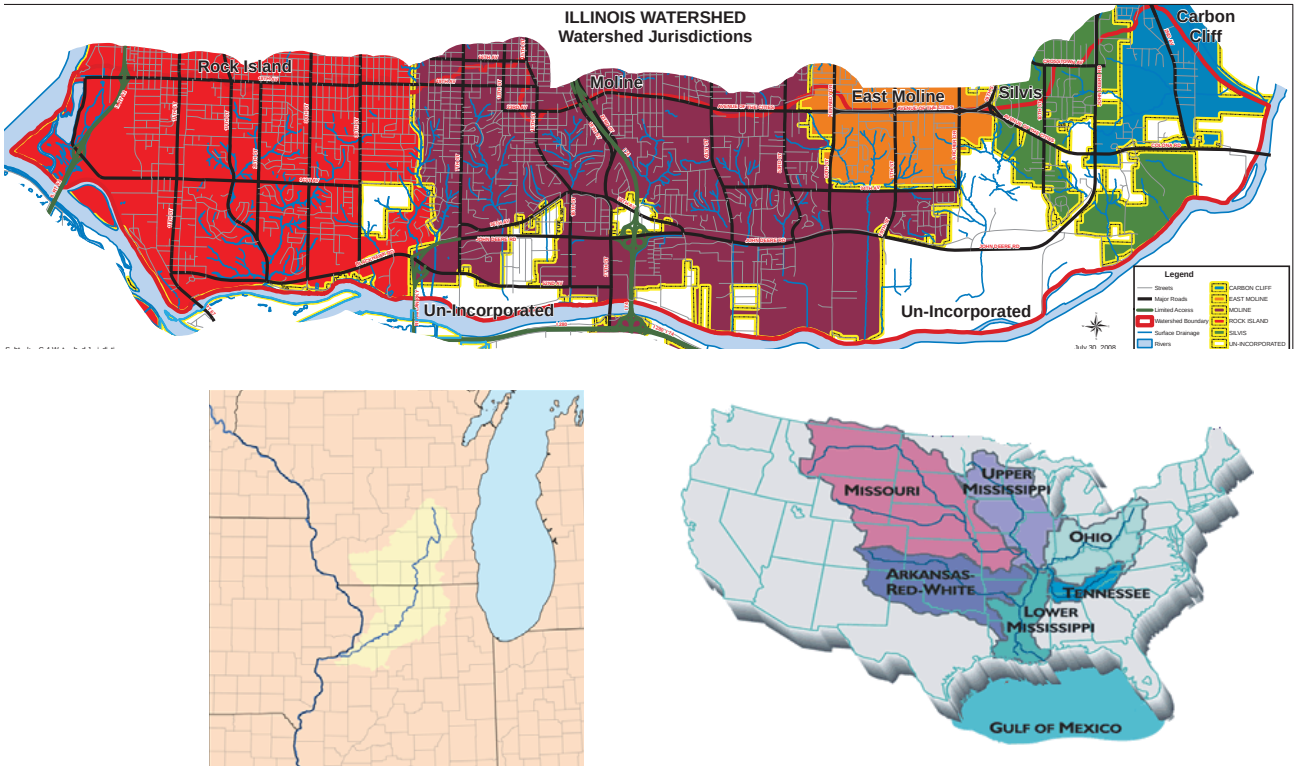
1 introduction

1.1 THE ROCK RIVER RAVINES

The Rock River Ravines watershed is the area of land where water that falls as rain or snow flows across the landscape, enters our streams and wetlands, and ultimately drains into Mississippi River. The 25 square mile (16,068 acres) area within the Rock River Ravine Study Area watershed extends from the confluence of the Rock and Mississippi Rivers in the west to the I-84/Colona Road crossing over the Rock River in the east. Its northern boundary traces a ridge line that runs east to west and generally follows 18th Avenue in Rock Island, 23rd Avenue in Moline and Avenue of the Cities in East Moline and Silvis. From this point the boundary angles northeast to 2nd Avenue in Carbon Cliff and then turns southeast and follows the railroad line to the Rock River.

The Rock River Ravine watershed includes areas of the communities of Rock Island, Moline, East Moline, Silvis, Carbon Cliff, and Rock Island County, as well as a number of other public and private landowners. The majority of the watershed area is developed as residential and commercial land uses, but also includes significant acreage of undeveloped floodplain and natural areas in the eastern third.

The watershed includes over eighty-seven miles of stream and more than eighty-eight acres of wetlands. From west to east, there are a number of unnamed ravines and river tributaries that drain the surrounding uplands.



The Rock River Ravines study area (top) includes subwatersheds of the Rock River watershed (bottom left), which is part of the Mississippi River watershed.

1.1.1 THE WATERSHED OVER TIME

In the early 1800s, the watershed landscape consisted of scattered oak trees, prairies, and wetlands. Before settlement, the Rock River Ravine streams flowed cool and clear, and were surrounded with dense ground vegetation and scattered trees. In the 1800's, the fertile soils and openness of the oak tree and prairie landscape attracted farmers, who converted these lands, including the draining of wetlands, for agriculture. In the early 1900's, urbanization of settlements began and continued with suburbanization following World War II. Today, approximately half of the watershed has been converted into older neighborhoods and newer suburban development interspersed with commercial and industrial land uses. The rest of the watershed remains in agricultural land use.

