%	26	0%	54,818	69%	2,195	3%	22,963	29%	21,169	27%	7,803	10%	2,078	3%	3,354	4%	17,468	22%
Ulster	Shawangunk	36,283	2,487	7%	30,860	85%	4,288	12%	2,936	8%	13,007	36%	8,455	23%	12,809	35%	840	2%	6,745	19%	3,752	10%	8,466	23%
Ulster	Ulster	18,916	4,819	25%	13,970	74%	2,017	11%	127	1%	4,984	26%	4,342	23%	3,189	17%	735	4%	2,630	14%	5,113	27%	8,046	43%
Ulster	Wawarsing	85,857	4,202	5%	55,655	65%	19,006	22%	26,000	30%	6,358	7%	17,536	20%	14,740	17%	3,327	4%	5,567	6%	5,738	7%	20,054	23%
Ulster	Woodstock	43,321	2,158	5%	26,773	62%	3,764	9%	14,389	33%	2,709	6%	16,373	38%	12,925	30%	6,310	15%	3,960	9%	2,497	6%	13,946	32%

Appendix C: Towns Ranking in the Top Ten by Resource

Land Use

	Conserved Land		Developed Lands		Private Lands, Undeveloped		Preferred Growth	
1	Shandaken	69%	Kingston Town	55%	Cochecton	97%	Tusten	51%
2	Denning	68%	Ulster	25%	Callicoon	97%	Thompson	49%
3	Hardenburgh	64%	Marlborough	16%	Tusten	96%	Cochecton	46%
4	Hunter	56%	Lloyd	14%	Fremont	96%	Fallsburg	44%
5	Lexington	55%	Rosendale	14%	Harpersfield	96%	Highland	40%
6	Olive	46%	New Paltz	13%	Franklin	96%	Forestburgh	39%
7	Colchester	40%	Saugerties	12%	Delaware	95%	Lumberland	38%
8	Neversink	37%	Thompson	12%	Meredith	95%	Davenport	35%
9	Hurley	34%	Catskill	12%	Hancock	94%	Meredith	34%
10	Kingston	34%	Plattekill	11%	Greenville	94%	Harpersfield	33%

Privately Owned Open Space Resources

	Water Quality		Habitat		Recreation		Agriculture	
1	Greenville	45%	Rockland	77%	Hardenburgh	24%	Marlborough	44%
2	Rosendale	43%	Esopus	71%	Neversink	22%	Sidney	38%
3	Olive	38%	Halcott	48%	Halcott	19%	Meredith	36%
4	Woodstock	38%	Lloyd	46%	Jewett	19%	Shawangunk	36%
5	Neversink	35%	Deposit	40%	Denning	18%	Delaware	35%
6	Coxsackie	33%	New Paltz	36%	Kingston	16%	Gardiner	34%
7	New Paltz	32%	Hardenburgh	36%	Woodstock	15%	Franklin	34%
8	Shandaken	29%	Liberty	35%	Olive	14%	Harpersfield	33%
9	Kingston Town	29%	Shawangunk	35%	Lexington	14%	Kortright	32%
10	Plattekill	29%	Hancock	32%	Middletown	13%	Coxsackie	30%

Restrictions to Development

	Moderately Regulated Lands		Strictly Regulated Lands		Steep Slopes and Unstable Soils	
1	Ulster	27%	Plattekill	31%	Esopus	57%
2	Kingston Town	26%	New Paltz	28%	Hancock	56%
3	Catskill	23%	Greenville	25%	Marlborough	55%
4	New Paltz	19%	Saugerties	22%	Lloyd	54%
5	Lloyd	19%	Lloyd	19%	Hamden	50%
6	Esopus	19%	Rosendale	19%	Walton	49%
7	Saugerties	17%	Shawangunk	19%	Delhi	47%
8	Athens	17%	Catskill	18%	Halcott	46%
9	Rosendale	17%	Coxsackie	18%	Roxbury	46%
10	Marlborough	14%	Athens	18%	Rosendale	44%

Open Space Institute

The Open Space Institute protects scenic, natural and historic landscapes to ensure public enjoyment, conserve habitats and sustain community character.

OSI achieves its goals through land acquisition, conservation easements, regional finance programs, fiscal sponsorship, creative partnerships and analytical research.

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The findings of this study and the GIS shape files used in the development of this report are available on OSI's website:

www.osiny.org/PrivateLands

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