

# Ecology and Recovery

## *Allegheny County*

Timothy Collins   Jonathan Kline   Kostoula Vallianos   Cyril Fox



3 Rivers 2nd Nature : STUDIO for Creative Inquiry : Carnegie Mellon University : Pittsburgh Pennsylvania



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STUDIO for Creative Inquiry  
Carnegie Mellon University  
Pittsburgh Pennsylvania



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For more information on the work of the 3 Rivers 2nd Nature Project,  
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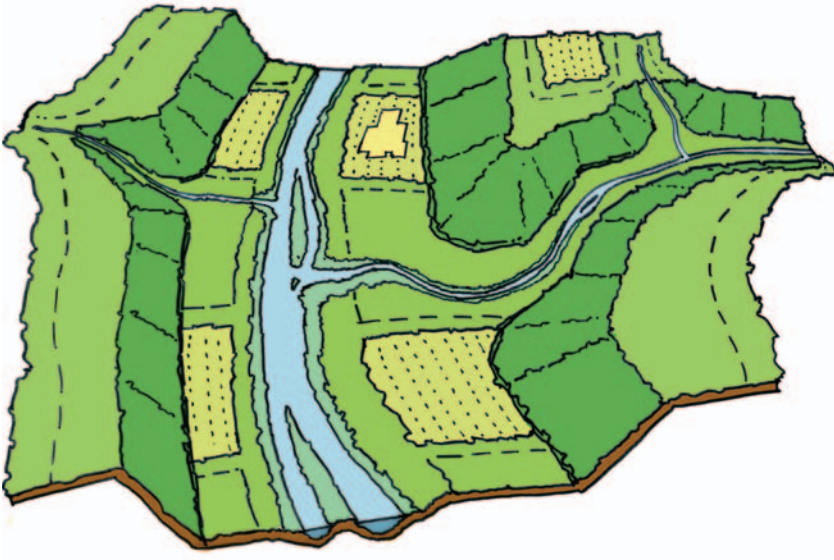
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**Cover**

Photo: *Evidence of Acid Mine Drainage on the Monongahela River* (3R2N)  
Map: *Ecological opportunity areas in Allegheny County* (3R2N)

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Ecology and Recovery - Allegheny County

Ecology and Recovery - Allegheny County is the culmination of the 3 Rivers 2nd Nature Project, a five year inquiry directed by artists Tim Collins and Reiko Goto. Using full page maps, photographs and charts, the report reveals extraordinary ecological opportunities in Allegheny County, providing a solid foundation for greening our collective future. The STUDIO for Creative Inquiry is grateful to the interdisciplinary team of artists, geologists, botanists, architects, planners, historians, regulatory experts, and Geographic Information Systems (GIS) specialists that participated in gathering the material for this report and to the Heinz Endowments for their support.

Forward

The idea that nature has value in an urban setting is just starting to take hold in Western Pennsylvania. Where nature needs sunlight and nutrients to thrive, new ideas need public discussion and a means of comparing what we know from the past to what is occurring in the present. It has been both our assignment and our great pleasure to consider the meaning, form and function of nature in Allegheny County, Pennsylvania. Principal funding for this effort was provided by the Heinz Endowments through a research grant paid to 3 Rivers Wet Weather Inc., and then redirected to the STUDIO for Creative Inquiry at Carnegie Mellon University. The STUDIO is a recognized leader in interdisciplinary research in the arts and sciences. STUDIO projects demand the social application of creative knowledge.

In this report, we examine, value and rank the remnant and recovering ecosystems that support the natural health of the rivers and streams of Allegheny County. To activate that knowledge, we analyze techniques for preserving, conserving and restoring these systems. While these terms are often used interchangeably, they also describe different stages and philosophies of ecosystem protection. Traditionally, the conservation movement put forth the ability and need for humans to manage the natural environment through scientific means. It believes in the importance of human management of the environment for human benefit and is predicated on a firm faith in human capacity to manage nature effectively. The conser-

vationist goal is planned and rational use of natural systems for human benefit. Partly in reaction to the conservationist’s focus on management for human use and benefit, the preservation movement developed a philosophy of protecting natural areas for their own benefit, not necessarily for human use. Indeed, active human intervention was believed neither necessary nor advisable. The struggle to create national wilderness areas, which were to be pristine lands untouched (or nearly untouched) by human hands, is one illustration of the philosophy of this movement.

Restoration refers to the process of deliberately managing a site to establish an identified, native and historic ecosystem. The Society for Ecological Restoration (SER) defines restoration as “the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed.” SER’s description is informative: “Ecological restoration is an intentional activity that initiates or accelerates the recovery of an ecosystem with respect to its health, integrity and sustainability.” The restoration process contemplates active management of a damaged ecosystem until it has recovered its historical development path. While it may not be possible to restore land to its exact historical condition, it should be possible in many cases to reestablish the direction and boundaries of historical development.

Allegheny County was once a gorgeous place to live. The hills were covered in rich, deep forests that framed good healthy rivers. In the last thirty years, with the downturn of industry, nature has started to reassert its beauty, its sense of health and well-being and its service to our community. In December 2005, the Pittsburgh City Council passed a steep slope zoning ordinance that reflects the work that you are about to read. 3 Rivers 2nd Nature project team members worked closely with Allegheny Land Trust and Perkins Eastman Architects on the Pittsburgh Steep Hillside Zoning study. Things really are changing; our leaders are awakening to the value and import of our natural living infrastructure. They are starting to pay attention to the environmental issues that are essential to our youth. They are beginning to understand the relationship between the environment and the economy, and its role as a keystone to our future.

In Figure i.1, municipal boundaries are overlaid on the watershed boundaries in Allegheny County. Municipal boundaries are a legal-cultural product

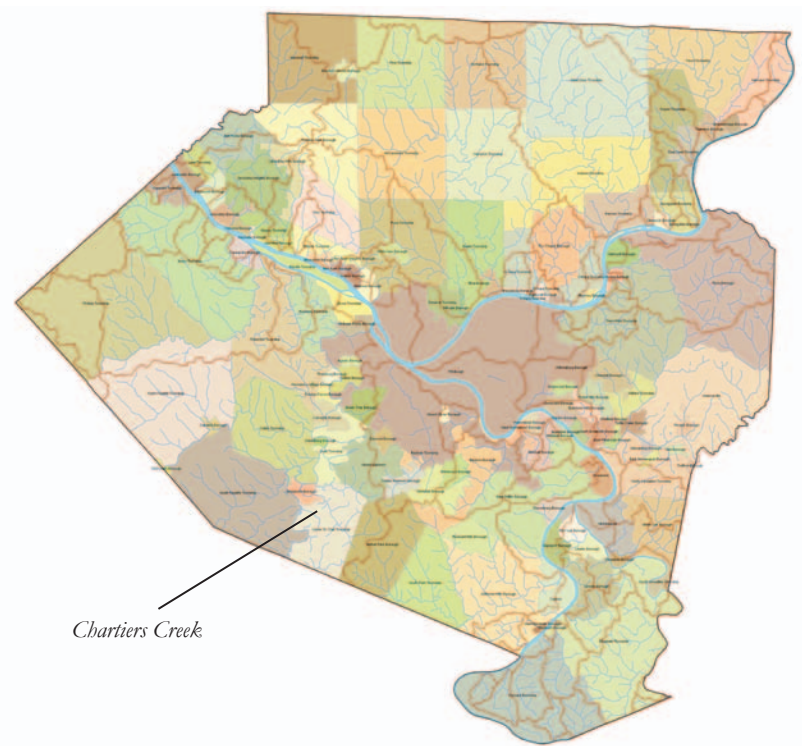


Figure i.1 The 130 separate municipalities of Allegheny County overlaid with the sub-watersheds.