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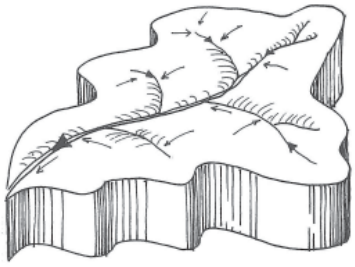
These landscapes have been restored to resemble presettlement condition.

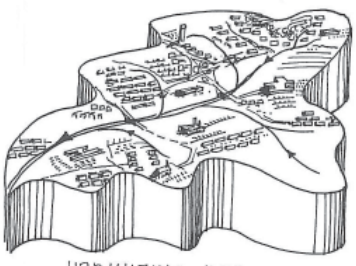
1.1.2 IMPACTS OF WATERSHED DEVELOPMENT

Under natural conditions, most of the water that falls on earth is used by plants, evaporates into the air, or seeps into the soil and becomes groundwater. Water that does not evaporate or infiltrate into the ground is called runoff. As a watershed develops, natural areas are converted into fields, lawns, rooftops, roads, and parking lots, which reduces the amount of land available for the natural evaporation or infiltration of water into the ground. Water that falls on these surfaces quickly flows to our streams through the stormwater drainage and sewer system.

A watershed is the geographic area of land that drains water to a particular stream, lake or wetland, and is defined by the topography of the landscape. The watershed includes not just the surface of the land, but also the area below the surface where water that infiltrates into the soil flows toward the receiving stream or waterbody as underground flow.



A WATERSHED DRAINS AN AREA OF LAND

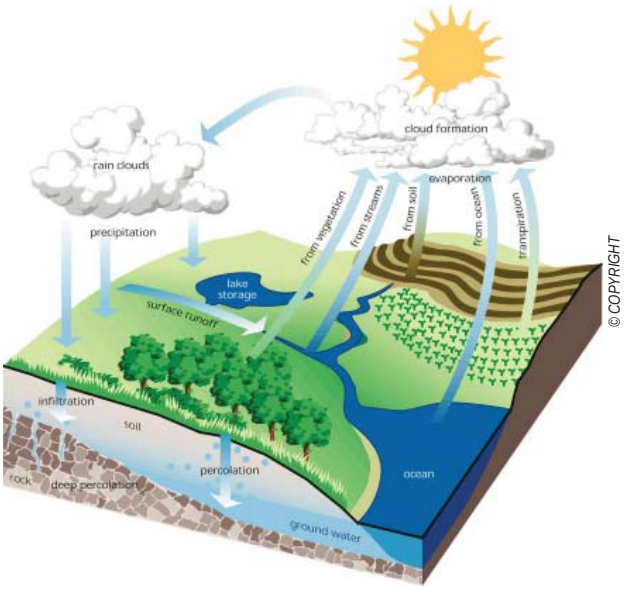


URBANIZING WATERSHED

This rapid drainage of water to our streams results in what is called “flashy” hydrology. A “flashy” hydrology means that the water level in the stream rises very quickly during a storm and falls quickly afterward. Low flows are considerably lower and high flows are considerably higher.

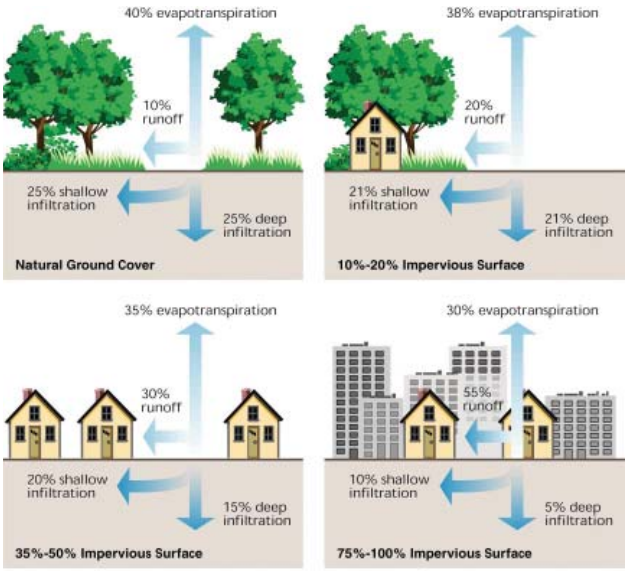
High flows that can not be conveyed by the stormwater system can result in flooding damage to property of watershed residents. Heavy flows can dislodge, damage, and erode around stormwater infrastructure components such as culverts and discharge pipes. High flows can also move and carry logs, branches, and other debris which can be deposited in large debris jams that are very difficult to dislodge. These debris jams can cause erosion problems as water finds its way around them.

As a result of this flashy hydrology, streams and wetlands receive large pulses of water in shorter periods of time, causing erosion of the streambed and/or streambanks. As the streambed erodes over time, the channel deepens and becomes more entrenched, in a process called downcutting. If the streambed is composed of materials that are more resistant to erosion such as gravel or stone, then the flow will tend to widen the channel by eroding the streambanks, rather than deepening it. As the stream erodes away, it takes property with it and exposes and damages infrastructure such as roads and bridges.



The hydrologic cycle.

