Planning for Green River Corridors

Environmental Stewardship Program

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Oakland County Planning & Economic Development Services

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A Resource Guide for Maximizing Community Assets Related to Rivers

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Overview

Why This Manual?

The information and tools provided in this manual are designed to assist communities blessed with river corridors to take a fresh look at their riparian resources. By using these techniques and approaches, communities can begin to leverage the opportunities a river or stream flowing through the landscape provides their residents.

The information is targeted to community officials, planners, engineers, environmental groups, and citizens. Additionally, those who own land along the river, as well as river enthusiasts such as anglers, paddlers, and nature-lovers can benefit from this information.

Riparian (Ri*pa"ri*an)
Adjective
1. Of or relating to or located on the banks of a river or stream; "riparian land".

This manual includes the following chapters:

1. **Riparian Corridors: An Opportunity to Connect to Nature** An introduction to the opportunities presented by riparian corridors.

2. **Riparian Corridors in the Landscape of Southeast Michigan** Information about the geography, ecology, and history of riparian corridors.

3. **Land and Identity: A Planning Process for Riparian Corridors** Options for planning for riparian corridor enhancement and protection.

4. **Conservation and Restoration of Riparian Corridors** References to best practices for the preservation and ecological management of riparian resources

5. **Cultural Resources: Building Awareness and Connecting with the River** Options for bringing people and the river together.

6. **The Role of Community Planning in Riparian Corridor Protection** Information about the role of local community planning and regulatory measures that can help protect riparian resources.

7. **Funding Riparian Initiatives** Information about funding opportunities for work in riparian areas.

8. **Case Study: Riparian Planning and Management in the Rouge Green Corridor** Discussion and lessons learned from a riparian corridor project in southeast Oakland County.

9. **Summary & Additional Resources** The importance of developing and building river identity and communications tools are discussed. A case study of riparian corridor planning and management in the Rouge Green Corridor in Southeast Oakland County is presented. Finally, a summary and additional resources are given.

The Clinton River flows through urban, suburban, and natural landscapes in the cities of Rochester and Rochester Hills, providing community amenities that can be leveraged through planning and promoting the river as a resource.

Riparian Corridors: An Opportunity to Connect to Nature

Chapter 1 Includes:

- Riparian Corridors: A Missed Community Asset and Opportunity
- What Makes Riparian Corridors So Special?
- River Corridors Provide Valuable Benefits to People
- Rivers Connect Us With Our History and Culture
- Rivers Cross Boundaries and Tie Communities Together
- No Two Are Alike: Urban, Suburban, and Natural Rivers

A river seems a magic thing. A magic, moving, living part of the very earth itself.
Laura Gilpin

Riparian Corridors: An Opportunity to Connect to Nature

Riparian Corridors: A Missed Community Asset and Opportunity

Not every community is fortunate enough to have a significant river or stream flowing through it's landscape. Too often in the past, riparian resources have fallen into a state of decay because they were not managed as a community asset. River corridors were the primary economic asset in early town development, providing water and power for agricultural and industrial activities. Impacts caused by these activities, or the subsequent neglect that often followed the end of river-based economic activities, often make it challenging to preserve riparian resources or utilize them as community assets today.

In the past, river corridors have been:

- Used as waste places or dumping grounds
- Used for less desirable, polluting industrial land uses (out of sight, out of mind)
- Cleared of valuable riparian forests
- Drained and filled
- Built up inappropriately in the floodplain or too close to eroding banks
- Built with road crossings that erode and contribute sediment to the river
- Applied with "hard" methods for stabilizing stream banks that are unsightly and detrimental to habitat
- Delivered untreated sewage
- Had their channels straightened or placed in concrete pipes
- Had their hydrologic regimes altered through impoundment, groundwater withdrawal, and increased stormwater runoff from impervious surfaces
- Missed opportunities to enhance recreation
- Had community development oriented away from the river instead of taking advantage of the river

In addition, neglect and natural processes have resulted in some of the following:

- Invasion of riparian corridors by invasive, exotic species
- Decay of archaeological and historic resources
- Destruction of scenic resources

The banks of the Paint Creek in the City of Rochester Municipal Park are stabilized by gabion baskets.

This home is threatened by bank erosion along the Clinton River in Rochester Hills.

What Makes Riparian Corridors So Special?

Riparian areas provide critical wildlife habitat. Because of their location in the transition zone between aquatic and terrestrial ecosystems, riparian areas provide access to food, water, and shelter creating diverse habitat types. This diversity in turn supports a great number of unique species found nowhere else in the landscape.

Because riparian areas form corridors in the landscape, they serve as pathways for species movement. Even when the surrounding landscape does not provide adequate habitat for many species, migratory birds, mammals, and fish use rivers and associated riparian habitat to travel upstream and downstream to patches of better habitat. Thus, riparian corridors provide a key component of the green infrastructure of a landscape, maintaining ecological integrity by providing connections between patches of higher quality habitat in fragmented landscapes.

River Corridors Provide Valuable Benefits to People

Intact river corridors and associated wetlands provide ecological functions that are important to human health and safety and save us money. These benefits include water filtration, storage of stormwater, flood control, protection of water quality, and protection of shorelines and stream banks. When any of these functions are compromised, costly engineering solutions are often required.

In addition to these functions, intact riparian corridors provide exceptional resources for passive and active outdoor recreation that can benefit local economies. River corridors are ideal for hiking and biking as well as for quieter activities such as nature study and birding. Intact fisheries can attract many anglers to a river, providing a significant boon to the local economy.

Rivers Connect Us With Our History and Culture

Like plants and animals, humans have historically utilized river corridors for food, water, and transportation. Discoveries of Native American artifacts are often concentrated along riparian corridors, providing evidence that early peoples used these areas as hunting grounds and for settlement sites. River banks were the sites of many early European settlements in southeast Michigan, including Rochester, Holly, Milford, Howell, Plymouth, Mt. Clemens, and the City of Detroit. These villages grew up around rivers as agricultural and milling communities. Later, industry took advantage of the resources that the rivers had to offer.

Because of this rich past, historic structures and stories are clustered around river corridors, providing fertile ground for connecting with our history and culture and rich opportunities for historic preservation and interpretation. Local mill sites, native village sites, sites of first landing, as well as structures such as historic bridges, farmsteads, and dams can help to piece together vivid details of life in past centuries.

Urban: The Rouge River is highly urbanized near its mouth and has been lined with concrete to prevent flooding in downstream communities.

Suburban: The Clinton River is lined with suburban housing in Rochester Hills.

Natural: Stretches of the upper Huron River are natural and pristine, flowing through wetlands and natural areas.

Rivers Cross Boundaries and Tie Communities Together

Rivers know no political boundaries. They respect only natural boundaries such as the fluctuating lines between stream and wetland, or topographic boundaries that confine rivers to their valleys. They also respect, for a time, structural boundaries created and enforced by humans such as dams, levees, and hardscape shorelines, although time and the power of nature often erode these boundaries.

When one floats down a river by kayak or canoe, it is often difficult to get a bearing on one's location because the usual cues are missing; there are no signs telling us when we have left one country, state, county, or municipality and entered another. The resources provided by a river and the impacts of human activity upstream are carried downstream through the river system, regardless of the political jurisdiction through which the river flows. Because of this, rivers present a great opportunity for tying communities together, as they are oblivious to the political boundaries that separate communities.

No Two Are Alike: Urban, Suburban, and Natural Rivers

Every river is a unique system, influenced by its geological history and setting, the historical land uses and impacts in the watershed and along the corridor, and the current state of the land, water, and vegetation that surround it today. The character of rivers in populated areas often varies from very urbanized rivers that have been heavily impacted by humans, to suburban rivers that retain many high quality features but are being rapidly affected by a changing landscape, to natural rivers which are relatively unaffected by human impacts and retain pristine natural features. Each river is unique and presents it's own set of challenges and opportunities.

Following is a description of the attributes, threats, and opportunities of three distinct river characters: urban, suburban, and natural. It is important to understand that these three characters are really a continuum and blend into one another. Just as a river's natural and physical character gradually changes as it flows from upland headwaters to lowland mouth, so a single river in different parts of the same watershed may be natural, suburban, urban, or somewhere in between, depending on the surrounding and upstream landscape.

River Type	Descriptive Characteristics	Challenges	Opportunities
Urban Rivers	Rivers flowing through communities with densely populated residential areas or commercial or industrial areas	• Surrounding land uses are likely to be sources of impacts and pollution, such as industrial or commercial landscapes • Physical, biological, and water quality conditions are often highly degraded • Riparian vegetation is often removed or dominated by exotic invasive species • High amounts of impervious surface in the watershed contribute to high volumes of stormwater runoff, rendering most channels unable to support a diversity of aquatic life • Hardscape structures or culverts have often removed the river from view or made it very unsightly • Years of neglect and damage have resulted in a negative perception in residents' minds about the river	• Rich historic resources provide ample opportunity for storytelling and interpretation • Redevelopment of blighted industrial or commercial areas provides opportunity to tie the river into revitalization projects • Opportunities to "daylight" buried rivers can add vitality to urban areas • Communication programs can improve public perception regarding positive aspects of the local river system • Use of innovative stormwater management techniques in watershed redevelopment projects may improve stormwater volume impacts
Suburban Rivers	Rivers flowing through developing communities usually dominated by medium to low-density residential land use with some commercial or light industrial and remnant agricultural and natural landscapes	• Changing land uses are likely to become more detrimental to the river as development progresses • Physical, biological, and water quality conditions are often somewhat degraded • Riparian vegetation is often patchy as residents mow to the river; vegetated areas are threatened by exotic invasive species • Increasing amounts of impervious surface in the watershed contribute to high volumes of stormwater runoff, causing instability and negative impacts in river channels	• Physical, biological, and water quality conditions are often relatively intact and can be prevented from degrading further if correct management practices are incorporated as development occurs • Opportunities for restoration and stewardship of the riparian corridor in residential areas and along parkland can improve the river system • Use of innovative stormwater management techniques in watershed development projects may prevent further deterioration due to increased stormwater volumes • Conservation along the riparian corridor may still be possible in some areas
Natural Rivers	Rivers flowing through rural, undeveloped areas dominated by intact natural landscapes, with some agricultural areas and low-density residential	• Agricultural land uses may contribute to impacts such as nutrient and bacterial loading and channel straightening for drainage • Riparian vegetation is often intact but may be under threat by exotic invasive species	• Significant intact natural areas within the riparian corridor provide opportunity for proactive preservation and development of recreational opportunities • Rural communities have a great opportunity to incorporate strong planning goals and policies for protection of the riparian corridor as a community asset

Summary

This manual provides information and tools designed to assist communities blessed with river corridors in taking a fresh look at their riparian resources. Riparian corridors are a community asset that is often neglected or underutilized. They provide critical ecological habitat, provide valuable ecological functions that provide economic benefits, and connect us with our history and culture. Rivers cross political and ecological boundaries and tie communities together. No two rivers are alike; they reflect the nature of the landscape they drain, whether it is natural, suburban, or urban.

Riparian Corridors in the Landscape of Southeast Michigan

Chapter 2 Includes:

- What is a Riparian Corridor?
- How were Southeast Michigan's Watersheds and Riparian Corridors Formed?
- Regional Landscape Ecosystems and the Rivers They Create
- How Do Regional Landscape Ecosystems Affect the Character of Riparian Ecosystems in Southeast Michigan?
- Riparian Landscape Features
- Upland Features
- Lowland Features
- Summary

Rivers are the natural highways of all nations, not only leveling the ground and removing obstacles from the path of the traveler... but conducting him through the most interesting scenery, the most populous portions of the globe, and where the animal and vegetable kingdoms attain their greatest perfection.

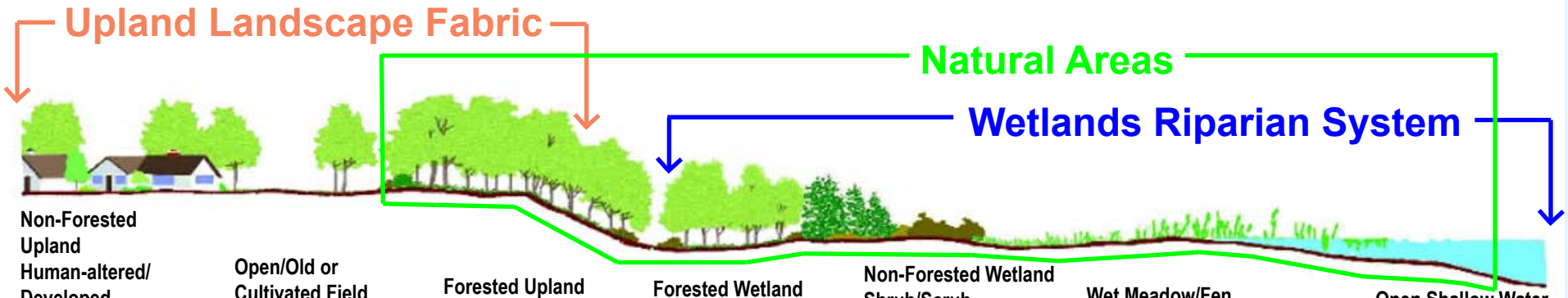
Henry David Thoreau

Introduction to Riparian Corridors in Southeast Michigan

What is a Riparian Corridor?

The area of land that exists between low, aquatic areas such as rivers, streams, lakes, and wetlands, and higher, dry upland areas such as forests, fields, cities, and suburbs are called riparian landscapes. Because these lands travel along the paths of flowing water, they are called riparian corridors.