of historic land use, ownership and political interest. Typically, municipal boundaries are informed but not in any way constrained by landscape ecology, topography or hydrology. The fact that the City of Pittsburgh now encompasses land on the north side of the Allegheny River, the south side of the Monongahela and the pie-slice between the rivers is a very good example. None of this is a problem until society and its political interests begin to think about the zoning and regulation of riparian land (land along a river or stream). The management and oversight of natural ecosystems can be instigated by environmental benefits or environmental threats, the latter being particularly actionable on the basis of public safety. The former, primarily an aesthetic and emergent economic value, is more difficult to pursue due to the bias of the Pennsylvania courts. (See Cyril Fox on legal strategies for preserving and conserving land, P. 91-102)

In the Figure i.2, there are three layers of information: municipal boundaries, watersheds and population concentrations in the year 2000. It is

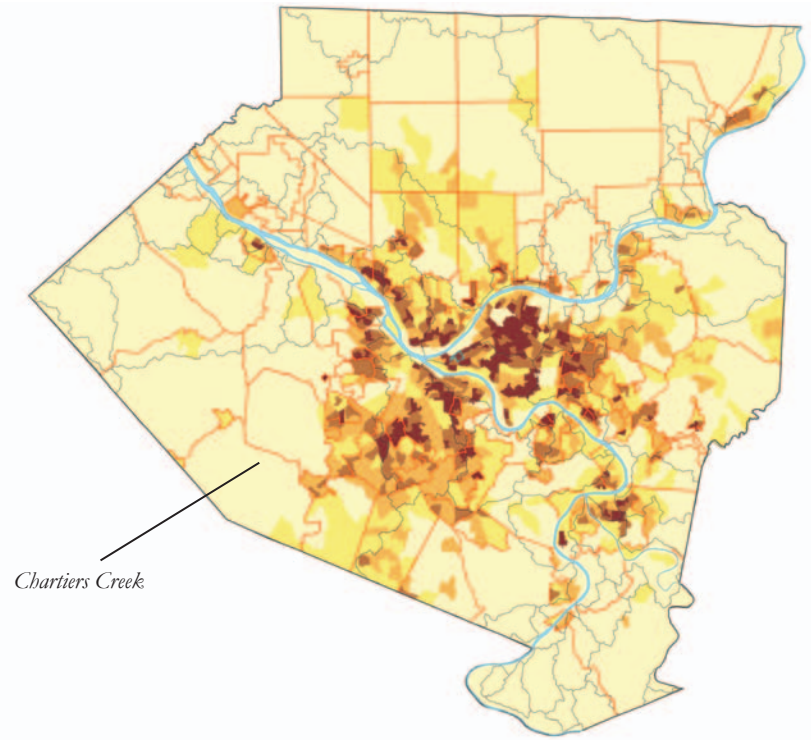


Figure i.2 Allegheny County population density in 2000 shown by census block group.

important to consider the relationship between population growth, steep hills and once wooded valleys, and urban stream flow. Development impacts both water quality and quantity. If you lived in the valleys and flood plains of Streets Run, Chartiers Creek, Girty’s Run or Pine Run, you would notice significant changes to stream flow in the last ten years as development patterns changed and growth occurred in the hills above these valleys. With each major flooding event, instead of offering money to people so they can move away from the floodplains, the politicians request support from the U.S. Army Corps of Engineers to defend homes from floodwaters. Uncontrolled development, coupled with the blatant (Pennsylvania Department of Environmental Protection approved) intent to ignore downstream impact of upstream development decisions, means we will have a century or more of flooding ahead of us. We typically react to the flooding with expensive, concrete infrastructure instead of sensible low cost proactive planning and land use controls, based on what we all now know about upstream development and downstream flooding. Our current controls do not work.

It is effective to look at the center of these maps, and particularly the large watershed of Chartiers Creek, which drains to the Ohio. Chartiers Creek is both a multi-state and multi-municipal watershed where upstream development adversely effects downstream communities that are close to the floodplain. The issue is not flood water—water is the effect. The issue is unrestrained development and its impact on hydrology and ecosystems, as well as the constraints of the political boundaries that we rely upon to manage development, public safety and the public good. Allegheny County sprawls outward from the City of Pittsburgh, with population density decreasing the further you get away from the city. It is in the north and the west that the region is seeing the most significant growth and development that is radically altering the forest cover and hydrological characteristics of the land, adding significant infrastructure costs and creating downstream flooding problems for the riverfront communities that are not benefiting from development in the hills.

According to the Western Pennsylvania Conservancy (1994), the natural communities of the county are now in a state of growth and recovery. But what are the conditions of present growth and the scope of recovery? Are remnant natural forests and recovering ecosystems of Allegheny County of any value? According to the text The Terrestrial Ecoregions of North America, Allegheny County is located in Appalachian Mixed Mesophytic Forest ecoregion which harbors “the most diverse temperate forests in North America.” The Appalachian Mixed Mesophytic Forest Ecoregion has been identified as globally outstanding and requires immediate protection and restoration. It is clear that we have amazing potential for recovery and stabilization of the natural ecosystems of Allegheny County. The question is how do we begin to quantify their value and understand their relative health?

As this report demonstrates, there are many strategies available to conserve, preserve and restore riverfront and supporting lands. These strategies consist of a mix of public and private actions. No one strategy nor one single institution may be appropriate for all of the land along the four rivers, but combinations of strategies can greatly improve the ecological health of Allegheny County’s river oriented location. The next step is to find public agencies, interested private citizens and private organizations willing to pursue them with vigor. This report is intended to provide tools

for developers and conservationists alike. There is a better way and we must find it together.

We return this report to the citizens, the activists, the visionaries and leaders of Allegheny County who are prepared to do the real work of change. Once ideas have taken hold and the thinking has shifted, there are decades of work ahead of us. With one hand to the earth and its waters, we must reach out with the other to all who can help. Organizations like the Allegheny Land Trust, Friends of the Riverfront, Pennsylvania Environmental Council, Penn Future and the Sierra Club have been staunch allies on this project. Our friends and colleagues have attended countless meetings and participated in on-the-water “river dialogues” with the explicit intent to support public discussion about change. Our future is green, our future is wet and our future is forecast by the choices we make every day.

Tim Collins  
January 2006

Executive Summary

The Landscape of Allegheny County

The landscape ecology of Allegheny County has developed in relation to a complex drainage pattern of streams and rivers. This pattern is the result of millions of years of erosion and is the major characteristic of our local landscape. We have four rivers and 52 second-order and higher sub-watersheds in the county. In 2006, we have to ask ourselves, what is this place we live in? What do we want it to become? After thirty years of economic hardship, the natural aesthetic condition of our hillsides and riverfront forests has begun to return. Our forests, rivers and streams are vital living elements—testaments to the relief that has been provided after a century of industrial impacts. In thirty years time, we have seen our forests explode with new growth, and our fisheries have returned to the point where we can host a Bassmasters tournament! Thirty years ago, we had only three species of fish in the rivers.

It is not all good news. In the last ten years, that we have seen new proposals to re-mine urban coal and harvest the maturing forests. There are new and powerful advocates for steep slope housing development, real plans for riverfront highways, and new housing developments downwind from the nation’s largest coke plant. We have a choice to make. We will either support the recovery of nature in Pittsburgh, or accept another generation of poorly planned, usurious land uses. If we want another generation of out-migration, it is ours by historic default.

Allegheny County covers an area of approximately 745 square miles. Its topography consists of rolling hills that are framed by four principal river valleys. Drainage flows from the north (Allegheny River), the east (Youghiogheny River), and the south (Monongahela River). These rivers join and become the Ohio, which flows northwest before turning southwards towards the Mississippi. Allegheny County contains 130 separate municipalities. Exactly one-half of that number, or 65 municipalities, border one or more of the four rivers. In addition to the four major rivers, there

are fifty-two (second order) tributary streams and sub-watersheds in the county. In fact, for every mile of riverfront (90 miles), there are more than twenty miles of accessible stream edge (2024 miles).