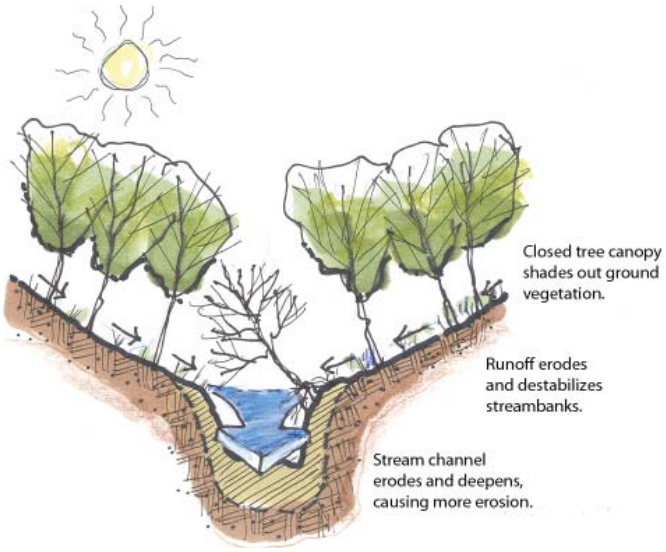
High flows can cause stream bank erosion and loss of property.



Greater imperviousness results in a greater percentage of rainfall leaving as runoff and less infiltrating into the ground.

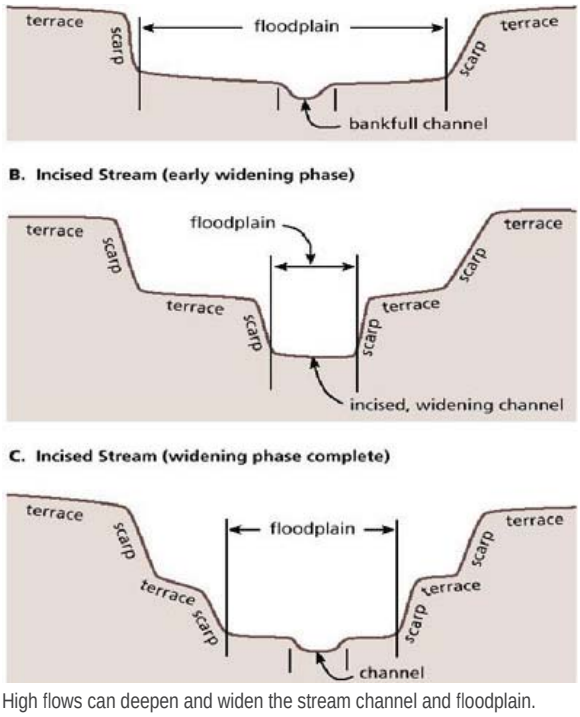
Erosion of the streambed or streambanks also results in heavier loads of sediment being transported and settling out of the water column and into the channel, which makes the habitat unsuitable for some species.

Streambanks are further destabilized by the type and density of vegetation along the streambanks. Due to the introduction of plants that are not native to Illinois, and to the lack of natural landscape processes such as fire, deep-rooted ground vegetation that used to stabilize stream edges have been replaced with non-native plants and dense woods that shade out good vegetation and do not adequately stabilize the stream banks.



High runoff can cause erosion and incision of stream channels.

Erosion can damage infrastructure, such as storm sewer pipes.



High flows can deepen and widen the stream channel and floodplain.

In addition to increasing the volume and rate of runoff, pollutants such as oil and grease, road salt, eroding soil and sediment, metals, bacteria from pet wastes, and excess nutrients (nitrogen and phosphorus) from fertilizers are washed from streets, buildings, parking lots, construction sites, lawns and golf courses into the streams and lake. This kind of pollution is called nonpoint source pollution and reduces the quality of our streams for aquatic life, as well as for human uses such as fishing, swimming, and bird watching. These pollutants accumulate as the water flows downstream and eventually begin to degrade the quality of the Mississippi River for similar and other uses. In this way, every small bit of pollution adds up to a very large problem. And in this way, every small action to reduce the pollution problem adds up for the greater good for everyone.

An eroding stream channel before (left) and after restoration (right).

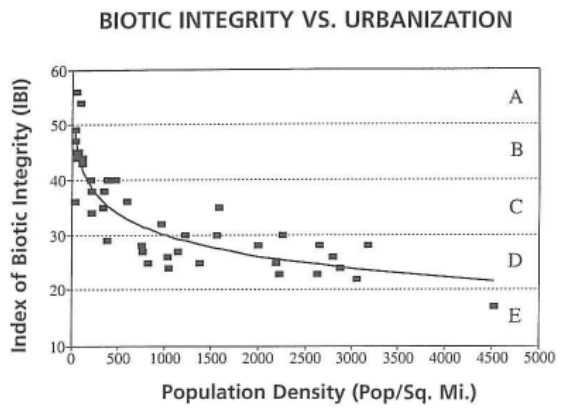
Impervious surfaces, such as those identified in the top photo, contribute pollutants to rain water runoff.

Severe erosion is common within the Rock River Ravines.