Riparian lands are sensitive, critical components of the landscape, providing ecological and cultural value to the communities through which they travel. The function of riparian landscapes is governed by their dual roles as ecotone transition zones between aquatic and terrestrial environments and as corridors. They often have steep or moderate slopes, sensitive vegetation and soils, provide critical wildlife habitat, and protect the water quality of streams, rivers, lakes, and wetlands. When these lands are altered or developed, unique opportunities and challenges arise.



Non-Forested Upland Human-altered/ Developed
These are areas currently developed with residential and commercial land uses.

Open/Old or Cultivated Field
These herbaceous areas are usually dry and support grasses and shrubs. They consist of old cultivated fields and have been altered.

Forested Upland
These areas consist of dry to mesic forests dominated by beech and sugar maples as well as dry-mesic oak hardwood forests on drier sandy loams.

Forested Wetland
These areas consist of relict conifer swamps or bogs as well as southern swamp plant community, a wetland deciduous type forest.

Non-Forested Wetland Shrub/Scrub
These areas are characterized by fluctuating water levels and poor drainage. They are dominated by dogwoods and willows that are successionally intermediate between a wet meadow/fen or emergent marsh and a forested wetland.

Wet Meadow/Fen
These areas are consist of a wet meadow sedge and grass dominated wetland. A fen is also dominated by a herbaceous layer through which flows groundwater rich in calcium and magnesium carbonates. Fens are rare because they are restricted to the southern oak region and are absent from the glacial lakeplains.

Open Shallow Water
Open shallow waters include areas characterized by emergent and submergent vegetation including broad leafed herbs and grasses as well as floating herbs.

Riparian Corridor Cross Section from the Shiawassee & Huron Headwaters Project

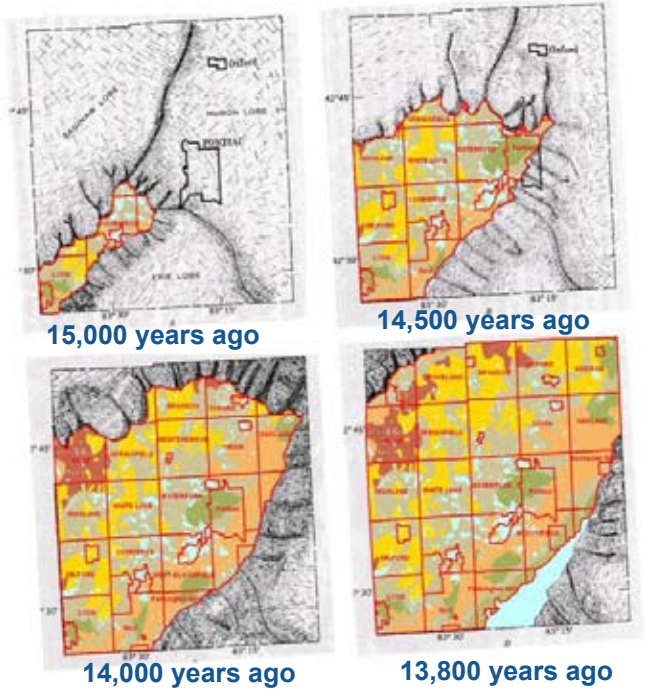
How were Southeast Michigan's Watersheds and Riparian Corridors Formed?

To begin to understand how the riparian landscapes in southeastern Michigan were formed, go back about 20,000 years ago during the Pleistocene when Michigan and most of the continent were engulfed in a massive sheet of ice.

Over the past million years or so, the Earth's climate shifted from a tropical/ temperate climate to a much colder one, resulting in circumpolar ice sheets periodically extending from northern latitudes to cover more than one-third of the Earth's surface[1]. Approximately 14,500 years ago, the last glacier to cover the State of Michigan began to melt away. In Michigan, this ice sheet was over a mile thick, extending southward from the Arctic through Ohio and Indiana.

The retreat of this last ice sheet gave rise to the major river drainage systems in Michigan. As the glaciers retreated in Southeast Michigan, they separated into 3 lobes (the Saginaw Lobe, Huron Lobe, and Erie Lobe) which split apart from one another in a northeast to southwest orientation. As these glaciers melted away from one another, enormous quantities of glacial melt water drained away from them, depositing vast amounts of sediment and debris across the landscape.

Glacial Retreat Timeline



- **18,000 years ago:** A mile-thick glacier covered all of Michigan, extending into Ohio and Indiana
- **14,500 years ago:** Global warming- the ice sheet begins to retreat
- **12,500 years ago:** Mammal mega fauna (mastodon, mammoth, giant beaver), muskeg and spruce forest inhabit Southeast Michigan
- **11,500 years ago:** Prehistoric Native Americans (Paleo-Indian) cultures inhabited the Great Lakes area
- **9,000 years ago-400 years ago:** Modern Native Americans (Woodland Indian) cultures inhabited the Great Lakes area, the modern landscape takes form
- **400 years ago:** European settlement begins

As the glaciers withered away, large chunks of ice broke off from the ice sheets, forming the kettle lakes that today form a band dotting the landscape from northeast Oakland to southwest Jackson Counties. Finely sorted sand and gravel was deposited by the glacial meltwater and fanned out over the landscape, forming the sandy outwash plains.

During several intervals, the climate stabilized for a time, and the glaciers remained stationary. During this time, long, steep-sided hills called moraines were formed at the edges of the ice sheets. By examining the map of the moraine systems of Michigan, the stationary position of glaciers all over the state becomes evident.

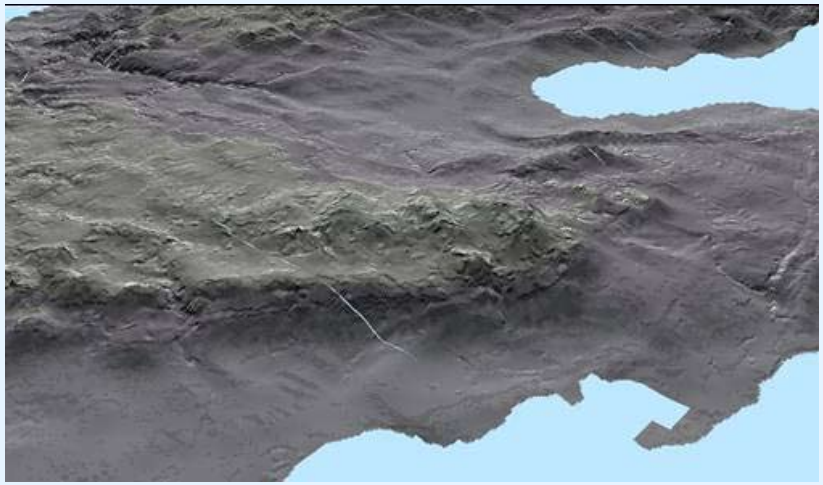
Morainic Systems of Michigan

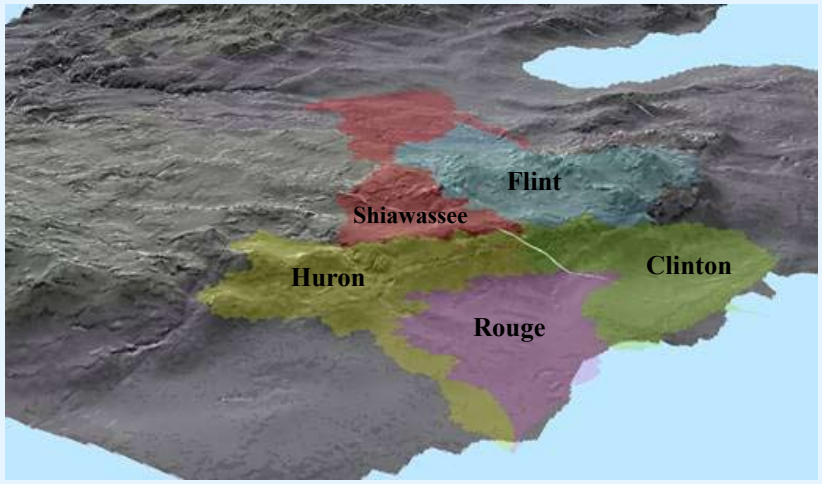
The end result of this activity in Southeast Michigan was the formation of the interlobate area, a landform running southwest to northeast between the former seam lines of the three glacial lobes. The Interlobate area is approximately 500 feet higher than the surrounding landscape, and is a distinct geological feature extending from the far northwest corner of Macomb County, through the centers of Oakland, Livingston, and Washtenaw County, ending in Jackson County.

The surface geology of the area is a deep layer of glacial outwash, sand and gravel, rimmed by the terminal moraines that formed during stationary periods of glacial retreat. Water in the numerous wetlands and lake systems across the interlobate area drain through the major river systems of Southern Michigan.

Fluctuating water levels during the various glacial lake stages had a significant impact on the shape of river valleys as they flow down from the interlobate area[2]. During certain periods as the ice receded, lake levels dropped dramatically, forcing the rivers draining to them to undergo a process called base-level adjustment. During this process, streams and rivers cut down deeply into the underlying landscape in order to adjust to the change in elevation of their receiving waters. This action created deep river valleys, such as those along the Clinton River in Rochester and the Huron River in Ann Arbor, with associated features such as ravines and abandoned terraces.

Deep ravines along the Clinton River valley in Rochester Hills provide evidence that the river incised deeply into the landscape as it adjusted to a dramatic change in base level.



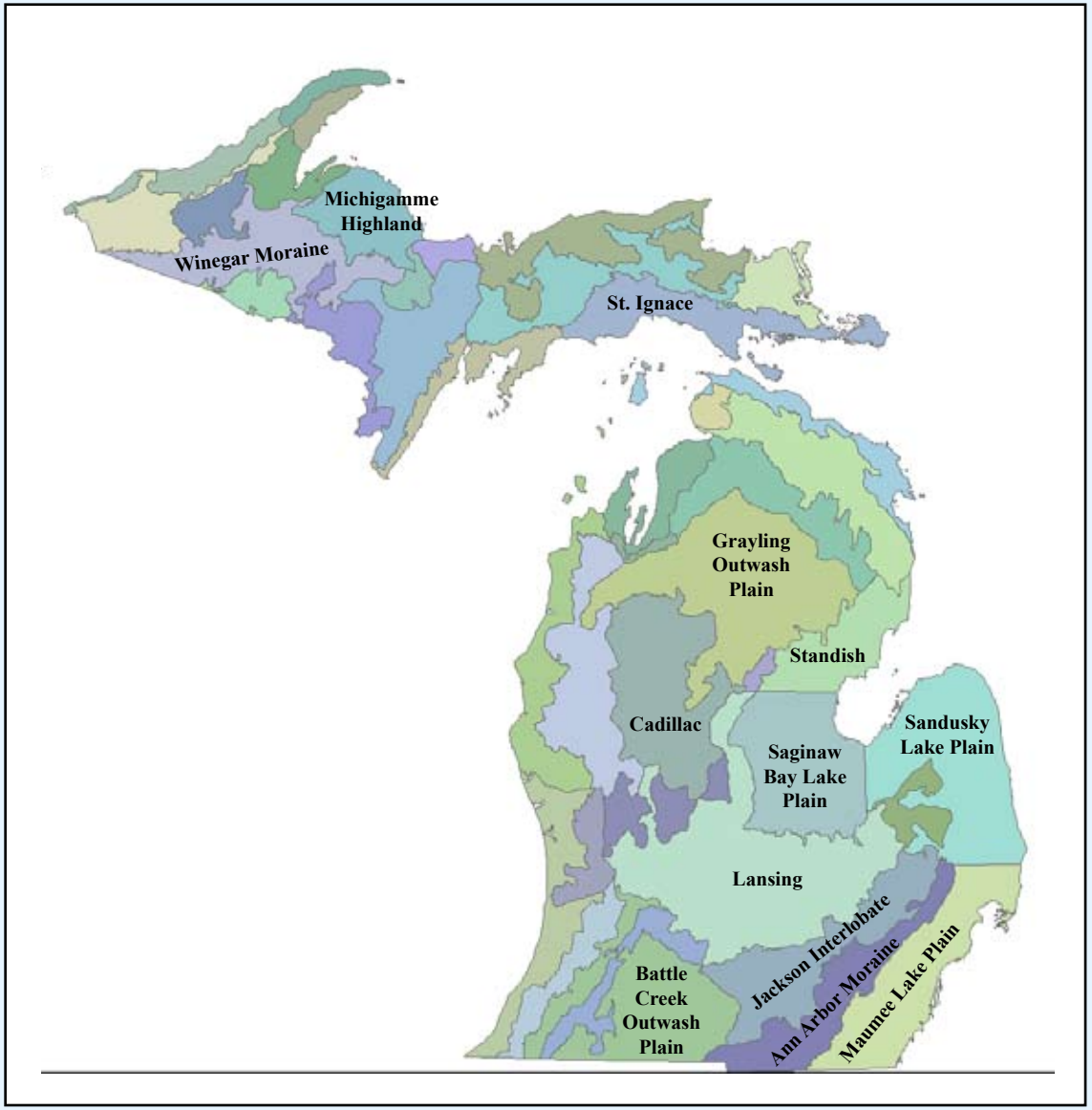


Headwaters of southeast Michigan's river systems: The Interlobate Area

Regional Landscape Ecosystems and the Rivers They Create

The characteristics of riparian ecosystems in Michigan are closely associated with the type of landscape through which they travel[3]. Surface and bedrock geology, soils, vegetation, climate, and land use on both a watershed and local scale are factors that influence riparian ecosystem characteristics. Dennis Alberts at the Michigan Natural Features Inventory has used these factors to map and describe regional landscape ecosystems for Minnesota, Wisconsin, and Michigan[4].