The Demographic Context of Allegheny County

To clarify the relationships between people, nature and economies, we have reorganized social, economic and housing census data for display at the stream-watershed scale in Allegheny County. Typically census-based social and economic data are displayed in terms of “block groups” which are subdivisions of a U.S. census tract. Mapping census data to the scale of regional stream-watersheds is intended as a general tool to enable the readers of this report to correlate watershed specific ecological opportunities and impacts with relative income, ownership and population density. If a stream is heavily impacted by urban sewage for instance, a high level of home ownership and median income would indicate a context in which the problem has good potential for resolution. In turn, a stream-watershed with significant impacts and low income and low home-ownership may very well necessitate state and federal support mechanisms that the previous example would not. In the case of a stream with a healthy ecology and the land-use characteristics that support sustained health, it makes good economic sense for the rich and poor alike to protect natural green infrastructure systems. Natural green infrastructure exists without costly human investment in the infrastructure and treatment systems that protect the environment from human impact. Forested lands, natural streams and floodplains that are protected from development insure long term water quality and manage water quantity in a manner that is economically efficient, culturally sustainable and aesthetically pleasing. Natural infrastructure buffers human impact on the landscape, up until the point of significant failure. It is at that point that municipalities need to make costly investments in engineered infrastructure systems to support dense human populations. Understanding the social, economic and ecological characteristics of each of the stream-watersheds of Allegheny County helps us understand where ecosystems services actually occur—who has the best environmental quality in the region, which in turn translates into the potential for public involvement to seek environmental equity in access, health and ecosystem services.



Figure i.3 The Monongahela River Corridor from the surrounding hilltops. The community of Hazelwood sits on the far side of the river. (Photo 3R2N)

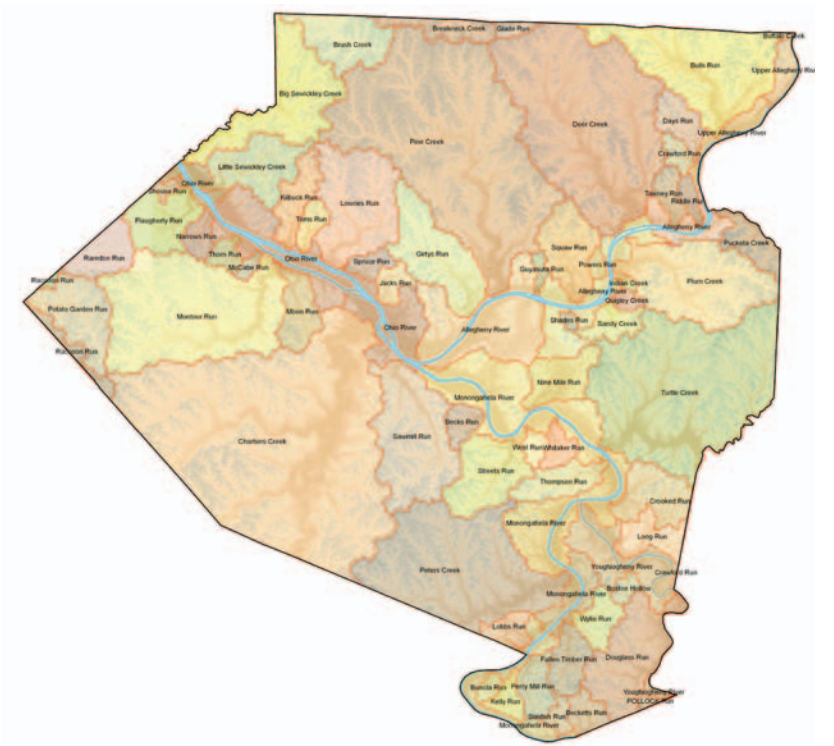


Figure i.4 The major sub-watersheds of Allegheny County.

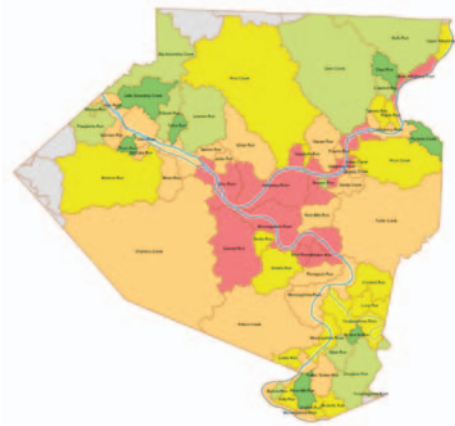


Figure i.5 Watershed Woodland Evaluation.

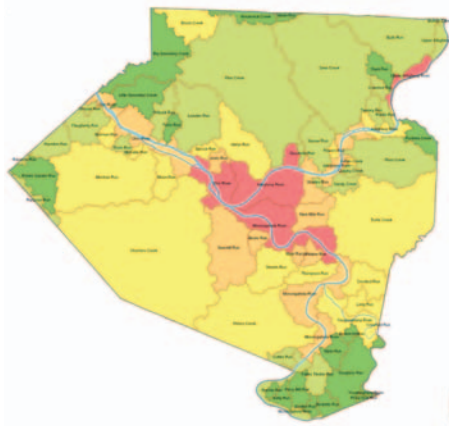


Figure i.6 Watershed Imperviousness.

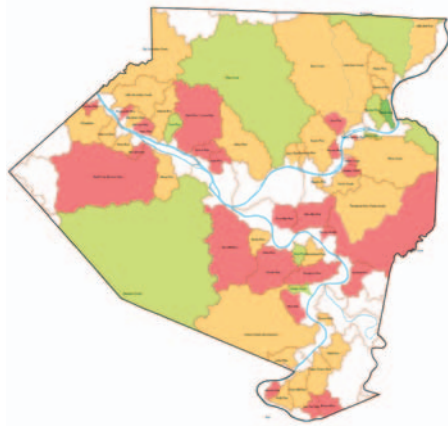


Figure i.7 Stream Condition - Invertebrate Health.

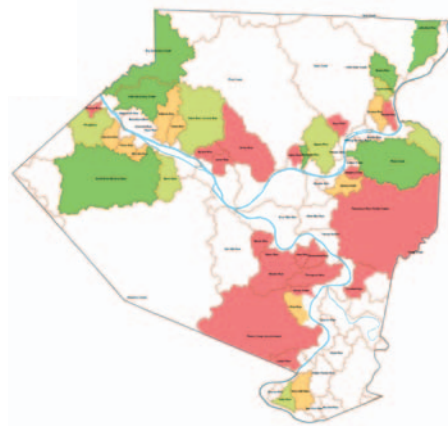


Figure i.8 Stream Condition - Index of Biotic Integrity.

### Woodland Watershed Analysis and Other Measures of Watershed Health

This section of the study looks at the entire hydrological network of Allegheny County at a watershed scale. On average, 86% of the woodland areas in Allegheny County are within 100 meters of streams, and 46% of the 100 meter stream buffer contains woodlands. As expected, the major rivers all had low scores for this analysis. The industrial development of the region was focused near the rivers.

**Fig i.6 Impervious surface:** The more developed an area is, the more impervious surfaces there are. Impervious surfaces increase the amount of runoff that enters streams and waterways and ultimately increase the amount of pollutants and sediments that enter those systems. In addition, the increased runoff can cause flooding and increase erosion. The percentage of impervious surface found in each watershed was calculated and mapped.

**Fig i.7 Invertebrate health:** Seventy-two regional streams draining into the main stem rivers of Allegheny County were evaluated through bio-assessment for the relative health of the macro-invertebrate community. This is a study of small insects in streams that display a range of tolerance and intolerance for urban pollutants. All but one stream displayed some degree of impairment. At the time the streams were sampled, 19% were slightly impaired, 42% were moderately impaired and 38% were severely impaired.

**Fig i.8 Index of biotic integrity:** Based on the results from the invertebrate study, fifty-three streams were identified as likely candidates for fish sampling. Electro fishing was conducted between 2001 and 2003; an index of biotic integrity score was developed from that data for these streams. The study showed that 17% of streams in Allegheny County rate as good, 17% as fair, 22% as poor and 43% as very poor.