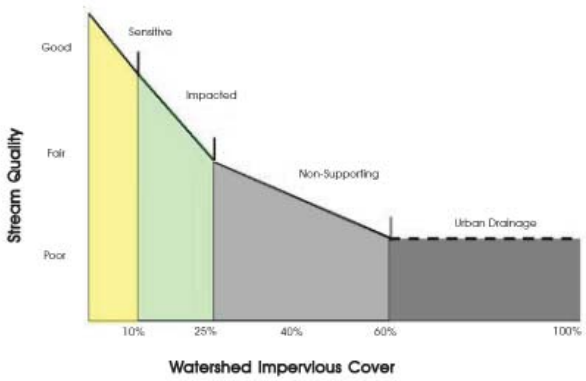
In addition to chemicals and other substances picked up from the landscape, non point source pollution includes other measures such as temperature, acidity, and the amount of oxygen in the water. Aquatic organism, including fish and insects that are critical links in the food chain, need oxygen that is dissolved in the water to breathe. Low flows and non-point source pollution can cause the dissolved oxygen levels in the water to fall below healthy levels. When this happens, some plants and animals will die, in some cases causing large fishkills, and others will leave that location to try to find more habitable waters.

Water temperature can also cause problems. Many fish and other aquatic animals require cool or cold flowing water to survive. As rainwater flows across urban surfaces and through the sewer system, these surfaces warm the water causing the overall temperature of the receiving stream to be too warm for many aquatic plants and animals. This water can also be either more acidic or more alkaline than is healthy for these organisms to survive.

A number of studies have demonstrated the impact of urbanization of a watershed with stream health. In one set of studies, the number of people per square mile of a watershed was found to be inversely related with the biological health of a stream, as measured by the Index of Biotic Integrity (IBI). In another set of studies, the percentage of impervious cover of a watershed (streets, rooftops, parking lots, etc.) was inversely related to stream quality. In sum, these studies show that urbanization has a significant and direct impact on stream health and water quality.



Urbanization negatively impacts the biological quality of streams.

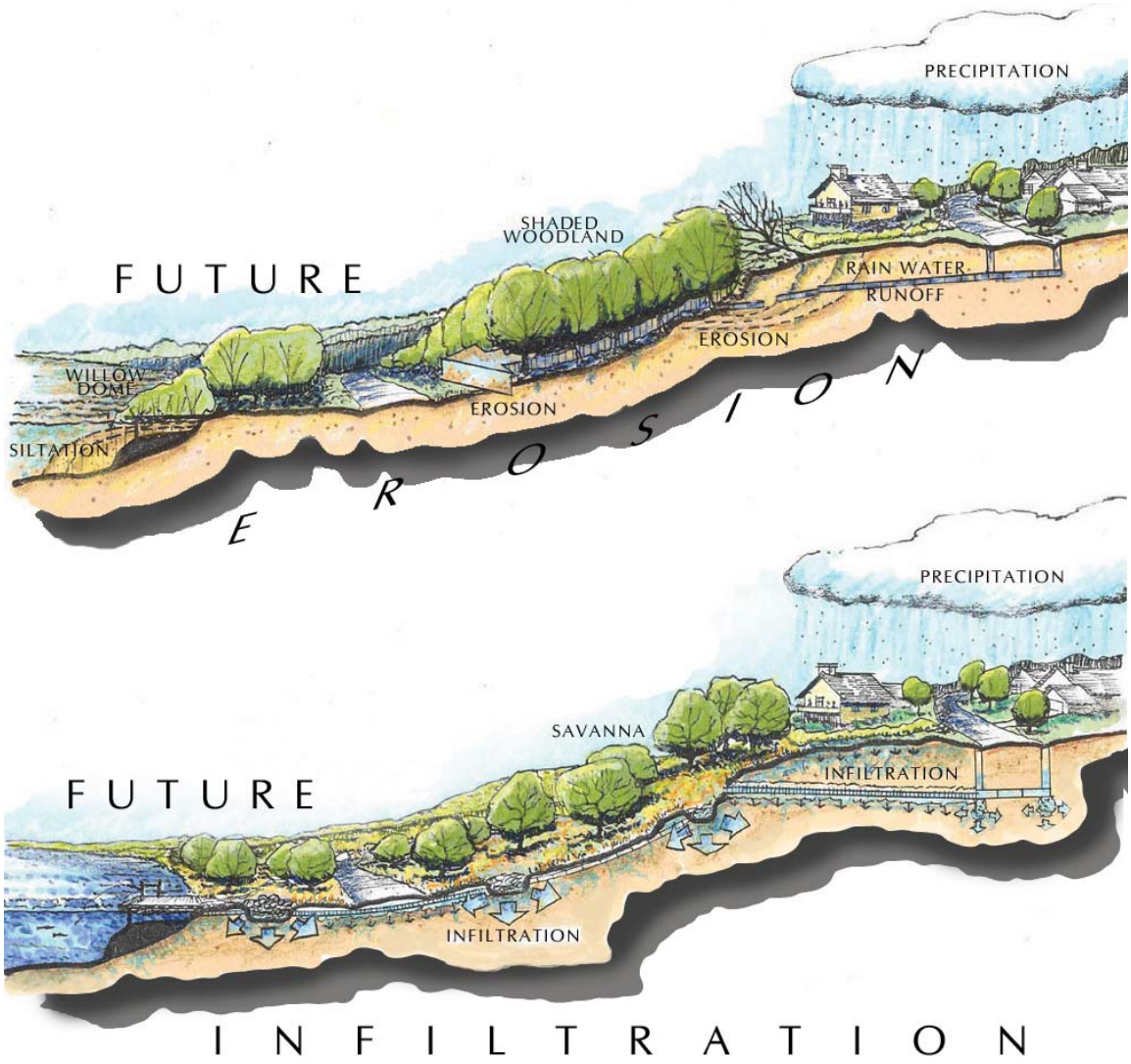


Impervious cover also negatively impacts stream quality.