In southeast Michigan, three landscape ecosystems have been described. These landscapes run parallel to one another in a southwest to northeast orientation across the landscape: the Jackson Interlobate, Ann Arbor Moraines, and Maumee Lake Plain. These landforms provide a useful framework for understanding many aspects of the region's river resources. Understanding the origin and character of the major regional landscape ecosystems of southeast Michigan supports a better understanding of the resources, threats, and opportunities that exist in local natural systems, particularly in riparian corridors.



The regional landscape ecosystems of Michigan, as defined by the Michigan Natural Features Inventory. For more information, visit www.npwrc.usgs.gov/resource/habitat/rlandscp/

Jackson Interlobate

The Jackson Interlobate was formed as three lobes of the Pleistocene glacier- the Saginaw, Huron, and Erie lobes- receded away from one another along a southwest to northeast axis, depositing vast amounts of outwash in the process. This area is characterized by Alberts as "coarse-textured end moraine, outwash, and ice-contact topography; oak savanna and oak-hickory forest, hardwood swamps, prairie fens, bogs"[5]. The elevation range is between 750 and 1,280 feet. Landforms are dominated by broad outwash plains surrounding sand and gravelly end moraines, which rise above the outwash plans like islands. Near the margins, linear end moraines lie parallel to the receding glacial positions, and are often broken by narrow outwash channels. Ice-contact landforms such as kettles, kames, eskers, and outwash channels are featured in this type. Soils in this area are typically very well-drained. Presettlement vegetation varies by landforms, with oak savanna and oak-hickory common on sandy moraines and ice-contact features, and hardwood swamp, bogs, and prairie fens in outwash areas.

Ann Arbor Moraines

The Ann Arbor Moraines were formed as the Huron and Erie lobes stalled in their recession and became stationary for a time, depositing vast amounts of poorly sorted materials along the same southwest to northeast axis, to the southeast of the Jackson Interlobate. This area is characterized by Alberts as "loamy end and ground moraines; oak-hickory forest, beech-sugar maple forest and deciduous swamp forest"[6]. The elevation range is between 750 and 1,150 feet. Landforms are dominated by fine- and medium-textured end and ground moraines. End moraines may form distinct ridges or may be broken by outwash channels, while ground moraines form low, broad hills. Soils are moderately well-drained sandy loams on moraines to poorly drained mineral soils at lower margins of ground moraines. Presettlement vegetation consisted of oak and oak-hickory forest or beech-sugar maple on uplands, and swamp forests in lowlands.

Source: Michigan Natural Features Inventory

Maumee Lake Plain

The Maumee Lake Plain was formed in the most southeastern portion of Michigan as glacial meltwaters formed vast lakes trapped behind the receding glacier to the east. As the glaciers receded and the water eventually drained away from the area, a flat landscape composed of sand and clay with low topographic features and beach ridges was left behind. This area is characterized by Alberts as a "flat, clay lake plain dissected by broad glacial drainage ways of sandy soil, with beech-sugar maple forest, elm-ash forest, deciduous swamp, white oak-black oak savannas, wet prairies, coastal marshes"[7]. The elevation range is between 580 and 750 feet. Landforms include very flat clay lake plains with several water-lain end moraines that have been reworked by water. Beach ridges corresponding to the fluctuating positions of the glacial lakes are common. Soils are generally poorly drained, clayey loams. Presettlement vegetation consisted of forests on clay lake plains while sandy lake plains supported oak barrens in uplands and wet prairies or marshes in lowlands. Beach ridges and dunes supported oak savannah and small dry prairie areas.

How Do Regional Landscape Ecosystems Affect the Character of Riparian Ecosystems in Southeast Michigan?

The geomorphology of southeast Michigan's rivers changes as watercourses pass through the various landscape ecosystem types. Geomorphology literally means the morphology (or shape) of the geosphere (or earth). The following table summarizes several aspects of the region's riparian resources and describes how they are affected by the landscape ecosystem type in which they are found:

Regional Landscape Ecosystem	River Network Position	Description of Riparian Systems	Challenges
Jackson Interlobate	Headwaters with a low to medium stream gradient	Riparian systems in the area comprise the headwaters of most of the major rivers of Southern Michigan, including the Saginaw, Clinton, Rouge, Huron, Grand, Kalamazoo, and St. Joseph Rivers. These rivers have their origins in extensive wetlands. Kettle lakes, ponds, and depressional wetlands predominate. Streams are generally small, groundwater-fed channels associated with wetlands. River valley topography is not well-developed as these areas were relatively unaffected by base-level adjustment. Due to the permeable soils, groundwater flow is very dynamic with significant aquifers and many groundwater-fed lakes, wetlands, and streams.	Because this area is so rich in sensitive headwaters, groundwater resources, and wetlands, water resources are highly sensitive to surface and subsurface sources of pollution. Extensive residential lake developments present a major source of nutrient pollution in the form of leaking septic tanks and fertilizer misuse. Urban and suburban development started reaching this area in force during the 1990s; SEMCOG projects that a large portion of the region will be developed by 2030. Residential and commercial development is one of the most important threats in this area as the attractive topography and rural landscape attract more residents.
Ann Arbor Moraines	Mid-river with a medium to high stream gradient	This area has very few lakes, and those that exist are generally of human origin or oxbow lakes, with a few kettle depressions on moraines. Headwater drainage systems converge in this area, so rivers enter the landscape type as smaller streams and emerge as larger rivers. Interesting river valley topography related to glacial lake base-level adjustment, such as terraces, ravines, deltas, are found in these areas.	Steep topography in these areas presents a threat in terms of river erosion and an opportunity in terms of scenic vistas and geologic interpretation. These areas have been heavily developed, so lack of a riparian forest in many areas reduces the value of river corridors as wildlife conduits. Stormwater runoff and illicit connections are also concerns.
Maumee Lake Plain	Lowland river and mouth with a low stream gradient	No natural lakes exist in this landscape type. Rivers reach their largest size as they flow to the Great Lakes and connecting channels. Due to the low topography and increasing amounts of impervious surfaces in the watershed, river flooding is a serious issue in these areas.	This area was the first to be settled and mainly altered by agriculture and urban development. Extensive floodplain forests, lake plain prairies, and coastal wetlands in this region have been largely destroyed with a few precious remnants remaining. Streams are perhaps the largest casualty of these areas as many natural streams were straightened and ditched to service the drainage of tiled farm fields. In urban areas, many streams have been buried in culverts or otherwise heavily degraded.

Characteristics of riparian ecosystems in southeast Michigan landscapes; based on Albert, 1995

What Types of Ecosystems and Natural Communities are Found in Riparian Ecosystems?

The Michigan Natural Features Inventory (MNFI) has described and abstracted 60 distinct natural community types within the State of Michigan. Twenty-nine of these are likely to occur in riparian ecosystems in the State of Michigan. According to MNFI, the following 12 occur in Southeast Michigan[10]. These include:

- Bog
- Coastal Plain Marsh
- Hardwood-Conifer Swamp
- Intermittent Wetland
- Prairie Fen
- Relict Conifer Swamp
- Southern Floodplain Forest
- Southern Swamp
- Southern Wet Meadow
- Emergent/Submergent Marsh
- Wet-Mesic Prairie

Teams of MNFI scientists conduct field surveys to locate and identify threatened and endangered species and communities throughout the state, create and maintain a database of all relevant species and community locations, and provide data summaries and analysis in support of environmental reviews.

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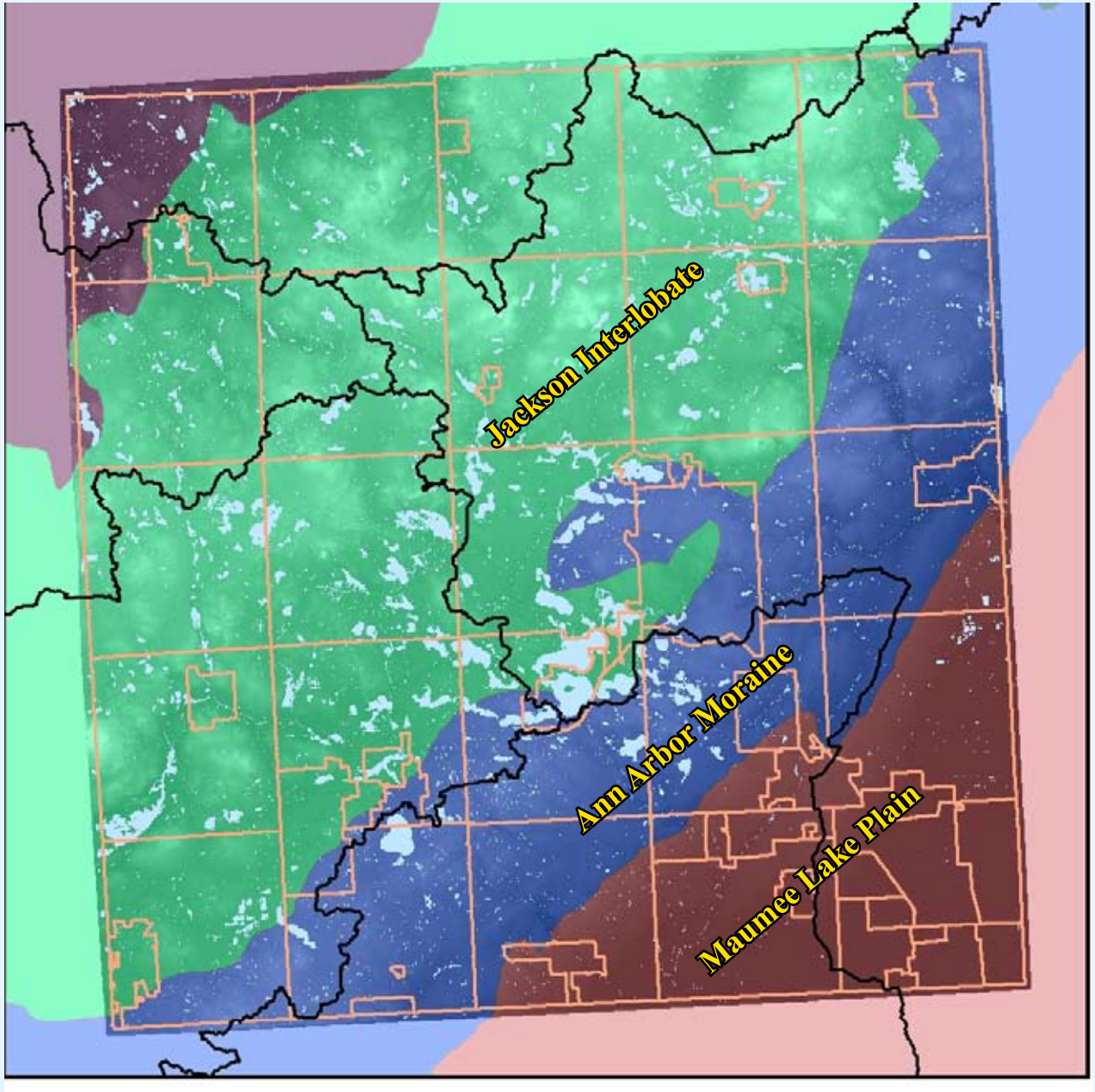
Michigan Natural Features Inventory



This graphic displays the regional landscape ecosystems in Oakland County with the hydrologic network. Lakes, wetlands, and slow-moving streams predominate in the headwaters area of the Jackson Interlobate. Moderate to high-gradient flowing streams predominate in the Ann Arbor Moraines, and low gradient streams an wetlands in the Maumee Lake Plain.

Riparian Landscape Features

Several distinct features are commonly found in southeast Michigan's riparian systems because of the retreat of the glaciers, the pathways of pro-glacial rivers, and the resulting regional landscape ecosystems and local geology[2]. These include features confined to uplands (areas above the modern floodplain elevation) and lowlands (areas at or below the elevation of the modern floodplain).

The Clinton River is an enclosed channel beneath the City of Pontiac. Current studies are evaluating the feasibility and opportunity for "daylighting" the river.

Upland Features

The following three features are usually found in association with one another in the Ann Arbor Moraines landscape ecosystem type, below headwaters but above the lower sections where rivers reach the lake plain. They reflect the action of pro-glacial river systems exerting great force as they incised their river valleys and adjusted for the episodically receding base levels of the glacial lake stages, in a process called base-level adjustment. Examples of these upland riparian features are found along the Clinton River in Rochester, the Rouge River in Southfield, and the Huron River in Ann Arbor.

- **Valley walls** are steeply sloped lands that enclose the entire river valley. Valley walls are often steeper than may be explained by the size of the modern river, providing evidence of much larger pro-glacial systems that did most of the work carving out the valley.

- **Terraces** are abandoned floodplains reflecting a former (higher) river base elevation during a historical lake stage. As the elevation of the glacial Great Lakes receded, rivers cut deeper into the underlying substrate, abandoning their floodplains and creating new ones at a lower elevation.

- **Ravines** are steep-sided tributary channels often found in association with valley walls. The streams in these ravines may be much smaller than suggested by the size of the ravines, or even non-existent. This discrepancy provides evidence for rapid down-cutting during episodic lake-level lowering.

In addition to these naturally occurring features, many features occur within riparian corridors that have been significantly altered by human encroachment, development, or management.

- **Altered riparian areas** are areas in which the topography has been extensively altered.

- **Enclosed channels** are channels that have been encased in metal or concrete and diverted through an underground path.