**Fig i.9 Ecological Watershed Rating:** An average rating was calculated for each watershed by using the scores from the woodland watershed analysis, impervious surfaces and macro invertebrate stream condition data. The average ecological score provides an initial evaluation of the county's watersheds and should serve as guidance for future field studies and data collection. Arrayed on a point scale from 5 (best) to 1 (worst), only 4% of our regional watersheds had a good (5) rating, 34% were rated 4, 30% were rated 3, 30% were rated 2 and 2% rated in the worst group.

Despite changing land use characteristics, the watersheds on the north shore of the Allegheny and the eastern shore of the Ohio still look quite good; forest cover and structurally complex larger watersheds are ideal sites for attention. The other areas that show promise are found along the Monongahela River valley, with the best opportunities on the eastern shores of that river. It is forest cover and the lack of impervious surfaces that make these opportunities stand out.

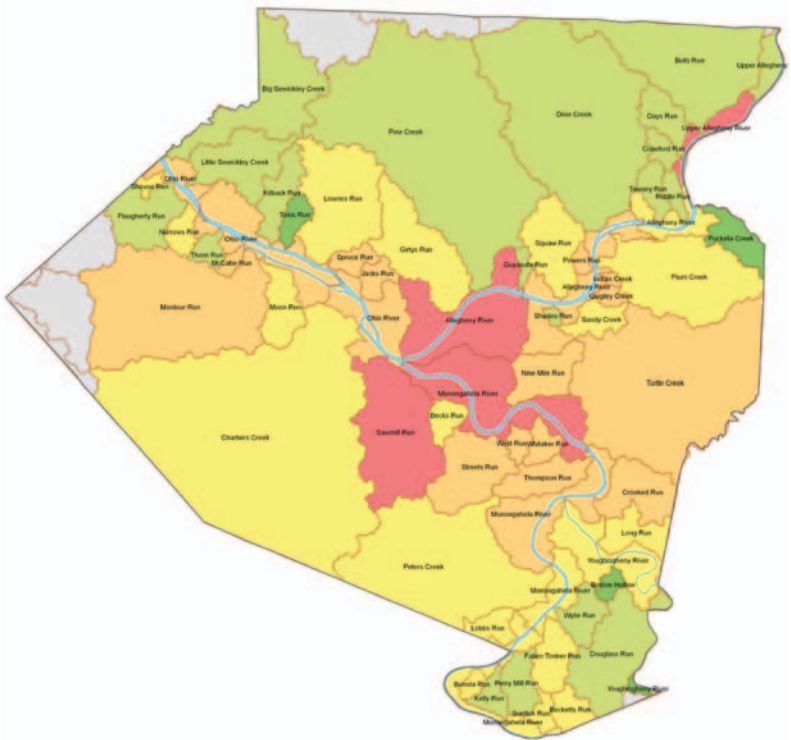


Figure i.9 Average Ecological Watershed Rating summarizes the four earlier measures.

### Defining the River Corridor

While the watershed section of the study looks at the entire hydrological network of the county, the river corridor analysis zooms in to examine only the sections of the county with a direct spatial relationship with the major rivers. The analysis attempts to measure the ecological functionality of the major river corridors using a combination of field data and GIS analysis of existing mapping.

Our study adopts the landscape ecology model of river corridors put forth by Richard Forman in *Land Mosaics: The Ecology of Landscapes and Regions*. The river corridor concept focuses on the entire landscape corridor through which the river flows. It is about the landscape in relation to the river. In a river corridor study, the “emphasis is on the vegetation corridor, its components, functioning and dynamics.”

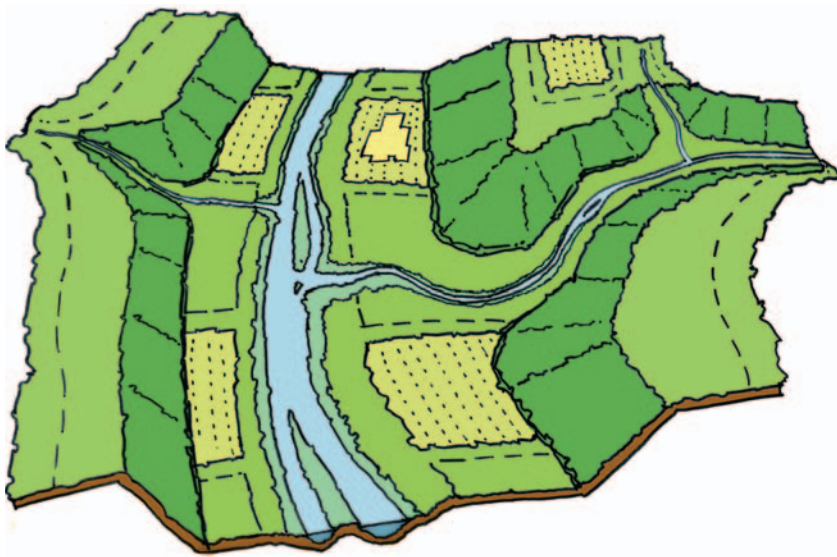


Figure i.10 A three-dimensional interpretation of the Forman river corridor model used as a theoretical basis for studying the river corridors of Allegheny County. (Jonathan Kline-3R2N, after Forman)

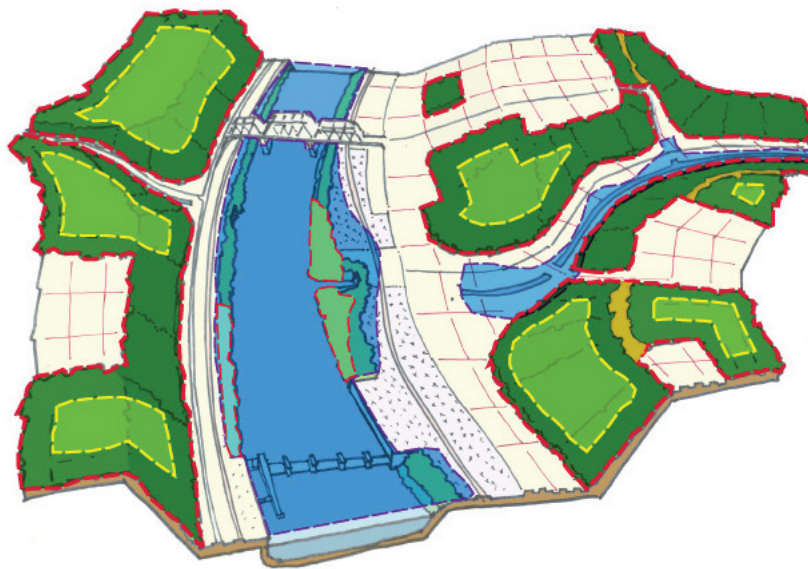


Figure i.11 The developed reality of Allegheny County's river corridors showing the measured aspects of the river corridor including bank data and woodland patches used to find remnant value. (Jonathan Kline-3R2N, after Forman)

The basic spatial characteristics of the optimum river corridor are:

1. Continuous bands of vegetation along river banks.
2. Presence of woodlands on hill slopes.
3. Continuous bands of upland interior woodlands above hill slopes.
4. Patches of interior native floodplain vegetation extending from river edge to hill slope base alternating with patches of ecologically compatible land uses.

The river valleys of twenty-first century Allegheny County are a long way from Forman's optimal river corridor model as shown in Figure i.10. Taking a restoration ecology approach, our study argues for the measurement of remnant value, looking for areas of opportunity for preservation, conservation and potential restoration. To do these analyses, we identified aspects of ecological value that relate to the model. Two major data sets for the county were used to identify areas of value in the river corridors. The first is the woodland patch GIS mapping for Allegheny County. The second is riverbank botany and geology point data sets collected by the 3 Rivers 2nd Nature project between 2000 and 2004. Analysis of the woodland patch data rates groups of patches for ecological value relative to one another. Analysis of the riverbank data rates riverbank edges for preservation and restoration potential. These two ratings give us a partial picture of ecological value within the river corridors and allow us to identify areas for further analysis and field study.