1.1.3 WHERE WE GO FROM HERE

As illustrated in the previous section, the health of the Rock River Ravine systems is a direct reflection of land use activities throughout the watershed. How we develop the watershed, and how we live in and manage our urban landscape, have a dramatic effect on the condition of watershed resources. These impacts affect not only the residents and visitors of Rock Island, Moline, East Moline, Silvis, and Carbon Cliff, but all of the communities that depend on the Rock and Mississipi Rivers to provide water, recreation, food, economic well-being, or other values.

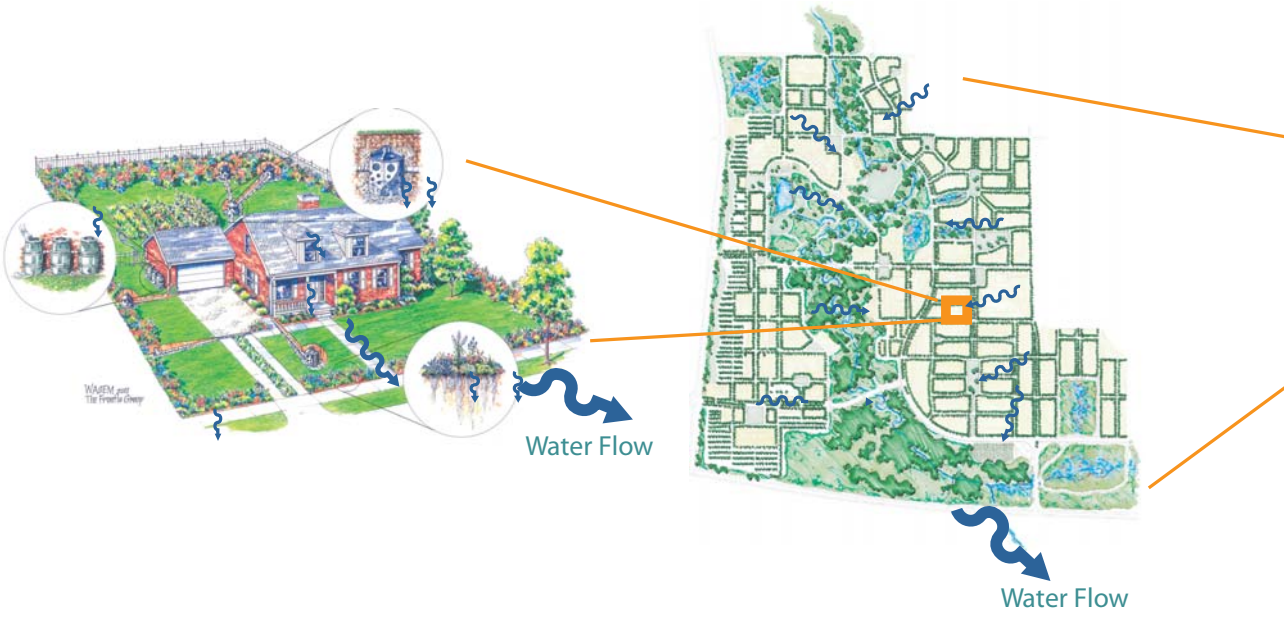
Fortunately, there is something we can do, and this watershed plan outlines the actions that need to be taken to restore watershed conditions to a healthy state. The possible futures of the watershed depend largely on how we manage stormwater and how we manage the natural and urban landscape, as illustrated below. The business-as-usual trajectory, using conventional development, stormwater management, and landscape management practices will result in continued erosion and degradation, or elimination of watershed resources. However, a new trajectory that incorporates proven and environmentally-friendly stormwater and landscape management practices, can reverse this trend and begin the road to recovery.



Possible futures include one of continued high runoff and streambank erosion, and another of infiltration and stable streambanks.

There is no single fix for watershed problems. They are the result of thousands of different decisions and actions made across the 16,068 acres of the watershed, and it will take an equal number of decisions and actions to improve the watershed. Every landowner, business owner, resident, public official, public works employee, golf course superintendent, farmer, teacher, banker, and bus driver—EVERY SINGLE PERSON who lives, works, and plays in the watershed—can take simple and positive actions to help improve it for you, your children, and your children's children.

Take your yard as an example. If you replace 10 square feet of your turf grass lawn with native plants, you'll need to mow, fertilize, and control weeds on 10 square feet less. This translates into less air pollution from lawn mowers, less fertilizers and pesticides making their way into the stream, and reduced yard maintenance needs (and costs) for you. Now consider the impact of all of your neighbors, the entire town, and the entire watershed doing the same thing. The combined impact of many small actions has a significant positive impact on overall health of the watershed.