- **Straightened channels** are river channels that have been straightened to accommodate development or facilitate drainage.

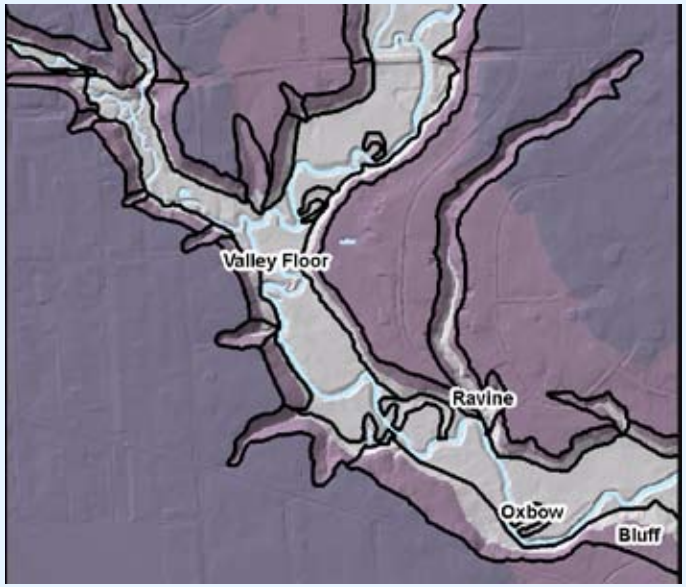
Lowland Features

Lowland features are very diverse; some are confined to specific areas within a particular landscape ecosystem type while others may be found in all three. These features are "lowland" relative to surrounding topography; some features, such as interlobate lakes and wetlands, are actually at a much higher elevation than river floodplain features. Abundant examples of each type can be found in southeast Michigan.

- **Oxbows** are old channels that were abandoned as the river migrated that are still hydrologically connected with the modern river and may be inundated during wet seasons or flood events. They typically represent an abandoned meander. They may be filled with slow-moving or stagnant water and are often in a process of converting to soft-bottom floodplain or wetland. They can provide important habitat and nursery areas for fish, herpetile, and waterfowl. The restoration of an oxbow along the Rouge River at The Henry Ford in Dearborn, Michigan provided for these amenities.

- **Abandoned Channels** are old channels within the floodplain that have been abandoned as the river has migrated and are hydrologically connected to the modern river only minimally or not at all. Abandoned channels may be found in any of the three landscape ecosystem types.

- **Confluence** areas are areas where two streams coalesce to flow together as one. They may represent the joining of two small stream systems, or larger subwatershed drainage systems. The City of Rochester contains the confluence of three major streams: the Upper Clinton River, the Paint Creek, and the Stony Creek.



The Rouge River in the City of Southfield exhibits several upland and lowland riparian landscape features.

- **Deltas** are depositional areas formed as pro-glacial streams or rivers slowed in velocity as they formed confluences with other tributaries or flowed into glacial lakes or estuaries. They are usually formed near the transition between the Ann Arbor Moraines and the Maumee Lake Plain, representing areas where deltas formed as pro-glacial rivers flowed off the higher moraine areas into the glacial lakes at their various stages.

- **Wetlands Areas** may exist in any of the landscape types. Many types of wetlands may exist depending on local conditions as described by the Michigan Natural Features Inventory.

- **Lakes Areas** are primarily a feature of the Jackson Interlobate area where lakes were formed in pitted outwash plains and glacial depressions. Kettle lakes, also referred to as "ice-block depressions" were formed as ice-chunks broke away from the receding glaciers and were buried in sand and gravel. Other lakes are formed in old glacial drainages, while still others were formed by beavers. Many artificial lakes and ponds exist in all three landscape types.

Summary

The area of land that exists between low, aquatic areas such as rivers, streams, lakes, and wetlands, and higher, dry upland areas such as forests, fields, cities, and suburbs are called riparian landscapes. The watersheds that are drained by riparian landscapes were created by the retreat of glaciers as they melted away over 10,000 years ago. Fluctuating water levels in the pro-glacial Great Lakes created dramatic topographic features in Southeast Michigan river valleys such as bluffs, terraces, and deltas. Regional landscape ecosystems delineated by the Michigan Natural Features Inventory are largely influenced by the legacy of the glaciers. The character of riparian corridors is heavily influenced by the type of regional landscape ecosystem through which they flow. The Jackson Interlobate, Ann Arbor Moraines, and Maumee Lake Plain regional landscape ecosystems predominate in Southeast Michigan. Riparian corridors present many ecological, cultural, and economic values to communities, with associated challenges and stewardship opportunities.

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Land and Identity: A Planning Process for Riparian Corridors

Chapter 3 Includes:

- How Riparian Ecosystems Function in the Landscape
- A Framework for Planning: Values, Challenges, and Stewardship Needs
- Approaches to Riparian Corridor Planning
- Planning for Riparian Corridors: A Dual Process
- Land-Based Planning Process
- Branding and Identity Planning Process
- Relationship of Riparian Corridor Planning to Federal Phase II Stormwater Requirements
- Summary

Planning is bringing the future into the present so that you can do something about it now.
Alan Lakein

Planning With Riparian Landscape Ecology

How Riparian Ecosystems Function in the Landscape

Riparian ecosystems are critical components of landscape ecology. Riparian ecosystems are both an ecotone (a transition area between aquatic and terrestrial ecosystems) as well as a corridor (a connector between habitat patches and landscapes across regions, through fragmented landscapes, and from upland headwaters to lowland areas)[11].

Ecotones are important because they serve as a transition between two distinct ecosystem types. Corridors are important in landscape ecology because they connect landscapes across regions. Corridors have four critical ecological functions[12]:

1. **Corridors provide habitat,** especially in fragmented landscapes. Riparian corridors provide access to the food, water, and shelter that species require.
2. **Corridors act as wildlife conduits,** providing protected pathways between larger habitat patches. If the riparian forest remains intact, the effective habitat is greatly increased in agricultural, suburban, and urban landscapes.
3. **Corridors act as filters and barriers to species movement,** preventing the flow of species across landscapes. Riparian corridors can act as barriers or filters to the movement of native or invasive species, however they can also facilitate their transport.
4. **Corridors act as sinks and sources of wildlife, nutrients, and energy,** providing such critical services as nutrient and carbon sequestering and recycling and providing important breeding habitat.

Examples of landscape ecological components along the Clinton River corridor in the City of Rochester Hills.

The discipline of landscape ecology has identified three elements which compose the landscape: patches or "hubs", corridors, and the matrix[13]. Patches are small areas of a particular ecosystem or landscape type surrounded by areas with a different structure. Corridors are linear patches that differ from their surroundings and connect patches. Together, patches or hubs and corridors comprise the "green infrastructure" of the landscape. The matrix is the background landscape within with patches and corridors exist. Within Southeast Michigan, several types of land uses typically dominate each of these types:

- **Patches:** Intact natural areas, remnant woodlots, wetlands, and other natural areas.
- **Corridors:** Riparian ecosystems, rail trails, parkways, tree rows or any other corridor connecting patches.
- **Matrix:** The human-altered landscape surrounding the natural or "green infrastructure": urban and suburban landscapes, or agriculture.

A Framework for Planning: Values, Challenges, and Stewardship Needs

Each riparian corridor provides unique values to local communities that are ecological, cultural, and economic in nature. In landscapes affected by human activity, unique challenges to these values can be addressed through stewardship opportunities tailored to the specific needs of a river corridor. An important step includes identifying the critical values in a riparian corridor, existing and potential challenges to those values, stewardship opportunities to address the challenges, and responsible parties and resources needed to implement best stewardship practices. The table below is a sampling of typical riparian values and their associated challenges and stewardship opportunities. The values are described in terms of whether they are ecological, cultural, and/or economic in nature.

Value	Potential Challenges	Stewardship Needs	Ecological Value	Cultural Value	Economic Value
Generate Biodiversity	Habitat destruction and fragmentation, exotic invasive species	Protection and restoration of habitat, exotic management	✓		
Provide Wildlife Corridors	Vegetation destruction and fragmentation	Protection and restoration of land along riparian corridor	✓		✓
Filter Surface Runoff Pollutants	Direct piping of stormwater to river; inadequate riparian vegetation	Protection and restoration of riparian buffers, innovative stormwater management	✓	✓	✓
Provide Recreational Opportunities	Lack of public access to river, lack of available land, flooding, poor water quality	Acquisition and development of public access and park land, flood control, water quality improvement		✓	✓
Provide Drinking Water	Water quality/quantity degradation, alteration of natural hydrologic regime	Best practices to improve water quality and hydrologic regime			✓
Water Supply to Wetlands/Lakes	Alteration of natural hydrologic regime	Best practices to improve hydrologic regime	✓		✓
Stormwater Detention and Treatment	Alteration of natural hydrologic regime	Best practices to improve hydrologic regime	✓		✓

Value	Potential Challenges	Stewardship Needs	Ecological Value	Cultural Value	Economic Value
Provide Fisheries/ Waterfowl Habitat	Destruction and fragmentation of natural vegetation, alteration of natural hydrologic regime, invasion by exotic invasive species	Best practices to improve hydrologic regime, protection and restoration of habitat	✓	✓	✓
Provide Floral Diversity and Wildlife Habitat	Destruction and fragmentation of natural vegetation, invasion by exotic invasive species	Protection and restoration of habitat, management of exotic invasive species	✓	✓	✓
Protect Shoreline and Streambank from Erosion	Alteration of natural hydrologic regime, hardening of natural shorelines, removal of riparian buffer, development too close to water's edge, filing of riparian wetlands and floodplains	Best practices to improve hydrologic regime, protection and restoration of natural shoreline and riparian buffers	✓		✓
Recharge Groundwater Aquifers	Alteration of natural hydrologic regime	Best practices to improve hydrologic regime, protection of recharge areas	✓		✓
Provide Unique Geological Resources, Topography, and Scenic Vistas	Grading, development too close to water's edge, erosion	Protection of unique areas, interpretation of geological origins of river valley		✓	✓
Provide Historical Resources	Destruction or neglect of historic resources	Protection and interpretation of historic resources of river valley		✓	✓

Why Plan for Riparian Corridors?

Approaches to Riparian Corridor Planning

River corridors are fantastic opportunities for unifying communities, connecting residents with nature, and orienting development in a way that provides a focal point for civic life. However, rivers in our communities are vulnerable to neglect and mismanagement. Ecological degradation is due to impoundment, channelization and culverts, removal of riparian vegetation, erosion and sedimentation due to stormwater, streambank failure, exotic invasive species, dumping, and litter. When combined with cultural degradation such as destruction of historic resources and restricted access, the quality and potential of river corridors are reduced. Whether a river corridor is pristine or degraded, it can benefit from a little careful thought, promotion, and planning to maximize its benefit as a community asset.

Riparian corridor plans should focus on how to best utilize the diverse ecological and cultural aspects of river systems as they flow through communities. As a result, a riparian corridor plan is by necessity multi-dimensional[1]. It should identify the range of functions and values, as described in the previous section, provided by a river system and how those benefits can be best managed and leveraged so that the river corridor truly becomes a community asset.

Riparian corridor plans can vary significantly depending on unique, local planning needs and the degree of planning detail required or desired. A very pristine river corridor flowing through a rural area may benefit from preservation-focused planning, concentrating on the pristine aspects of the river system and how to best maintain those over time. A much degraded system would benefit from restoration-focused planning, identifying opportunities and needs for habitat restoration, streambank stabilization, and buffer rehabilitation. A riparian corridor that is hidden behind alleys and under roads away from public view will benefit from public access planning and a community awareness campaign. Many riparian corridors will vary in character and need along their lengths and will require unique planning approaches.

Plans can also vary with respect to the amount of detail required. Depending on the desires and goals of the communities, an "opportunities plan" may meet local needs. This type of plan does not go into great depth but instead focuses on identifying and describing local assets, broad goals, and general opportunities. Such a plan is a precursor to further, more in-depth effort and implementation. Communities may want to go further and prepare a comprehensive corridor plan, which looks at the full range of needs and identifies tools and techniques necessary to meet specific goals and objectives, responsible parties, required resources, timelines, and tracking methods.

Examples of Riparian Corridor Plans

- **Lower River Rouge Gateway Master Plan**

www.rougeriver.com/pdfs/wetlands/WATERSHED2002-02.pdf

- **Charting the Course: An Assessment of Assets and Opportunities on the Lower Detroit River**

www.mac-web.org/GreaterDetroitAHR/Charting_the_Course_poster.pdf

Planning for Riparian Corridors: A Dual Process

A riparian planning process may be initiated by a watershed group, local government, river friends group, fishing club, or any other group that has a stake and interest in the riparian corridor's future. Planning for riparian corridors presents a unique challenge; in many communities, river corridors are inaccessible and have been hidden from public view and use. Thus, the public may be unaware of the resource and uninterested in efforts to plan for it. Because of this, an effort to raise public awareness and reconnect people with the river needs to either precede or run concurrently with planning for the corridor itself. A dual approach of river corridor planning must include two components: planning for protection of the functional values of the corridor itself (land-based planning) and planning for public awareness and engagement (branding and identity planning).

This public meeting was held to gain input on greenway connectivity in Southeastern Michigan.