### Measuring the Woodlands

As stated earlier, the primary focus of a landscape ecology corridor analysis is on the vegetated areas in relation to the river itself. The first step in the analysis was to capture all of the woodland patches in the county that touch the river corridor zone defined in section five. The majority of the large intact woodland patches tend to be on the hillsides, related stream valleys or upland edges. The study attempts to identify areas of remnant value in a highly urbanized area. Strategies for grouping patches within close proximity were developed to help identify areas of value. Some fragmentation in the corridor is characterized by highly isolated patches such as steep hillsides in otherwise completely developed areas or woodlands within large city parks. By measuring and rating the patch groups, we were able to identify larger areas and systems of value within a highly

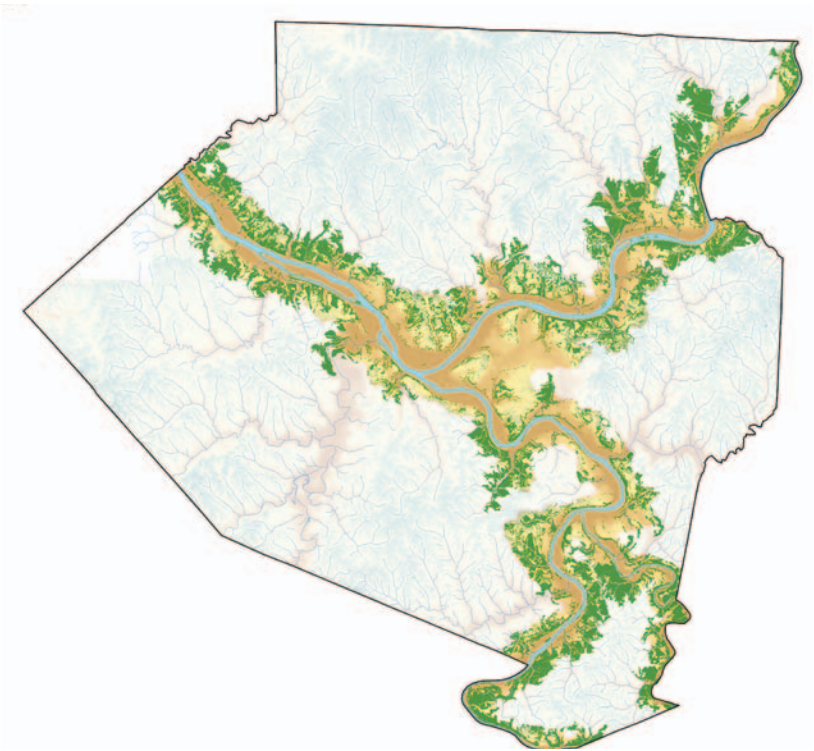


Figure i.12 The river corridor study area in gold was used to identify river corridor woodlands for further study.

fragmented post-industrial urban/suburban setting.

### Measuring the Riverbank Data

The 3 Rivers 2nd Nature botany and geology team collected data from boats, working their way up and down the three rivers, from the year 2000 to 2004. The geologists were interested in the bank - berm relationship. The berm is the gentle slope which first occurs at the transition edge between water and land. The more obvious slope indicates the riverbank itself, as well as the material composition of that bank. The slope and type of "soil" dictates the potential for natural recovery. Botany data included identification of wetland species wherever possible, although the primary interest of the botany team was in forest areas with no breaks in the tree canopy and the presence of a vegetated under-story. This was the best condition possible. It was examined against 6 diminishing conditions, beginning with the lapse of under-story species and culminating in



Figure i.13 In order to identify and study areas of remnant woodlands in the river corridor, proximate woodland patches uninterrupted by roads were grouped together and tested for a variety of ecological characteristics. Each green indicates a distinct group of proximate woodland patches. Paved surface roads are shown in dark red.

the absence of any vegetation whatsoever. More generally, the botanists analyzed for dominant and subordinate species in each 1/10 of a mile section, as well as the total percentage of vegetation, the continuity of forest cover vegetation as well as the relative impacts of invasive species such as Japanese knotweed, Purple loosestrife and Garlic mustard.

We have ranked specific woodland areas along the mainstem river corridors for overall ecological significance. We used the relative size of the forest, its contiguity with other forested areas, as well as its proximity to rivers and streams. In addition, we used interior forest as a point of reference, in that it is the best indicator that is known for potential biodiversity. Given the relatively fragmented reality of any urban forest, Allegheny County and its cohort of municipal governments should first attempt to protect lands that seem both ecologically valuable and accessible. From

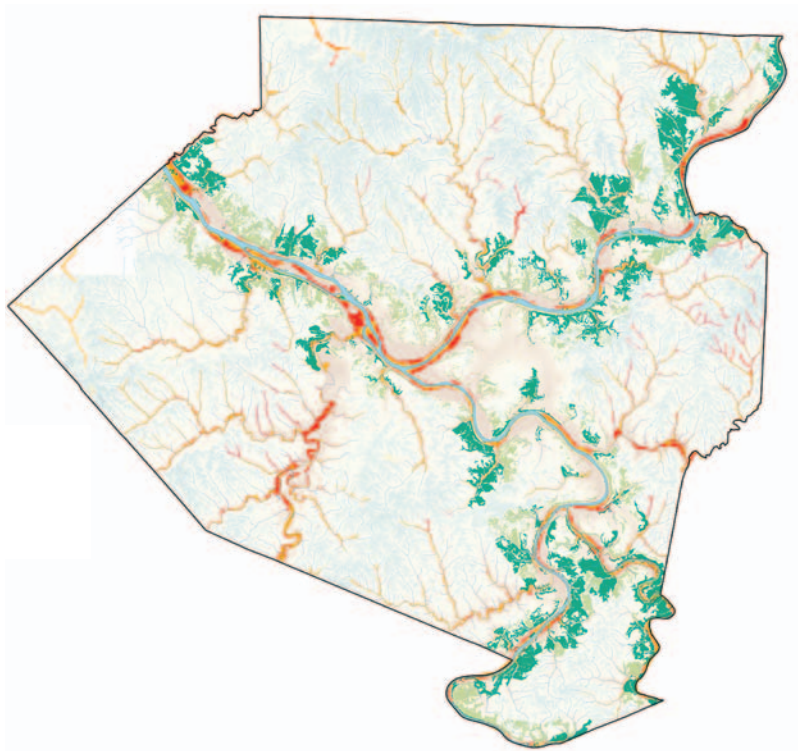


Figure i.14 Woodland patchgroups which touch the 500 year floodplain are shown in dark green, indicating remnant connections between riparian areas and woodland patches.

that foundation of forest, it is possible to devise a restoration plan that assures natural amenities and services for generations to come. In function, the region could establish a series of protected natural stream valley and steep slope forest corridors.

#### Identifying Areas of Opportunity

As stated earlier, the primary focus of our landscape ecology corridor analysis is on the vegetated areas in relation to the river itself. The unit of measure for the analysis is the woodland patch. Forman defines a patch as “a wide relatively homogeneous area that differs from its surroundings” (Forman 43). The majority of the analysis that follows is based upon spatial and geometric analysis of woodland coverage mapping, based upon planimetric aerial photography done in 1996. No field data is included in