Individual Lot Scale

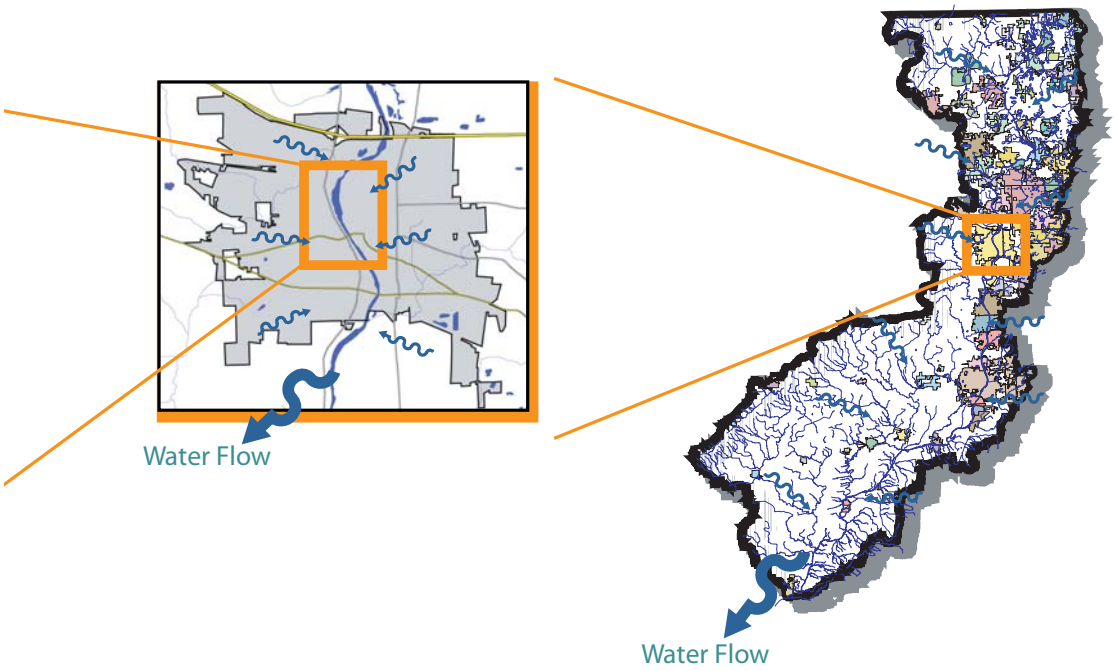
Every lot is part of a larger watershed. The degree to which water is properly managed at the lot scale is the degree to which downstream flooding, water quality, and habitat degradation can be avoided. Many practices described in this plan can be applied on individual residential and commercial lots, including green roofs, rain gardens and bioswales, native landscaping, and permeable paving. Although governed by community standards and regulations, implementation of lot-scale BMPs is generally the responsibility of property owners.

Neighborhood Scale

Greater benefits can be achieved through application of a conservation design approach at the neighborhood and campus scale. Proper planning at this scale ensures that onsite natural areas, water quantity, and water quality are protected. Conservation design and other approaches protect onsite resources from disturbance. Stormwater management approaches that mimic natural infiltration, evaporation, and runoff processes will protect offsite resources from the impacts of urban runoff.

Likewise, actions can be taken at every scale, from the individual lot to the neighborhood, town and watershed, to postiively impact watershed resources, as illustrated in the graphic below. Just as each landowner can do their part, everyone who works at these scales also must take responsibility for improving the watershed.

This watershed plan is a first step in helping you understand what you can do to help restore and highlight the unique and valuable resources of this wateshed. The watershed plan and planning process are described in the following section.



Community Scale

Communities are responsible for land use planning and thus have the ability to implement green infrastructure plans through comprehensive planning, development standards, easements, and planning assistance. Communities should establish stormwater and natural resource standards based on regional and watershed goals. Conversely, traditional community landscape and subdivision standards often can discourage environmentally-friendly conservation design in favor of more traditional development practices.

Watershed Scale

Since a watershed is composed of many communities, the actions of each of the communities will affect their watershed neighbors. Analysis of water resources and attention to goals at the watershed scale will ensure full protection of the region's lakes, streams, and wetlands. Green infrastructure plans established at the watershed scale can create ecologically functioning open space networks that can also serve as recreational resources.

1.2 ABOUT THIS WATERSHED PLAN

1.2.1 PROJECT PURPOSE

The Rock River Ravine Watershed Plan provides specific guidance for addressing impacts and for preserving and enhancing the valuable resources of the watershed. If no action is taken, our watershed resources will continue to degrade. Water quality will continue to decline, our streams and streambanks will continue to erode and impact property and infrastructure, our natural areas will continue to lose their rare qualities as habitat, and the Rock and Mississippi Rivers, sources of water and recreation to many, will continue to be neglected.

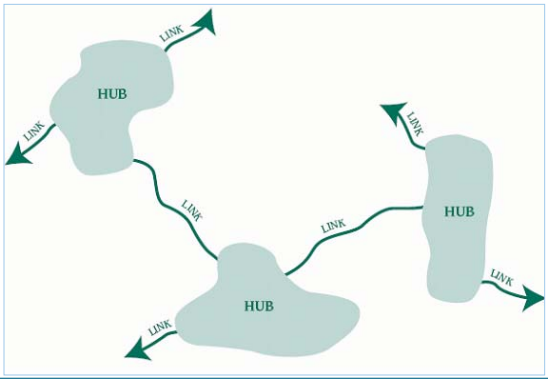
This plan provides information and a set of recommendations for municipalities, developers, residents, county and state agencies, and others to effectively plan and conduct land use and other activities in a way that is appropriate for protecting watershed resources. It provides guidance for comprehensive planning, development standards, capital improvement budgeting, green infrastructure preservation, natural resource restoration, land management, and water quality improvement, with an overall focus on water resources. Watershed planning also brings communities together to cooperate to protect and improve the land and water resources they share and impact.