The Dual Riparian Planning Process

1. Identify a planning need and project area
2. Identify the project stakeholders and initiate a stewardship group
3. Map the corridor

Land-Based Planning Process

1. Divide the corridor into unique sub-areas
2. Identify special places along the corridor
3. Inventory ecological and cultural assets and opportunities within sub-areas and in special areas
4. Create a Riparian Corridor Plan

Branding and Identity Planning Process

1. Describe the corridor and create an identity concept
2. Develop a logo and media products to communicate the identity
3. Plan & implement an outreach campaign

Step # 1 : Identify a Planning Need and Project Area

The type and character of riparian resources in local communities may vary from large, wooded river systems to open concrete-lined ditches. It may not be feasible or necessary to prepare a Riparian Corridor Plan for each and every river or stream in a community. To prioritize efforts, several criteria may be evaluated to determine whether a particular river corridor is a good candidate for a riparian planning effort:

- The riparian corridor has been identified as significant and worthy of protection and additional planning in existing community comprehensive plans, watershed plans, or natural features plans.
- Current and future land use changes and other threats represent significant changes and challenges to the riparian resource in coming years.
- The riparian resource has significant cultural and ecological functional values associated with it.
- The riparian resource is currently utilized by a particular interest group that wants to enhance and improve the resource.
- The river flows through several communities that are interested in working together, increasing the potential for a successful multi-jurisdictional partnership.

Step # 2: Identify Stakeholders and Initiate a Stewardship Group

This step is critical. Without a strong core of engaged, committed, motivated stakeholders, any plan is not worth the paper it is printed on. The development of a strong and diverse stakeholder group will garner strong political support, carry the project forward, and set the stage for unique opportunities and partnerships.

The strongest stakeholders are local interests; however it can be important to include others who may bring insight, expertise, and resources from larger regional, state-level, and federal groups. A good cross-section of interests is vital to ensuring that a plan will be embraced and implemented by the larger community.

Key stakeholders in riparian corridor planning projects include:

- Local river advocates (anyone who is a passionate angler, paddler, nature lover, or other type of river enthusiast)
- Riparian property owners (both commercial and residential)
- Local businesses (especially those interested in connecting to the river for business enhancement)
- Local developers (especially those who are interested in developing land along the corridor)
- Local officials (especially those responsible for setting local policy related to riparian resources)
- Local government recreation, planning, and public works staff (especially those responsible for municipal management of riparian resources)
- Like-minded partner group representatives (watershed councils, land conservancies, angling groups, trails groups, etc.)

The Natural Areas Advisory Group shares information about issues related to the preservation of natural lands and resources.

Step # 3 : Map the Riparian Corridor

Once a planning need and stakeholder group for a particular riparian corridor have been identified, it is important to carefully map and delineate the boundaries of the riparian area, the actual area of land that is included within the "riparian corridor" to be considered. There are various approaches to accomplishing this task, using different levels of mapping expertise and technology, each with their own advantages and disadvantages.

	Geomorphic Mapping	Buffer Mapping	Property Selection Mapping
Advantages	• Accurate rendering of riparian geography and geomorphology • May uncover unique topographic features that will be useful in watershed planning	• Very simple and easy to accomplish with minimal GIS mapping skills	• Very simple and easy to accomplish with minimal GIS mapping skills
Disadvantages	• Requires high-resolution digital topography, geology maps, and aerial photos • Requires medium-level GIS skills and familiarity with topographic mapping and riparian systems	• Difficult to determine useful buffer width • Single buffer width does not take into account full range of riparian lands; important land may be left out; unimportant land may be included	• Requires land parcel data set • Property mapping does not take into account full range of riparian lands; important land may be left out; unimportant land may be included

Mapping Option 1: Geomorphic Mapping Procedure

1. **Create a definition for the riparian corridor.** This step is critical for maintaining consistency and objectivity in the mapping process and will also assist the stakeholders in understanding the riparian landscape.

Many different riparian definitions are found in the literature. For community planning, a broad and consistent definition is required. As an example, the definition offered in the U.S. Fish and Wildlife Services System for Mapping Riparian Areas in the Western United States was modified as follows:

Riparian areas are areas of the landscape that connect to and influence or are influenced by the surface and subsurface hydrologic features of perennial or intermittent waterbodies (rivers, streams, lakes, ponds, drainages, and wetlands).

Features of riparian areas include bottomlands containing the geomorphic floodplain, oxbows and abandoned channels, and uplands, containing valley walls, bluffs, terraces, and ravines.

Due to human development, encroachment, and management, riparian areas may contain altered features such as altered riparian areas, enclosed channels, and channelized (straightened) channels.

2. **Select the segment of river to be mapped**

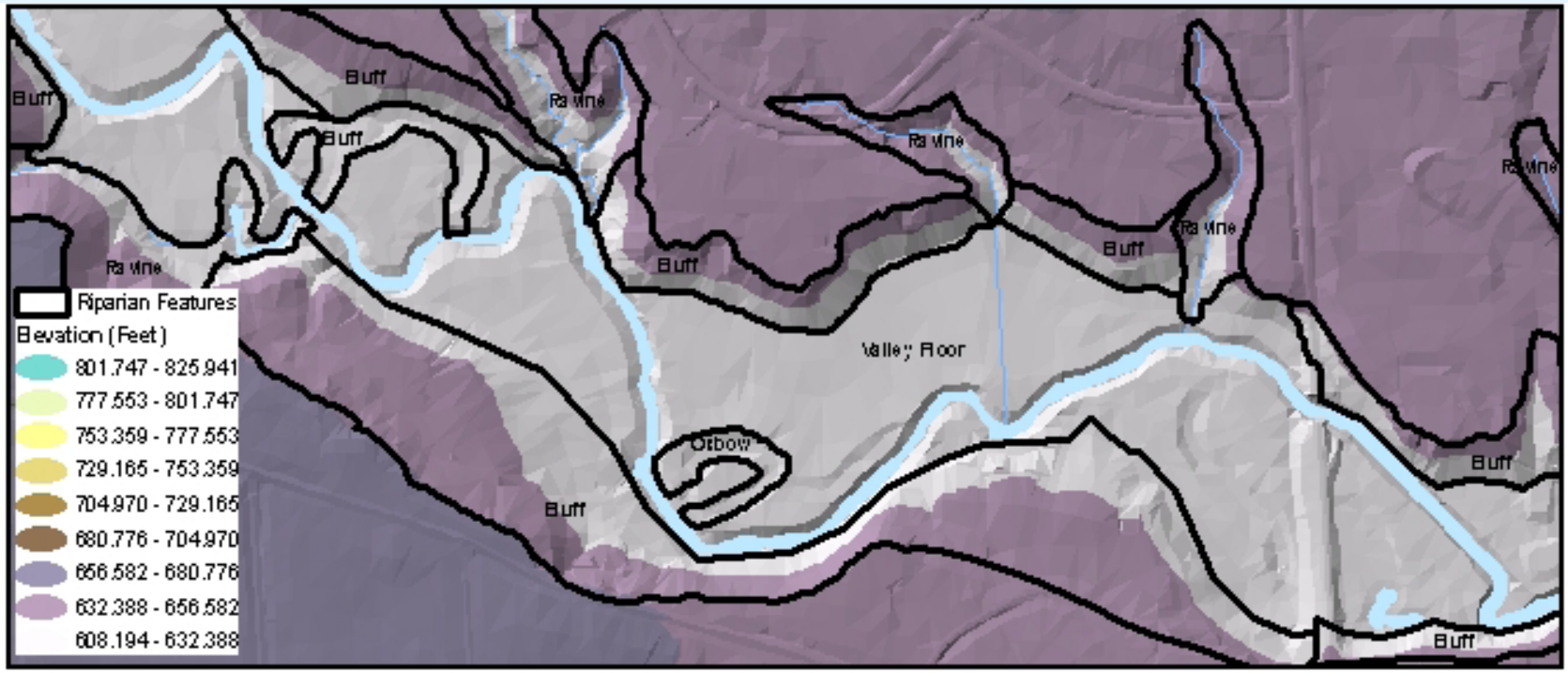
3. **Consider the landscape ecosystem that the riparian corridor flows through.** Based on this, define the landscape components that comprise the riparian corridor and decide which of these are valuable for mapping (*See "Riparian Corridors in the Landscape of Southeast Michigan" pages 9 and 10*).

4. **Create a data model** that will allow the identified riparian feature components in the riparian corridor to be mapped.

5. **Assemble layers of information in a Geographic Information System (GIS).**
   - High resolution digital hydrography
   - High resolution digital topography
   - Slope layer based on topography
   - High resolution aerial photography
   - Surficial geology and/or soils mapped by permeability

6. **Carefully delineate the entire river valley landscape using heads-up digitizing.** Using the digital topography, this land area may be easy or difficult to discern depending on the landscape. Become familiar with the system and use the slope, geology, and layer as an aid.

7. **Carefully delineate the riparian features within the river valley** components using the digital topography.



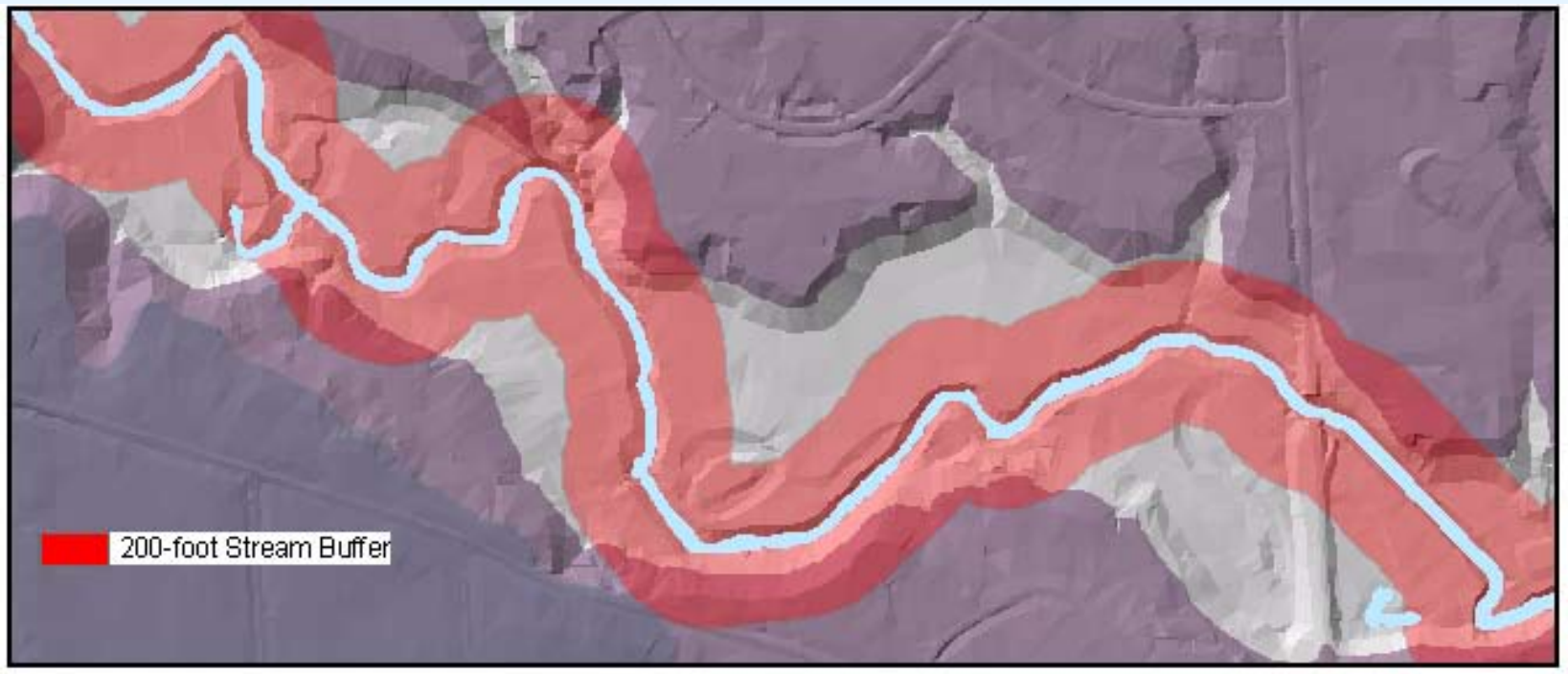
A geomorphically delineated riparian corridor map based on digital topography.

Mapping Option 2:
Buffer Mapping Procedure

1. **Decide on a buffer width for your riparian corridor.** Deciding on a static buffer width is not an easy task; there are no simple criteria on which to base such a decision. Consider the character of the river system. A very developed or degraded river that does not function as a wildlife corridor might necessitate a smaller buffer width than one which does. If wildlife corridor function is important, consult guidelines related to wildlife corridor width based on particular species of interest.

2. **Select the segment of river to be buffered.**

3. **Create a map using the GIS buffer function.**



A riparian corridor map delineated using a GIS buffering process.

Mapping Option 3: Property Selection Mapping Procedure

1. **Decide on a property selection method.** The GIS tool will give you several options, including selecting properties that intersect the river system or are within a certain distance of it. It is possible to choose to combine this method with the geomorphic mapping or buffer methods.
2. **Select the segment of river to be selected.**
3. **Create a map using the GIS selection function.**

A riparian corridor map delineated using a GIS parcel selection process.