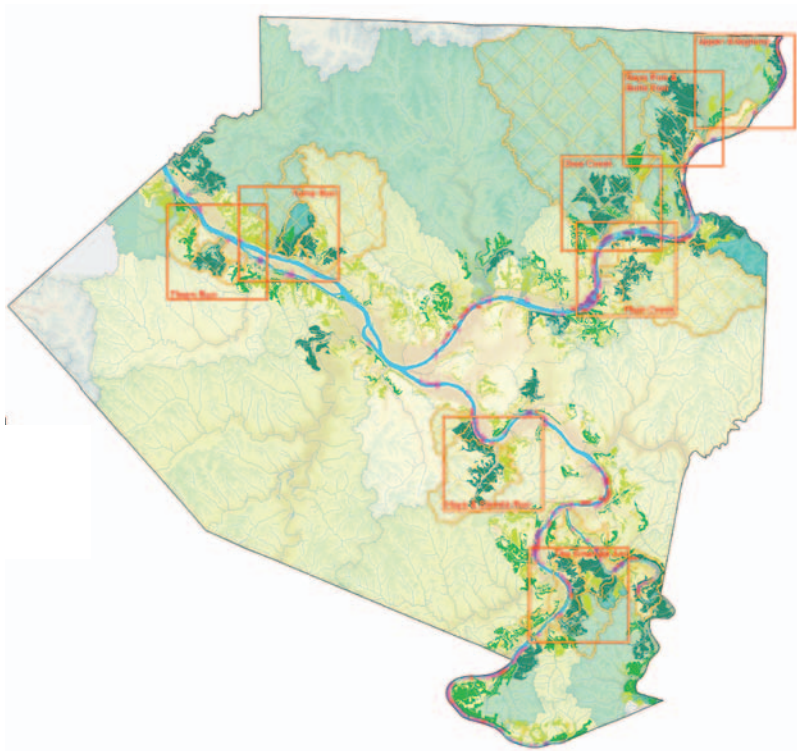


Figure i.15 The river corridor study concluded with a summary map rating the woodlands and indicating areas of riverbank restoration and preservation potential overlaid on the watershed ratings. This map was used to identify a series of river corridor opportunity areas, indicated with red boxes.

the data set, and time and scope of the project did not allow for any field data collection in the actual woodland patches. In Figure i.14 you can see the significant patches of forest cover that still connect our regions sub-watersheds to the historic floodplains of our main stem rivers. In Figure i.15 you can see the areas that were deemed to be the most significant in our study; these are our river corridor opportunities, and they include:

#### The Emerald Arc

Named by architect Rob Pfaffman at one of our public space design charrettes, this is a multi-watershed site, defined by the forested hillside on the east side of the Monongahela. The watersheds in this area fall within/cross the boundaries of Port Vue Borough, Liberty Borough, McKeesport, Versailles Borough, South Versailles Township, Elizabeth Township and Lincoln Borough. Approaching this site from downriver in a boat, the

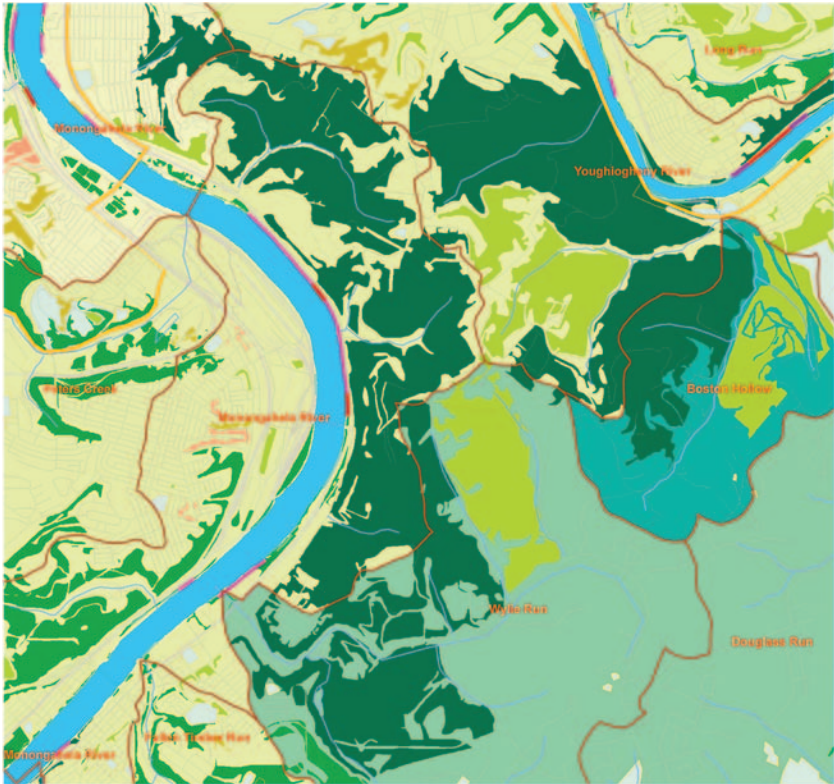


Figure i.16 One opportunity area examined in greater detail has been dubbed “the emerald arc.” This largely undeveloped area between the Monongahela and Youghiogheny Rivers contains very large woodland patches and numerous small first-order streams.

sheer scope and expanse of this forest is a breathtaking counter point to the industrial systems across from it. More importantly, it is a significant green link between the Monongahela River and the Youghiogheny River. This site can be characterized by significant forest or agricultural cover from the tops of the watersheds (the site drains multiple small streams to both rivers) down to the historic floodplains just before they open out at the mouths of the streams. There are important hillside connections to the riverbanks on the Youghiogheny and a site that could be restored along the Monongahela. The river edge studies indicate excellent restoration/preservation potential on both riverbanks as well.

The Hays and Streets Run Watershed

The woodlands on either side of Streets Run and the top of Hays hilltop between Glass Run and Becks Run form an extremely large woodland

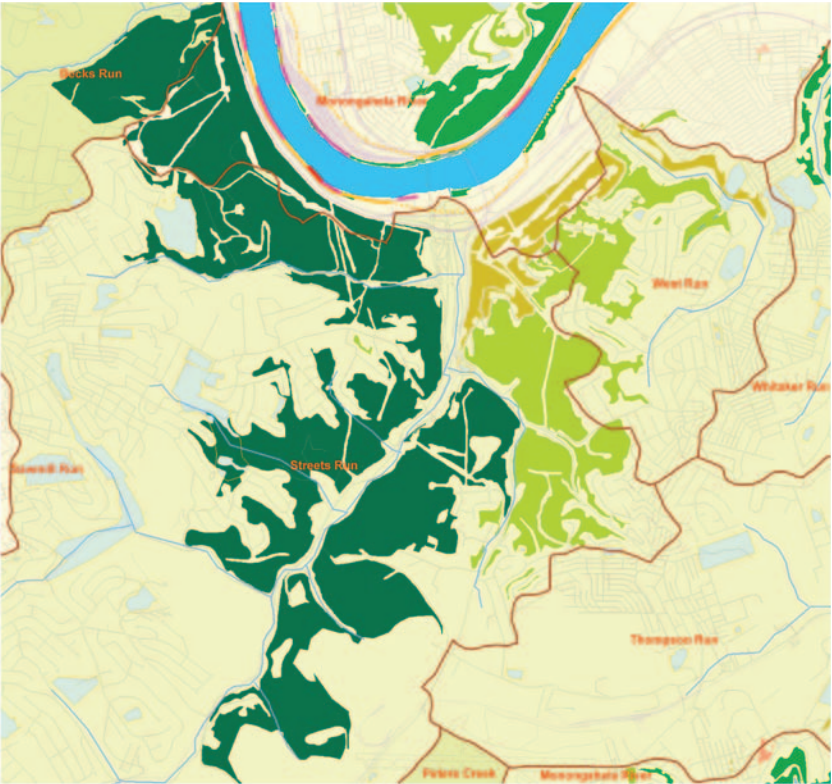


Figure i.17 The Hays and Streets Run watershed includes the most significant forested property within the City of Pittsburgh. This watershed has an amazing amount of contiguous steep slope forests and wooded stream corridor that run up the Streets Run Valley. The Hays and Streets Run Watershed is likely the most complicated intermunicipal watershed system in the county.

patch system in close proximity to the most heavily urbanized areas of the county. The watershed areas falls within/crosses the boundaries of Baldwin Borough, Brentwood Borough, West Mifflin Borough, Whitehall Borough, Mount Oliver Borough and the City of Pittsburgh. Very little of this land is managed open space or park and the system has no direct connection to the Monongahela at this time. This watershed can be characterized as developed at the upper end with extensive forest and some suburban development at the mid to lower ends. The south shore of the river has signification areas of riverbank that have a high preservation priority.