1.2.2 PROJECT FUNDING

Funding for the Watershed Plan was made available through a variety of funding sources including grants to River Action from the McKnight Foundation, Scott County Regional Authority, Moline Foundation, American Water, Cargill, and Twin States, as well as local matching funds from foundations, city, and county governments, businesses and individuals. Participating municipalities, interest groups, and concerned citizens contributed time to provide information and participate in the watershed planning process.

Green infrastructure: On the local scale, municipal or neighborhood, green infrastructure consists of site-specific best management practices (such as naturalized detention facilities, vegetated swales, porous pavements, rain gardens and green roofs) that are designed to maintain natural hydrologic functions by absorbing and infiltrating precipitation where it falls.

On the regional scale, green infrastructure consists of the interconnected network of open spaces and natural areas (such as forested areas, floodplains and wetlands, greenways, parks and forest preserves) that mitigate stormwater runoff, naturally recharge aquifers, improve water quality while providing recreational opportunities and wildlife habitat.



Conservation design: A method for developing land that conserves the green infrastructure elements of a site while providing for development at full density on the remainder of the site. Conservation design typically includes the use of stormwater management measures that filter and infiltrate runoff on site.

1.2.3 WATERSHED PLAN ELEMENTS

One of the key federal programs supporting watershed improvement projects is the Nonpoint Source Management Program, also known as Section 319 of the Clean Water Act. This program supports a wide variety of watershed activities including funding for education, watershed planning, demonstration projects such as streambank stabilization, and monitoring to assess the success of nonpoint source implementation projects. To be eligible for Section 319 funding, however, watersheds are required to have a Watershed Based Plan that addresses the following nine elements:

1. The causes and sources of water pollution.
2. Estimate of water quality improvement expected from implementing plan recommendations.
3. Describe best management practices and critical areas where those practices are needed.
4. Estimate the amount of technical and financial assistance needed to implement the plan.
5. Public information & education component.
6. Plan implementation schedule.
7. Set of milestones for measuring plan implementation progress.
8. Set of indicators to determine whether loading reductions are being achieved.
9. Monitoring component to evaluate the effectiveness of the implementation efforts.

1.2.4 PROCESS AND PLAN ORGANIZATION

The watershed planning process consisted of six primary steps that translate into the six main sections of the plan document. This plan was developed concurrently with the plan for Duck Creek in Iowa, and the watershed planning committee was made up of representatives and stakeholders from both watersheds. Thus, the watershed goals and objectives discussed in Chapter 2 are intended to apply to both watersheds. The following general steps were used to develop this watershed plan.

1. Assemble Planning Committee

A successful watershed management plan depends on the interest, input, commitment, and engagement by watershed stakeholders. A stakeholder is anyone that has an interest or 'stake' in the watershed. For the Rock River Ravines watershed, this included municipal representatives, special interest and citizens groups, and other interested parties, collectively known as the Watershed Planning Committee. Committee meetings were held regularly beginning in January 2008 and continuing through the end of 2008. Each meeting presented information and sought stakeholder input regarding major elements of the plan.

2. Identify Issues and Goals

During the first Watershed Planning Committee meetings, watershed stakeholders developed a list of watershed issues and opportunities and prioritized them via a voting process. The major topics of concern included: watershed planning, implementation, and coordination; water quality; stream restoration and management; stormwater management; natural resources and habitat; and watershed education and stewardship.

3. Inventory and Assess Watershed Resources

The project planning team assessed watershed conditions and prepared of a series of watershed maps based on data, studies, inventories, and stakeholder input. The assessment includes information on stream corridor conditions, stormwater infrastructure, water quality, land use, wetlands, and other relevant information. This information not only provides a snapshot of current conditions but also serves as baseline data for comparing future watershed assessments.

4. Build Best Management Practice Toolbox

After the watershed condition was determined, a best management practice toolbox was assembled to identify the range of actions needed to improve watershed resources. This toolbox includes practices in the areas of policy and planning, development standards, stormwater management, erosion control, streambank stabilization, yard and landscape management, habitat restoration, natural area preservation, and flood reduction. It also provides a number of details for implementing recommended practices.

5. Develop Action Plan

The effectiveness of the Rock River Ravines watershed plan will be largely dependent on the quality of the action plan. The action plan provides the "who, what, where and when" for watershed improvement and includes general and site-specific recommendations. The site-specific action items are tied to a particular location in the watershed or along the stream corridor, and they include details such as area, cost, responsibility, schedule, and priority.

6. Devise Monitoring and Evaluation Plan

A monitoring and evaluation plan was developed to provide stakeholders and other implementers with a way to monitor watershed conditions and track whether meaningful progress is being made towards plan goals. The monitoring plan includes milestones, parties responsible for monitoring, and the frequency and method for collecting data.

Monitoring is an important part of improving watershed resources.