Land-Based Planning Process

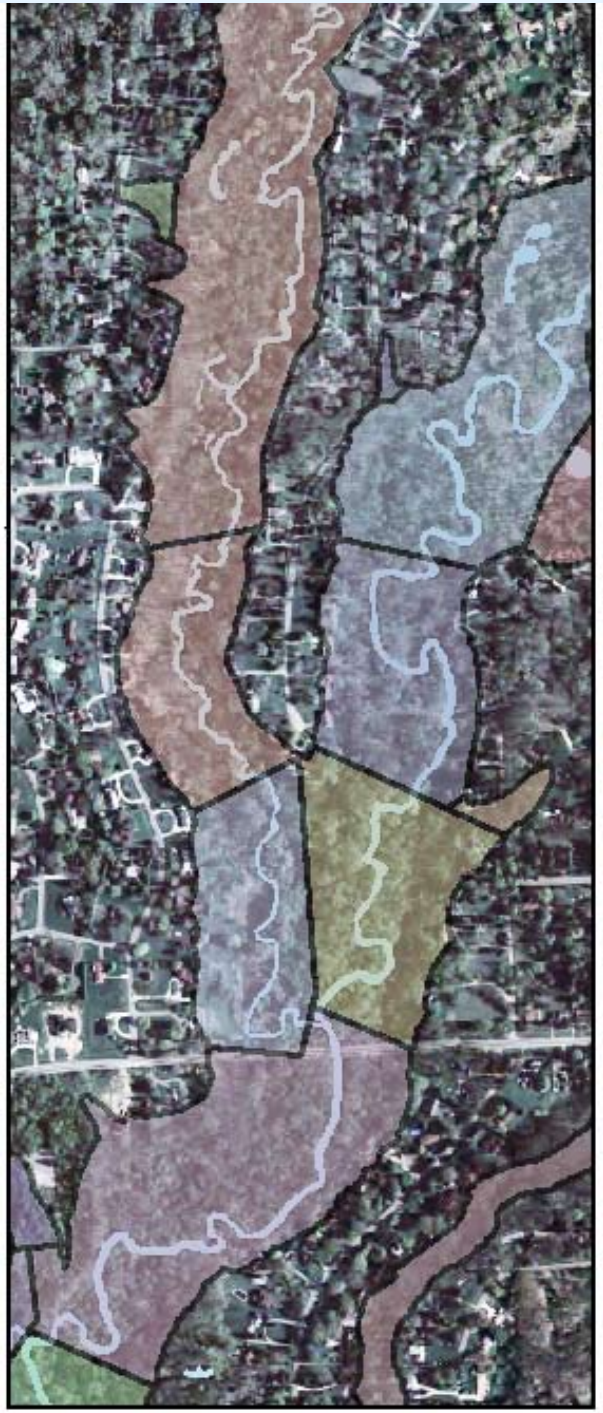
Many planning processes exist. The selection of a planning process will depend upon available resources and the desired level of detail. The following process is adapted from the 5-S Conservation Planning Process developed by The Nature Conservancy (TNC). (http://conserveonline.org/docs/2002/01/cbd.pdf) The 5-S process looks at Systems, Stresses, Sources of Stress, Strategies, and Success measures. This approach was modified to adapt to multi-objective riparian management planning. This method can be further adapted to the particular needs of your project.

1. OPTIONAL: Divide the corridor into unique sub-areas

This optional step involves taking a closer look at the entire length of the riparian corridor and identifying points where the character and context of the riparian corridor changes significantly. These may be areas along the river where there is a discernible change in physical/ecological or cultural character, context, or function that result in different assets, functional values, and ultimate goals and objectives. Depending on the size and complexity of the river system and the complexity of your planning needs, the corridor may be divided into many, few, or no unique sub-areas.

Examples of things to look for include:

- A transition into a new landscape ecosystem type
- A point of confluence where two streams join together
- A significant change in river valley width or slope
- An area where the river character changes significantly, such as becoming channelized or enclosed
- A change in hydrology or ecosystem type; such as transition from stream to marsh to lake
- Below a dam, impoundment, or lake level control structure
- A significant change in underlying or surrounding geology
- An area where riparian land use changes in character and/or intensity
- An area in which land ownership patterns change, such as transition into a large state park area



The Rouge River corridor divided into several subsections.

2. Identify special places along the corridor

This step involves taking another look at the entire length of the riparian corridor to identify special and unique areas that deserve special attention and planning.

Examples of things to look for include:

- A known high-quality natural area in need of special protection or stewardship
- An area of particular historical interest
- Publicly owned riparian lands
- Areas of stunning or expansive views
- Areas presenting unique opportunities for connecting people with the river such as urban waterfronts
- Significantly degraded areas presenting great restoration challenges

3. Inventory ecological and cultural assets and opportunities within sub-areas and in special places

Carefully evaluate each sub-area and special area identified in steps # 1 and # 2 to assess what is valuable in these areas. In some areas, these assets and opportunities may be only a potential.

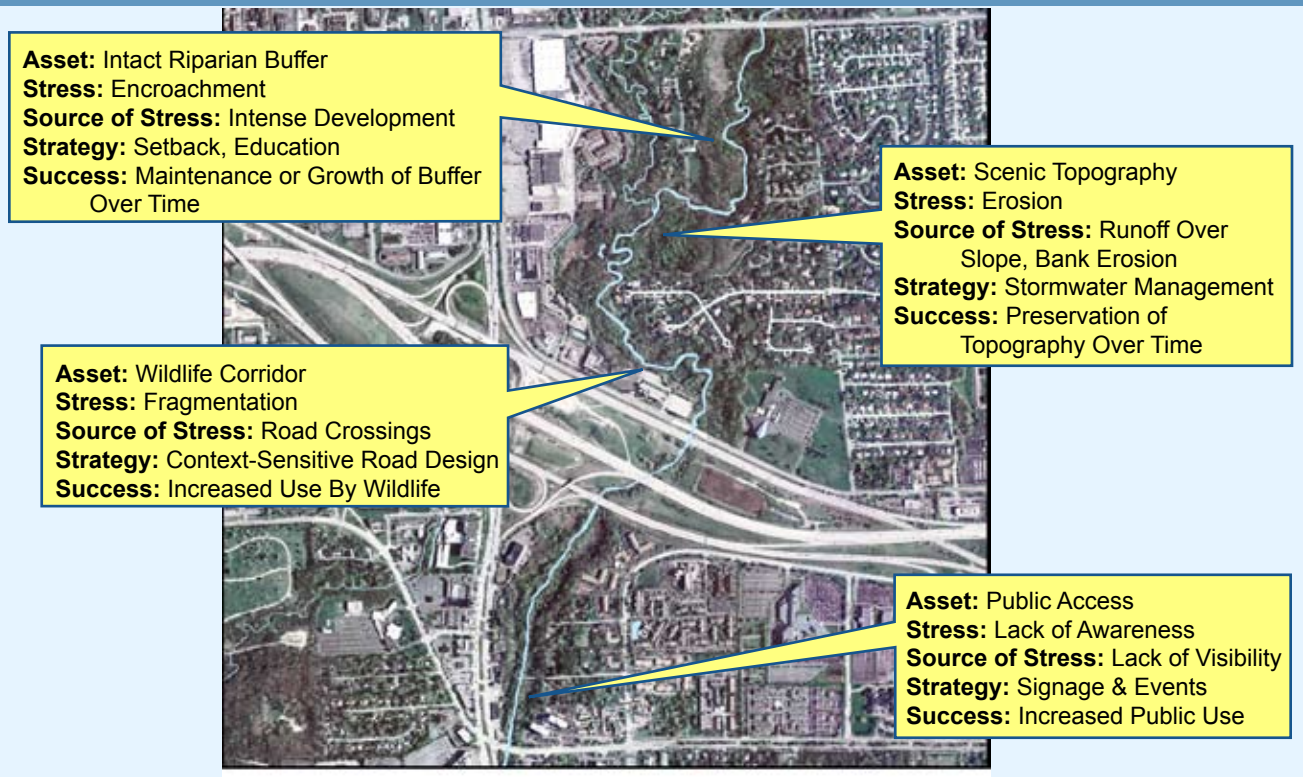
Riparian assets and opportunities may include the following:

- Generation of biodiversity
- Provision of wildlife corridors
- Filtering of surface runoff pollutants
- Provision of recreational opportunities
- Provision of drinking water
- Water supply to wetlands/lakes
- Stormwater detention and treatment
- Provision of fisheries/waterfowl habitat
- Provision of floral diversity and wildlife habitat
- Protection of shoreline and streambank from erosion
- Recharge of groundwater aquifers
- Provision of unique geological resources, topography and scenic vistas
- Provision of historical resources
- Connecting people with nature
- Focal point for economic development and revitalization

The TNC 5-S method terms these assets and opportunities “conservation targets”. These are the things you want to preserve, restore, or improve in your river corridor.

4. Create a Riparian Corridor Plan

By this point in the planning process, a project area has been identified, a group of stakeholders has been assembled, the corridor is mapped, sub-areas and special places have been identified, and the ecological and cultural assets and opportunities have been identified within each of these areas that are worth planning for protecting. The "5-S" process is now initiated. The first "S" involves looking at the ecological system, which is inherent in the process of planning for the riparian corridor system. The following steps continue the process by addressing the issues and solutions associated with each "target".



4a. Identify Stresses

Once you have identified the assets and opportunities for the sub-areas and special areas in your riparian corridor, examine each for stresses— what is threatening the asset or opportunity? For example, are fisheries being threatened by sedimentation or habitat loss? Is an opportunity for a recreational trail being threatened by a road development that is not sensitive to the local context?

4b. Identify the Sources of Stress

Look more deeply at each stress identified. What is the ultimate source, or root cause, of that stressor? If sedimentation is the issue, is it caused by a specific road-stream erosion problem upstream? If context-insensitive development is a stressor, is it caused by lack of awareness and coordination between planners, and engineers responsible for road projects?

Multiple sources of stress may exist for each stressor, and may cause more than one stressor. Prioritize the sources of stress that have been identified to see where the most "bang for the buck" can be found to address these threats.

4c. Identify Strategies

Identify strategies that directly address the most important sources of stress. If a particular erosion problem is of concern, streambank stabilization of a particular area may be required. If lack of coordination or awareness is a problem, an initiative to facilitate dialog and educate planners and engineers may be necessary. Strategies may occur at the local, corridor, and watershed levels.

Part of identifying strategies involves identifying the responsible parties, time frames, and resource needs necessary to implement them. The stakeholder group will be invaluable in identifying these resources.

4d. Identify Success Measures

How will you know when goals are met? It is critical to develop a set of criteria that enable you to measure the success, evaluate progress regularly, and communicate progress to the stakeholder group and the public. For example, success measures may evaluate whether land is conserved over time, erosion has abated, or increased public use of riverside facilities has occurred.

Branding and Identity Planning Process

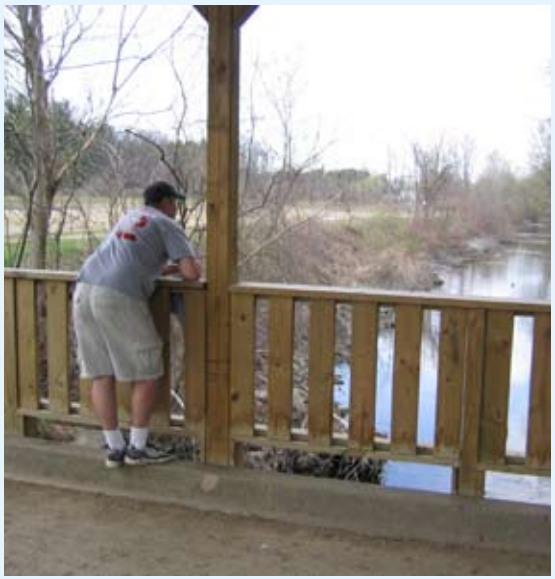
1. Describe the corridor and create an identity concept based on the unique geology, ecology, and cultural history

This planning process is based upon steps taken and lessons learned in the Rouge Green Corridor Identity Project in Southeast Oakland County. It is designed to assist stakeholders and partners in identifying the unique story told by their river corridor, and then turning that story into a brand identity and promotional tool.

It is difficult to care about something you have not experienced. To deeply care about something— whether it is a person, place, animal, or object— most people need to be able to either see, hear, touch, smell, or taste it. Even more, they need to be able to identify with it, to know something about its history and character, and its relationship to their own lives and the larger world. This is true for most things, including preservation of the environment.

Getting people to care about the environment requires that they identify and experience that environment in a personal way. Riparian corridors are excellent opportunities for doing this: they are distinct geographic features on the landscape, are accessible to people because they flow through nearly every community, and are rich in many attributes that can be used to create an identity and sense of place.

Riparian corridor identity begins with some basic elements: unique geography, ecology, history, values, challenges, and stewardship opportunities. All of these can come together to tell a story. When the details of these elements are sketched out, something special materializes that people can grasp with their hearts and minds.