Toms Run

Toms Run is a small watershed on the north shore of the Ohio River that is in excellent shape despite some development at the upper end. The

lower end includes lands held for conservation purposes by the Western Pennsylvania Conservancy. The opportunity area watersheds fall within/cross the boundaries of Franklin Park Borough, McCandless Township, Ross Township, Ohio Township, Kilbuck Township, Emsworth Borough, Glenfield Borough, Aleppo Township, Sewickley Heights Borough and Sewickley Hills Borough. This watershed is characterized by low density development at the top of the watershed along one leg of the stream and contiguous forests on the other leg, from the top right down to the lower end of the valley. There is also a significant development planned, which would bury the stream and fill the lower valley. The connection to the Ohio River floodplain is dominated by infrastructure, roadway and railway beds.

Thorn Run

Thorn Run is a small watershed on the south bank of the Ohio River with significant forest cover worth protecting. The connection to the Monongahela river is minimal. The opportunity area watersheds fall within/cross the boundaries of Moon Township and Coraopolis Borough. The watershed is characterized by good forest from the top through the midsection, with urban development at the bottom of the stream valley before it drains to the Ohio where a vegetated edge returns. This is one of many small forested watersheds in this part of the county that are under development pressure. Development is being exacerbated by recent changes to zoning laws that allow the development of housing on steep slope properties.

Plum Creek

Plum Creek is a watershed with significant woodlands and some parkland in the upper slopes. The watershed falls within/crosses the boundaries of Plum Borough, Penn Hills Township, Verona Borough, and Oakmont Borough. At the mouth of the river, lie an abandoned steel mill and acres and acres of flood plain which was filled only recently. The connection between the mouth and the forested upper watershed is complicated by light-industrial development. The watershed can be characterized in terms of an upper watershed with a mix of forest and increasing urban development. Significant flooding occurred on the stream recently and will continue to get worse if land use controls are not introduced in the upper watershed section.

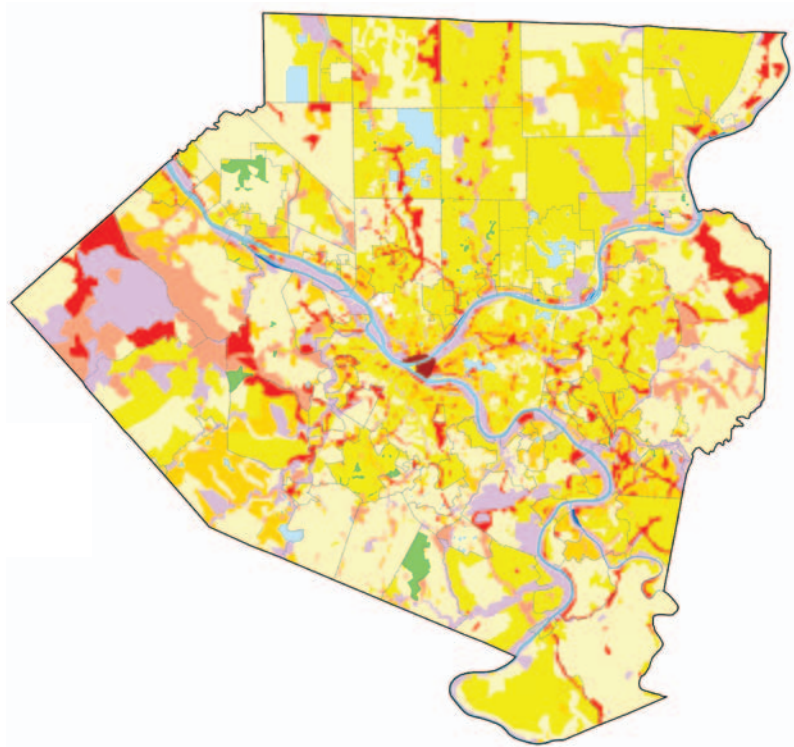


Figure i.18 A generalization of the individual municipal zoning codes to show general zoning in Allegheny County.

#### Deer Creek

The Deer Creek watershed is located on the north shore of the Allegheny River. The watershed falls within/crosses the boundaries of West Deer Township, Richland Township, Indiana Township, Harmar Township and Hampton Township. This is an important complex stream system. The watershed can be characterized by its suburban development and some parkland at the top of the watershed, with significant mid-level forest and remnant wetlands. Important areas of this watershed are currently under final planning for a new shopping mall.

#### Days Run and Bulls Run

Days Run and Bulls Run are watersheds on the north shore of the Allegheny River. These watersheds are both significant in size and in terms of inter-connectivity. Both watersheds can be characterized by signifi-

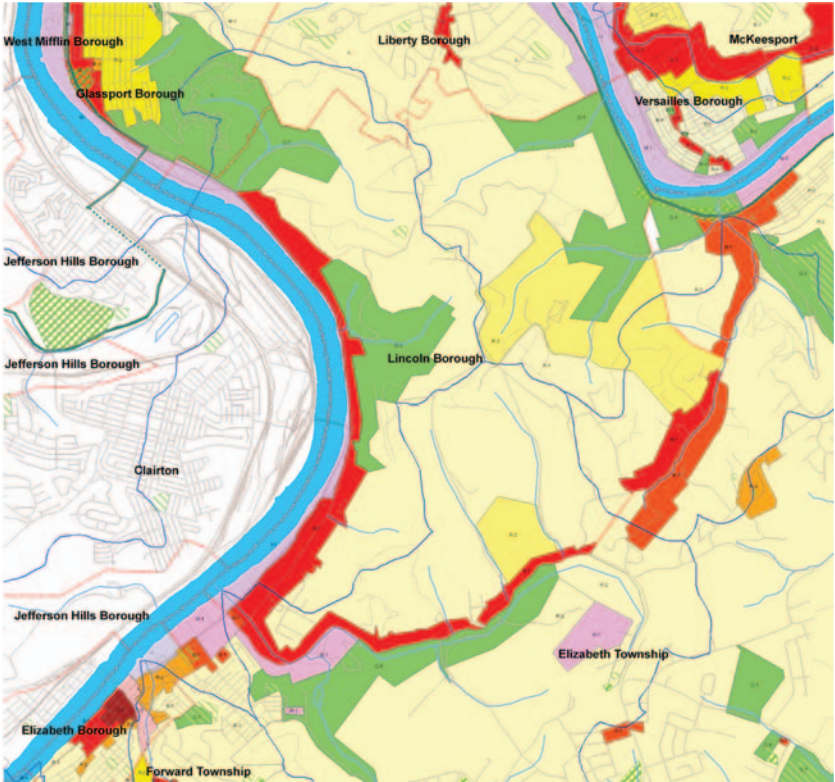


Figure i.19 The Emerald Arc crosses a number of separate municipalities, each with distinct local zoning. As a test, the zoning of this area was analyzed for its conservation characteristics. Areas in green indicate some form of conservation or public space zoning.

cant forest cover from the top to the midpoint of the watersheds. Days Run has good forest continuity right through the lower part of the valley as well. The watersheds fall within/cross the boundaries of East Deer Township, Frazer Township, Tarentum Borough, Harrison Township, Fawn Township and West Deer Township.

#### Upper Allegheny

At the top of the county along the north shore of the Allegheny lies a first order drainage which exhibits some of the best river edge forest cover with existing park space in the county. This area is characterized by well-forested first order streams that empty right into the Allegheny. The area falls within the boundaries of Harrison Township.