1.3 USING THIS PLAN

1.3.1 WHO SHOULD USE THIS PLAN

This plan has limited usefulness without the dedication and commitment of watershed stakeholders to the improvement, restoration, management, and stewardship of watershed resources. As the primary land use, development, and infrastructure authorities in the watershed, municipal and county officials and staff have a significant amount of the responsibility for plan implementation. County, state, and federal agencies also have a significant role in watershed plan implementation, by approving and supporting projects with funding, and by providing technical information, tools, and resources to assist local authorities and watershed organizations in their efforts. Watershed residents and landowners must also accept responsibility for managing their own land and water resources, for identifying watershed problems and opportunities, and for working with others to implement this plan.

All of these people and organizations will need to work together to successfully protect and restore the Rock River Ravines, to ensure long-term watershed stewardship, and to share the responsibilities, costs, and benefits of watershed improvements. Plan implementation will also depend on a watershed organization to oversee, guide, coordinate and monitor watershed activities on behalf of the stakeholders. This organization typically forms as an outgrowth of the Watershed Planning Committee with support coming from a variety of state and local agencies as well as local land use authorities and decision makers. This is the primary mechanism for the general public to be involved in watershed activities, to support the implementation of the watershed plan, and to voice their concerns and celebrate their successes in restoring watershed resources.

1.3.2 HOW TO USE THIS PLAN

For those unfamiliar with watershed planning and management, this document may appear overwhelming. There are pages of information to absorb, complicated tables to navigate, and hundreds of costly recommendations that an individual could not possibly begin to implement. But there are simple, straightforward actions that each person can take today to help improve the watershed.

First, remember that every action, no matter how small, can have an impact and improve watershed resources. Next, read the Executive Summary at the beginning of the plan to get a good overview of what this plan is all about. For additional details, browse the Table of Contents and flip to the relevant section, or refer to Table 1.3.2.1 and the suggestions that follow to help find more information. Table 1.3.2.1 on the following page is intended to help you understand priority actions to be taken today to help improve watershed resources.

1.3.3 TO FIND...

... what this plan is intended to accomplish, read about the watershed goals and objectives in Chapter 2, Goals and Objectives.

... detailed information about watershed resources and conditions, read the watershed inventory and assessment in Chapter 3, Watershed Inventory and Analysis.

... what sorts of education and outreach is needed in the watershed, refer to Chapter 5, Information and Education Plan.

... the watershed problems that are close to a specific home or business, first refer to the maps in Chapter 3 to find out which Subwatershed Management Unit and stream reach is closest to the area of interest. Once the location in the watershed has been determined, the maps and text in Chapter 3 can help identify what issues that area is experiencing.

... what types of actions can be taken, in general, to improve the watershed, then read Chapter 4, Watershed Best Management Practices Toolbox and Chapter 5, the Action Plan. Table 1.3.2.1 can help narrow the search.

... what types of actions can be taken that can help fix the problems in a specific area, turn to the maps and tables in Chapter 5, Section 3, Site Specific Action Plan. Within the table, each recommended action has a two digit identification number (SMU and ID#) under the heading "Recommendation Identification #." For example, the identification number C4 refers to an action in Subwatershed Management Unit C and action number 4. These two digit identification numbers are used to locate the action on the SMU maps in Chapter 5. They can also be used to locate additional detailed information such as cost, responsible party, and the action's impact on watershed resources for that particular action recommendation in Chapter 6, Implementation plan.

... what kind of funding is available for watershed projects, turn to Chapter 7 Watershed Resources.

Table 1.3.2.1 Priority Actions by Stakeholder Type

If you are a	.... the top priority actions to be taken include
Resident	1. Stabilize streambanks and ravine slopes, restore native riparian buffers, reduce the density of trees, and remove excessive debris from the stream corridor. 2. Dispose of yard and household waste appropriately, not into stream channels or into storm sewers or ditches. 3. Capture rain water runoff using rain gardens, rain barrels, or other practices, and avoid discharging stormwater directly into stream corridors.
Business or Institution	1. Manage your property appropriately by using environmentally friendly lawn care practices and by regularly cleaning parking lots and other paved areas. 2. Install stormwater best management practices to help slow and cleanse stormwater runoff from your property.
Government Official or Staff	1. Manage, retrofit, and stabilize the stormwater management system including detention basins, culverts, and especially stormwater discharge points (pipes and ditches). 2. Adopt the watershed plan recommendations into local plans, policies, and regulations. 3. Preserve and restore green infrastructure areas including stream corridors, floodplains, natural areas, and wetlands. 4.Require the use of better stormwater management, conservation design, and low impact development practices for new and existing development that slows, filters, infiltrates, cools, and cleanses stormwater runoff. 5. Modify and use planning and development standards, policies, and capital improvement plans and budgets to protect and enhance water quality. 6. Manage parks, streets, and other publicly managed land appropriately by using environmentally friendly lawn care practices, by cleaning streets and other paved areas regularly.
Developer or Homebuilder	1.Use better stormwater management, conservation design, and low impact development practices for new and existing development that slows, filters, infiltrates, cools, and cleanses stormwater runoff.
Land Manager	1. Manage and restore watershed natural areas including wetlands, former wetlands / hydric soil areas, and stream corridors. 2. Manage your property appropriately by using environmentally friendly lawn care practices and by regularly cleaning parking lots and other paved areas.