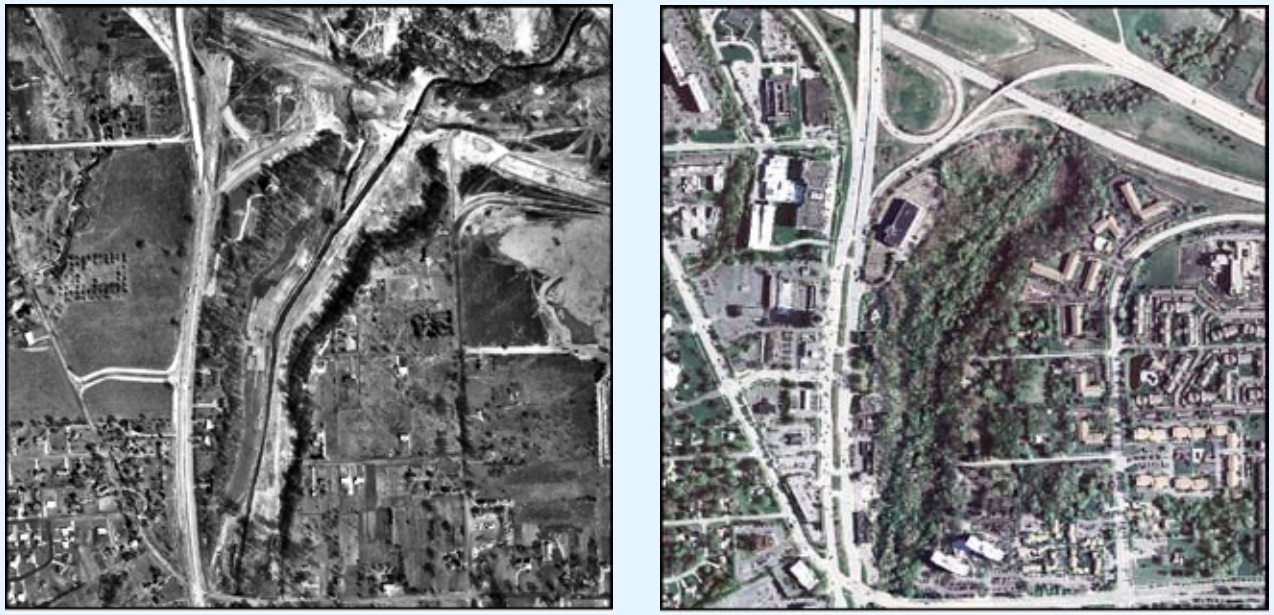


The Geographic Story

Each river corridor has a unique geography composed of many aspects. These characteristics change as a river flows from headwaters to mouth, as things such as topography, elevation, geology, landscape ecosystem type, and land use change. It is useful to construct the geographic story of the river corridor.

By answering the following questions, the story can be revealed:

- How did the watershed originate geologically? When and how did glaciers retreat, and what drainage patterns evolved as a result?
- What geographic features existing along the riparian corridor today provide evidence for the glacial origins of the river system?
- How did ecological succession take place in the time between the glacial melting and the modern day?
- What types of plants and animals once inhabited the area? What types of plants and animals inhabit it today?
- Is the river valley steep or shallow; is the surrounding landscape rolling or flat? How did the landscape affect the people, plants and animals who have inhabited this place?
- What types of riparian features exist in the river valley? Are there bluffs, oxbows, or ravines?
- Does the riparian corridor area being considered lie within the entire drainage network? Is it a tiny headwaters stream, a medium sized creek, or part of the lower river's main stem?
- What geographic factors were important in the economic and cultural history of the river, attracting or providing obstacles to native or European settlers?
- Did the location of the river affect how land was developed around it? Are there intense industrial land uses, a lot of private residences, or large parks and preserves?
- How does the geography play into modern recreational or interpretive opportunities? Are there any special viewsheds or overlooks?



The soils and low, wet floodplain along this stretch of the Rouge River allowed it to be farmed for celery in 1963 (left). Later on, the forest regenerated and it is now used as a public park (right).

The Ecological Story

The ecological story of a river changes in parallel with the geographic story, from headwaters to river mouth. Telling the ecological story provides a deeper understanding of the environmental resources of a river corridor.

Start with the broad overview:

- Which landscape ecosystem does the area fall in?
- Is the riparian area a functional wildlife corridor?
- How does the river relate to the larger landscape?
- How are the existing ecological resources impacted by modern land use and recreational patterns?

Next, move to the river corridor:

- What types of unique ecological communities exist in the riparian corridor? Are there any high quality natural areas?
- Are there any areas that have been severely impacted by removal of vegetation or by exotic invasive species? Has the vegetation along the river corridor been altered by human use: farming, mowed lawns?

Finally, consider the stream channel:

- How healthy is the river? What do studies of water quality, fish, and macroinvertebrates tell us?
- How does this information relate to the type of geology and land use in which the stream flows? Is the stream corridor impacted by stormwater inputs from surrounding impervious surfaces?
- Are there significant direct sources of pollution (illicit discharges)?

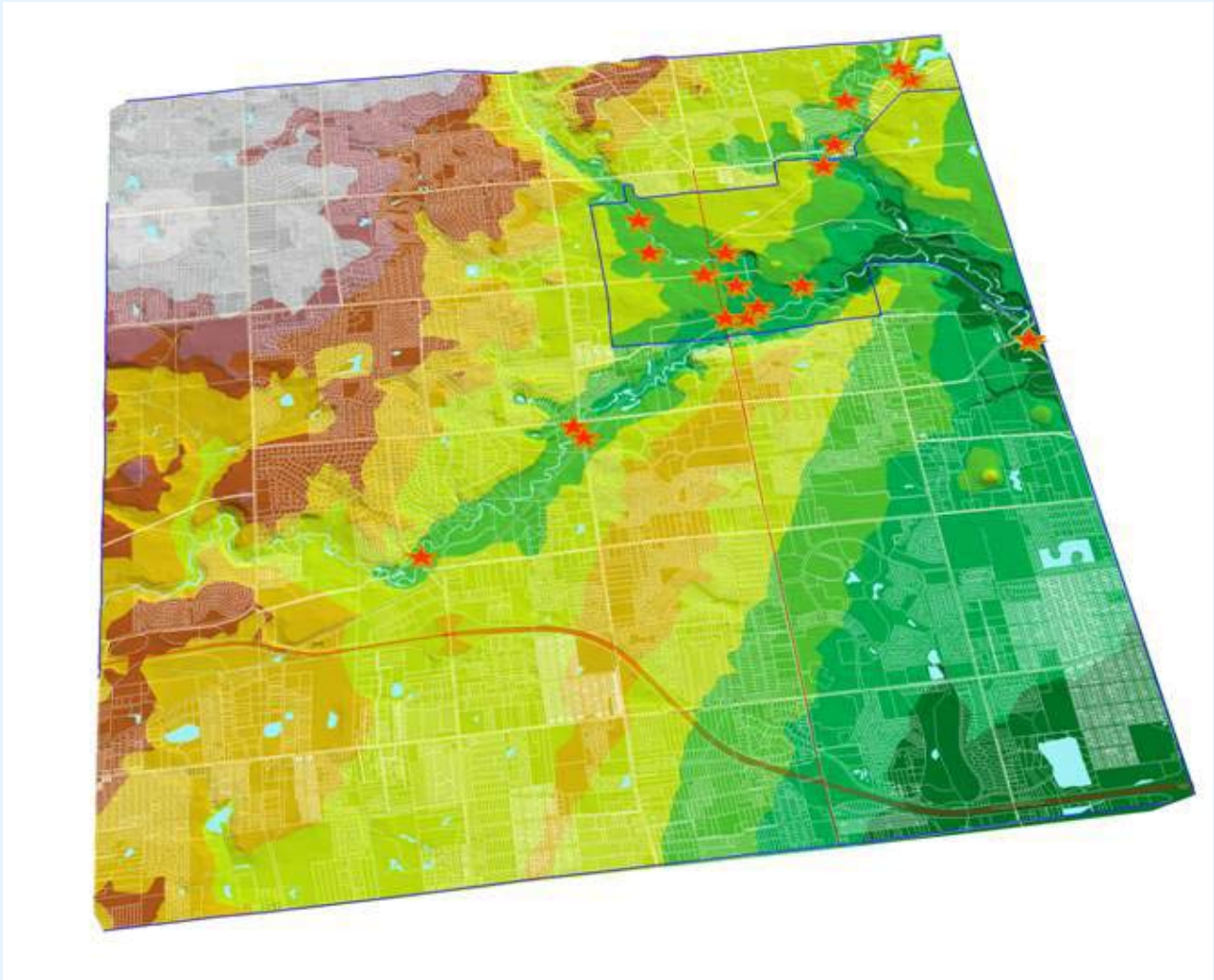
This area of the Rouge River is impacted by intense surrounding land uses and narrow buffer vegetation.

The Human Story

Humans have always made great use of river systems; rivers are sources of food, water, transportation, and energy.

Consider any historical human activity in the area:

- Is there any evidence of Native American settlement or movement along the river corridor?
- What ecological or geographic factors may have attracted or discouraged aboriginal activity?
- Are there any early European settlement sites? Were there any mills or early villages along the river?
- How are modern development patterns influenced by early European settlement patterns?
- Has development centered around or radiated from compact villages along the river?
- Do existing park lands reflect the vegetation of old farmsteads, with orchards and tree rows?



The steep gradient of the Clinton River and its tributaries in the Cities of Rochester and Rochester Hills made it the ideal locale for construction of mills. Each star on the map represents a historic mill site.

Photo Credit: Rochester Hills museum at Van Hoosen Farms

2. Develop a Brand Identity Concept

Once the appropriate questions have been asked and the story constructed, vehicles to communicate that story to the public will be needed. A brand identity that captures the essence of the riparian area's unique character will assist in communication and help to create a recognizable concept for the corridor.

Brands are commonly applied to consumer products like toothpaste and cereal, but brands can be applied to anything that one wants people to become familiar with. A good brand identity for a natural resource should do the following:

- Symbolically represent the resource
- Generate a positive feeling about the resource
- Raise the visibility of the resource
- Clearly communicate what the resource is
- Promote an expectation or promise about the resource
- Inspire people to want to connect with and protect the resource

This logo was developed for a stretch of the Rouge River that is considered special because of its unique natural character. The logo combines the colors blue and green to denote the natural elements of water and vegetation that combine in the corridor.

3. Plan & Implement an Outreach Campaign to Communicate the Brand Identity

Once the brand identity concept is created, an outreach plan needs to be implemented to get the brand out into the public eye. The brand logo needs to be bold, recognizable, and have a minimum need for explanation on all applications.

The following ideas may be useful:

- Conduct a public reception to unveil the identity concept and get the public out into the corridor.
- Create a website that communicates the corridor identity, updates the public on the planning process, and asks for comment and input.
- Hold a series of outdoor "ecotourism" events that highlight the corridor identity and require participants to provide input into the planning process.
- Work with local reporters and media outlets to create newspaper articles and TV spots about the corridor. When working with the media, know their deadlines and give plenty of advance notice when seeking event coverage. Follow up with a personal phone call, and thank the reporter.
- Create and distribute a colorful brochure or poster than includes the brand identity and encourages the public to visit the corridor.
- Use the brand in a series of printed advertisements: distribute bumperstickers, t-shirts, window stickers, etc. to the public.
- Use the brand in signage program.
- Use the brand in all communications relating to the river corridor.

Outdoor "ecotourism" events help the public become acquainted with the nature in their own backyard.

Relationship of Riparian Corridor Planning to Federal Phase II Stormwater Requirements

All riparian corridors exist within the context of a watershed. No amount of management at the stream corridor level can fully mitigate the impacts of stormwater. A watershed that is out of balance hydrologically will have degraded stream corridors. Successful watershed management includes stormwater management, including provisions for impervious surface reduction, low-impact development techniques, and preservation of critical natural areas and wetlands.

Management of riparian corridors is a key component of compliance with the federal Clean Water Act Phase II Stormwater Regulations. Many communities in Southeast Michigan have prepared local subwatershed plans to comply with Phase II. Virtually all of these plans identify management of riparian corridors as a specific goal and/or objective. In addition, the Michigan Department of Environmental Quality requires "education of the public concerning management of riparian lands to protect water quality."

Finally, each community must implement a program to eliminate illicit discharges of pollutants into their waterways.

Stormwater runoff from impervious surfaces such as pavement causes serious impacts to waterways. Stormwater is now regulated under phase II of the Clean Water Act.

Summary

Riparian corridors present many ecological, cultural, and economic values to communities, with associated challenges and stewardship opportunities. Whether a river corridor is pristine or degraded, it can benefit from careful thought, planning and promotion to maximize it as a community asset. A planning process for riparian corridors is a dual process; planners must communicate the identity of a river corridor while at the same time planning for management of the riparian landscape itself. Riparian corridor planning is related to and satisfies many requirements of federal Phase 2 stormwater regulations. A riparian corridor planning process begins with identifying the project area, initiating a stewardship group of relevant stakeholders, and mapping the corridor. Mapping options may incorporate geomorphic, parcel-based, or buffering methods. The 5-S planning approach developed by The Nature Conservancy may be appropriate. This method asks planners to identify conservation (or restoration) targets, and then identifies stresses, sources of stress, strategies, and success measures for each. For the branding and identity planning process, a brand identity concept for the river corridor is developed based on its unique geology, ecology, and cultural history. An outreach campaign to communicate the brand identity is then implemented.

Conservation and Restoration of Riparian Corridors

Chapter 4 Includes:

- Prioritizing Efforts to Protect the Natural Ecosystem
- Land Preservation Tools
- Connecting the Landscape Through Green Infrastructure
- Conserving and Restoring the Riparian Corridor
- Protecting and Restoring Stream Banks & Instream Habitat
- Unbalanced Flow: Stream Bank & Instream Habitat Degradation
- Benefits of Stream Buffering
- Stemming the Tide: Stream Bank Stabilization
- Managing Instream Habitat
- Stewardship, Invasive Species, Land Trusts, and Native Landscaping
- Partnerships, Volunteering, and Community Involvement
- Summary

Plans are only good intentions unless they immediately degenerate into hard work.