Of the sites identified, there are four that are significant indicators of our

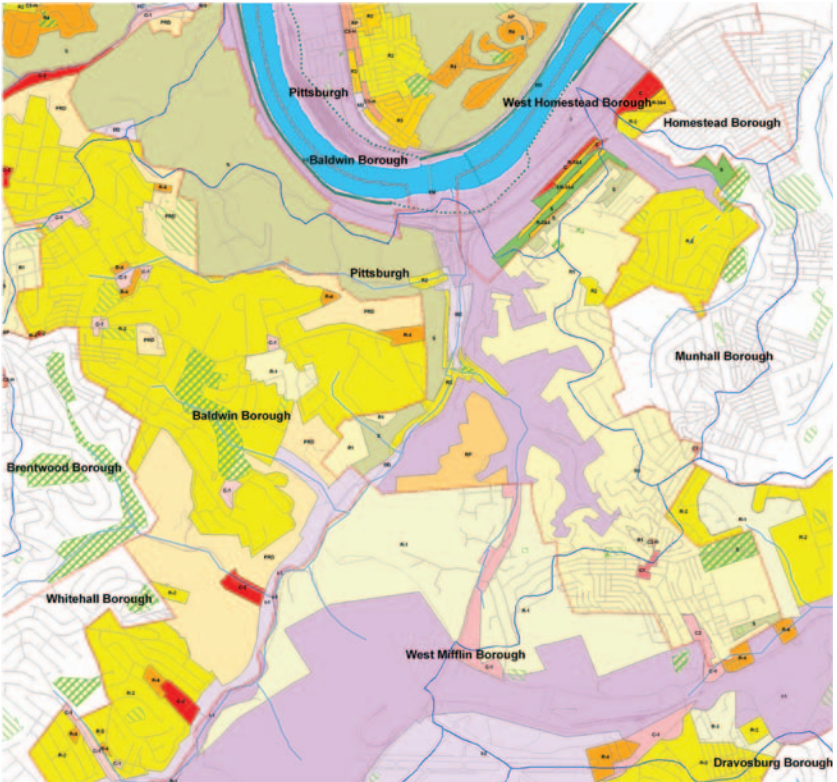


Figure i.20 The Hays area is part of four separate municipalities with the majority of the wooded hill top contained within the City of Pittsburgh. Recently 380 acres of the 635 acre Hays site was rezoned by the city from parks and open space to a specially planned district intended for a large development including a horse racing track, casino and mixed-use development.

current land use planning and zoning controls. These include the Hays and Streets Run Watershed, the Toms Run and Thorn Run Watersheds and the Emerald Arc area. Toms Run and Thorn Run are sites of value with normal development pressures. Thorn Run is impacted by housing development and Toms Run is impacted by a single commercial interest that is prepared to fill the valley and destroy the stream to meet its development goal. The Hays site includes a portion of the left bank of the Monongahela River as it flows toward Pittsburgh. Much of the land along and near the river bank is undeveloped. As one moves away from the bank, the land remains relatively flat for some distance and then begins to slope upward, culminating in steep upward slopes. Scattered residential and commercial development currently characterizes the land more removed from the bank. Becks Run flows into the river about halfway through the site. This watershed is governed by four different municipalities, three of

which front on the river. The ecological assessment for this site indicates substantial woodlands in the highest or “most significant” category, both near the riverside and along Becks Run. Several sections of both banks of the river contain riverbank botany with the highest preservation priority. The Emerald Arc site is located between two rivers. It is governed by ten different municipalities, all of which front on one or both rivers. These municipalities have 16 different zoning classifications. Only three municipalities have zoning classifications titled “Conservation.” The land at and near the confluence is developed for industrial, commercial and residential uses. As one moves down the near banks of each river (left for the Youghiogheny and right for the Monongahela), the land slopes upward, often rather steeply. Here are successfully regenerating forests, often of considerable beauty. Scattered residential and commercial development characterizes the slopes along the Youghiogheny. Our other three sites, Deer Creek, Plum Creek and the Upper Allegheny flood plain area, have good forest cover and the normal range of conflicting interests.

### Regulation and Conservation

This section identifies two basic legal strategies for preserving, conserving or restoring land along the riverbanks of the four rivers in Allegheny County. One of these strategies is dependent on public or private ownership and the other on public regulation. Ownership controls require an owner with the desire to devote land to preservation or conservation uses. Regulatory controls require a governmental agency with appropriate authority to adopt the particular measures described.

Each of the 130 individual municipalities in the county has its own authority to adopt land use controls. A generalized map of zoning classification throughout the county shows 12 basic zoning district classifications. Within these generalized classifications, the details of zoning districts can vary widely from municipality to municipality, depending on the degree of control and the sophistication of the agency charged with administration. The many smaller municipalities, coupled with Pittsburgh, pose difficulties for regulation of the river corridors.

### Ownership Options

Publicly owned land includes parks, state and municipal forests, preserves, open space reserve lands, natural areas, boating and fishing access areas, tax delinquent properties owned by the county, municipalities or school

districts, and other land held in public ownership. Private conservation organizations may also own land that is maintained for conservation, preservation and restoration purposes. The organization may own the property outright, or it may own a more limited interest, usually known as a conservation easement. A conservation easement serves to restrict the development options of the property’s owner. Other types of private ownership options include fee ownership by conservation organization, less than fee ownership, public ownership of less than fee interests, private ownership of less than fee interests.

### Regulatory Options

Regulatory options for land preservation or conservation exist where outright ownership strategies might not be appropriate. Private property is subject to public regulation if it serves a legitimate public purpose, such as promoting public health, safety, morals or the general welfare.

The federal government has several regulatory regimes that can affect the quality of the riverside environment. These include limits on development in flood plains under the National Flood Insurance Program Act, activities that adversely affect protected animal and plant species under the Endangered Species Act, historic sites and historic districts under the National Historic Preservation Act, and reductions in wetlands areas protected by the Clean Water Act. Most federal and state environmental programs are essentially single-purpose programs, designed to protect one element of the ecology, rather than the ecology of a region or area. For example, endangered species receive protection where members of that species are present and wetlands are protected where wetlands exist. Otherwise, these programs offer little of value to an overall plan for the protection of riverbanks and adjacent lands. However, where these protected features are present, these regimes can be quite important. The burden of protection is shifted from the county or local municipalities to the federal or state government, along with the demand on government resources that protection requires. In evaluating riverside lands for protection, one must be ever alert to the possibility of federal or state protected characteristics.

The Pennsylvania Department of Environmental Protection enforces a program regulating structures and activities in wetlands under the authority of the Dam Safety & Encroachment Act. Unlike the federal government, Pennsylvania’s regulations are based on its inherent police power.

Municipalities possess a wide range of regulatory powers under the police power that, used properly, can greatly advance the preservation and conservation of the river shores and riverside lands. Police power regulations are intended to guide and control private land use and development to protect the public health, safety or welfare. These regulatory powers include subdivision controls, which govern the initial development of land into individual lots and zoning controls, which regulate the use of land, watercourses and other bodies of water, the size and bulk of buildings and other structures, the amount of open space that must be left between structures, and the density of population and type of development in the different areas, or zoning districts, of the municipality.

A substantial amount of land abutting the banks of our rivers is steeply sloped and contains recovering forest growth. These steeper slopes are often prone to landslides, particularly following development that affects the existing slope or vegetative cover. Pennsylvania courts have recognized that a zoning ordinance may restrict forestry and vegetation clearing activities to preserve woodlands, steep slopes, landslide-prone areas and wetlands. All of these land characteristics are present in many areas along the riverbanks and abutting land.

This section closes by examining the Emerald Arc and the Hays and Streets Run areas along the Monongahela River to illustrate how a combination of strategies can be employed to further development, conservation, preservation and restoration of the lands along the rivers. This section looks at the full range of ownership options, regulatory options and municipal police power tools that are available to those among you in municipal, private and non-profit sectors that might consider taking action. They are offered as suggestions to encourage further discussion, experimentation and implementation of new strategies for urban ecological restoration and the promotion of public space on the four rivers within Allegheny County.

The acquisition and maintenance of land or conservation easements by public or private entities involves a commitment of resources, both financial and personal. It may be too much to expect any single entity to acquire and maintain all of the land necessary or appropriate for the preservation of the river banks and related areas within Allegheny County. However, a partnership between the county, local municipalities and various conservation organizations, working from a long range, coordinated plan, could

make it possible to acquire a variety of ownership interests along the rivers that would provide protection and public benefits. The Allegheny County Parks Department could serve as coordinator of land and conservation easement acquisition and maintenance, with contributions from local municipalities of services, funds and land for areas within their boundaries. Trail groups are already responsible for acquiring and maintaining rights-of-way. Land trusts provide a vehicle for acquiring both fee title and conservation easements on private land along the riverbanks and on adjacent wetlands, hillsides and hilltops appropriate for preservation and restoration in connection with river preservation.