Peter Drucker

Conservation & Restoration Opportunities

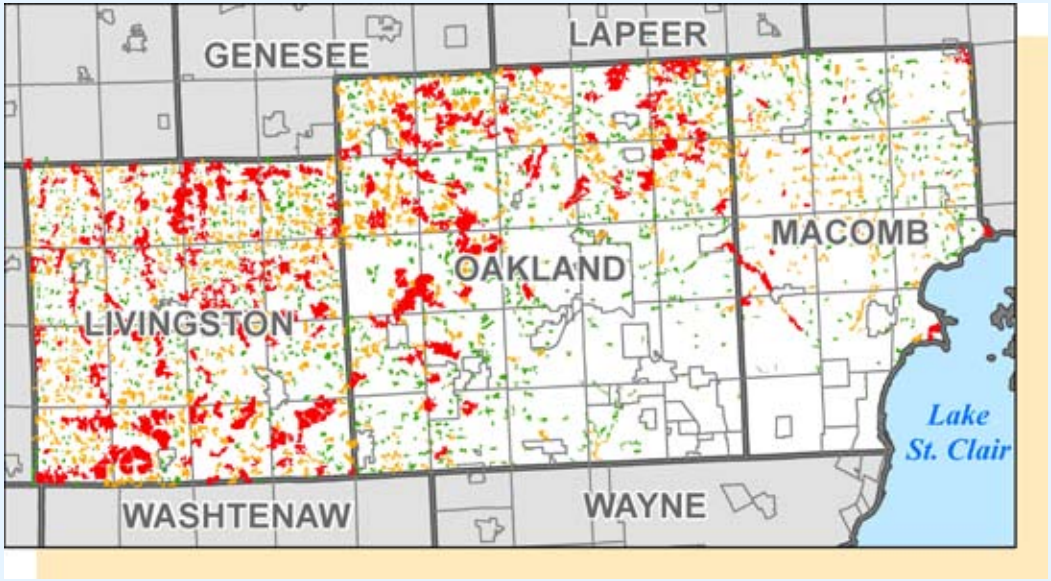
Prioritizing Efforts to Protect the Natural Ecosystem

Land use planning and other land use management programs can have a major influence on the future of natural landscapes. Municipalities have a responsibility to prepare official planning and zoning documents. Through these documents, they can protect the integrity of this very valuable natural resource system. Knowing which lands are ecologically important can assist in prioritizing preservation and restoration efforts. If avoiding significant habitat is not possible, projects can be planned that minimize the negative effects frequently associated with development.

County planners within the region have been working with the Michigan Natural Features Inventory (MNFI) to create comprehensive natural area mapping that identifies and prioritizes natural resources and critical ecosystems. This mapping is readily available within several southeast Michigan counties and is in the process of being developed in several others. This comprehensive mapping can help shape development and may provide a starting point from which to build a connected resource system. Streams along, with their vegetative buffers, are critical links that hold these natural areas together and should be taken into consideration whenever development occurs.

Natural areas provide community benefits such as clean air, water, and recreation when preserved and managed as part of a green infrastructure plan.

Local stakeholders join together to plan for the preservation of green infrastructure in Oakland County.



Comprehensive natural area mapping in Livingston, Oakland, and Macomb Counties assists communities in identifying and prioritizing critical natural areas.

Land Preservation Tools

Many different approaches are needed to preserve and/or restore a riparian system. River restoration is often difficult because the damage has accumulated over decades and restoration efforts may take a long time to be fully realized. It is much more cost effective to prevent the problem than it is to fix it. Forming a local conservation vision (preserve, monitor, and restore) will provide purposeful direction to guide the most appropriate actions within a given area.

Each land protection tool has pros and cons which must be weighed in context of the overall local conservation vision. Part of the overall strategy should include prioritizing the most fragile natural resource sites for acquisition or potential conservation easements by public agencies (local governments) and private organizations (land trusts).

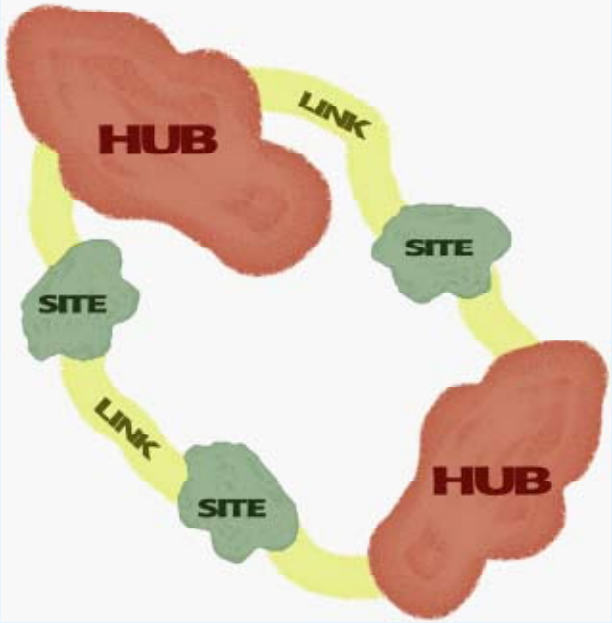
- **Land Acquisition:** Landowners can donate lands with conservation value to land conservancies so that the land can be managed and preserved for its ecological value. Outright donation of land has several benefits including substantial income tax deductions. On occasion, lands with unique natural features are purchased by municipalities and/or conservancies.

- **Conservation Easements:** A conservation easement is a legal agreement with a landowner that permanently limits the type and amount of development that may take place on the property. Landowners retain all other ownership rights and may qualify for income tax and property tax benefits.

Land acquisitions and conservation easements in key areas can help to preserve riparian corridors, wildlife habitat, and viewsheds.

Connecting the Landscape Through Green Infrastructure

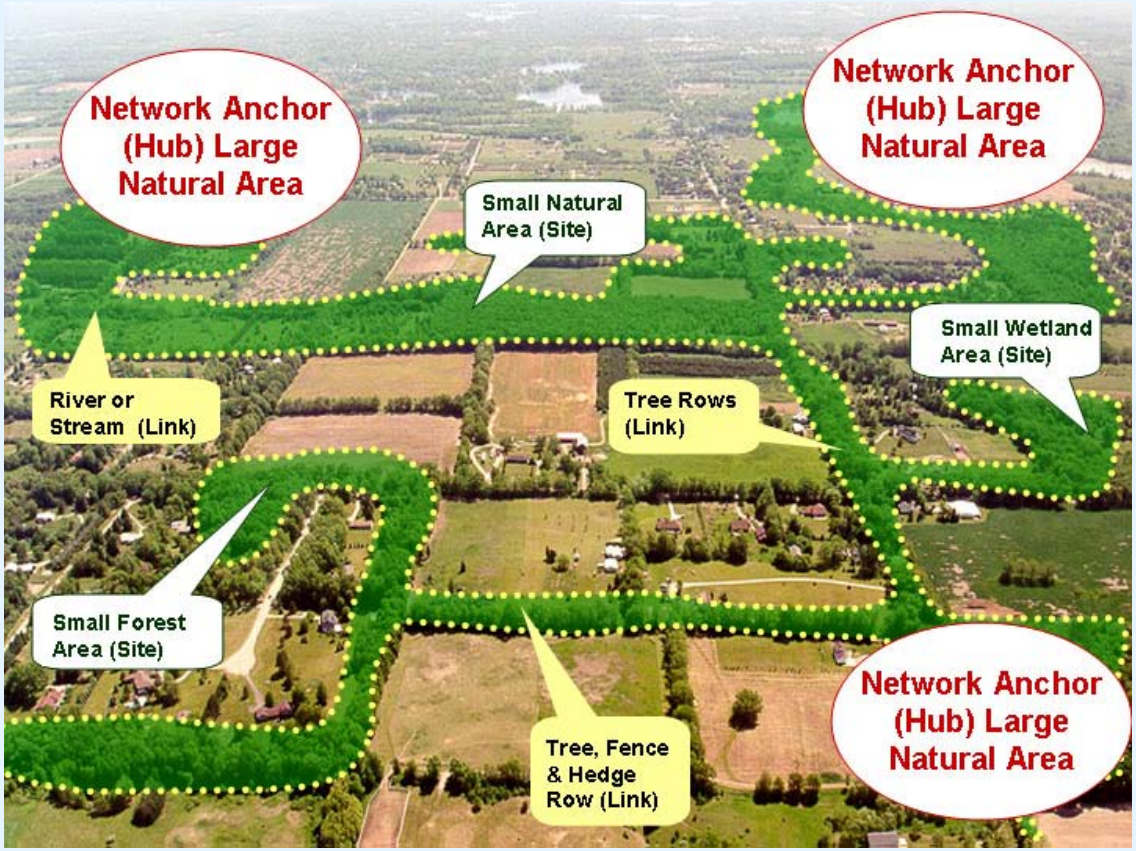
Several counties including Oakland, Macomb, Genesee, Lapeer, and Shiawassee along with various stakeholders are in the process of developing countywide Green Infrastructure Vision Plans in order to connect and protect their remaining natural lands. These visions will encompass natural and restored native ecosystems that make up a system of hubs, sites, and links. When completed, the visions have the potential to act as a guide for future development and should provide coordination for long-term ecosystem preservation and restoration efforts.



Hubs, Sites, and Links
Green Infrastructure is the interconnected network of open spaces, natural areas, and waterways.

Green infrastructure networks consist of the following components:

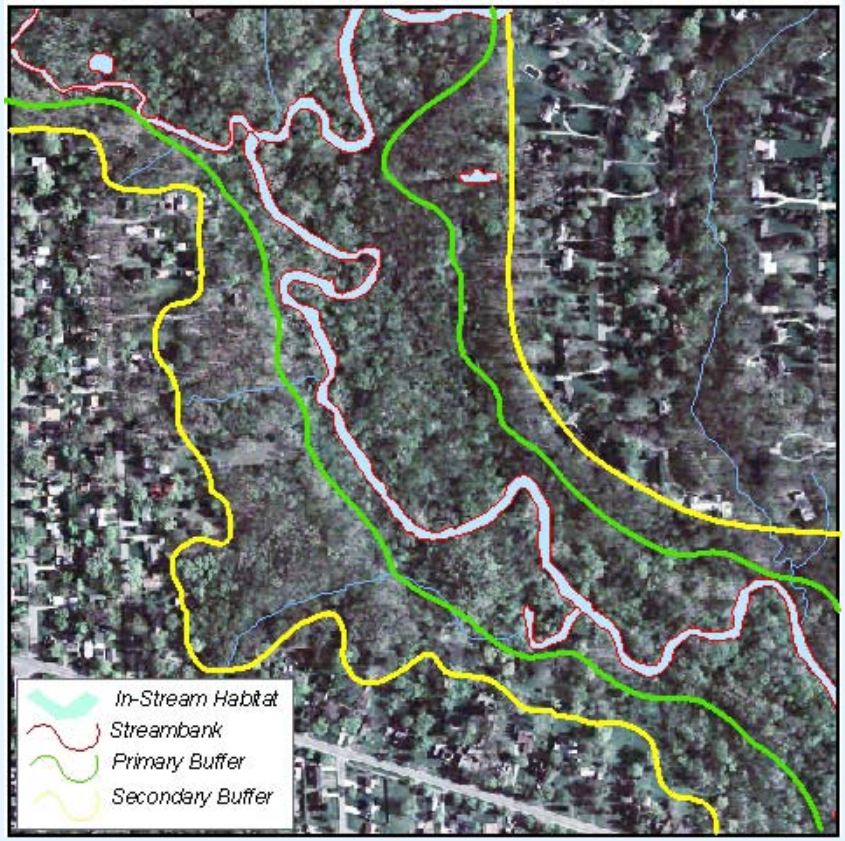
- **Hubs:** Hubs anchor the network and provide an origin or destination for wildlife. Hubs range in size from large conservation areas to smaller parks and preserves. Hubs provide habitat for native wildlife and help maintain natural ecological processes.
- **Sites:** Smaller ecological landscape features that can serve as a point of origin or destination or incorporate less extensive ecologically important areas.
- **Links:** The connections that hold the network together and enable it to function. Links facilitate movement from one hub to another.



Conserving and Restoring the Riparian Corridor

A few key points about preserving and restoring riparian corridor:

- **Wider the Better:** The wider the buffer vegetation around a water body, the more effective
- **Listen to the Landscape:** The optimal width of a buffer is not a fixed distance from the stream but varies depending on the local development pattern, natural topography, and resources.
- **Go Native:** Riparian buffer vegetation should consist of native existing or planted trees, shrubs, grasses and forbs well-suited to the site.
- **Any Buffer is Better Than No Buffer:** Even narrow strips of vegetation around a water body can stabilize streambanks and filter runoff
- **It All Adds Up:** The cumulative effects of many small restoration efforts can have a big impact.
- **Pocketbooks Benefit as Well:** Protecting natural areas and improving water quality enhances property values.



	Instream Habitat ***From water's edge to water's edge***	**Streambank** From the top of the water to the top of the bank	**Primary Buffer** From the top of the bank inland	**Secondary Buffer** From primary buffer to the nearest structure
Function	Provides aquatic habitat for fish, macro-invertebrates and herpetiles	Controls erosion, provides shade, visual screen, and noise control	Provides wildlife habitat and captures pollutants	Captures sediment and runoff, protect primary buffer from intense land uses and exotic invasive species
Action	Maintain adequate habitat through woody debris management, mitigation of erosion and sedimentation, and conservation of wetlands	Plant with native trees and large shrubs. Stabilize bank using natural methods when possible	Explore options for permanent protection such as conservation easement or acquisition. Plant with native trees, shrubs and perennial ground cover	Plant with native grasses and wildflowers
Tip	Utilize local efforts using volunteer labor from groups such as Trout Unlimited	Depending on the condition of the stream bank, hard or soft engineering approaches may be needed	Using a variety of plant species will attract more wildlife and better contribute to biodiversity	Place less emphasis on lawns and more on views

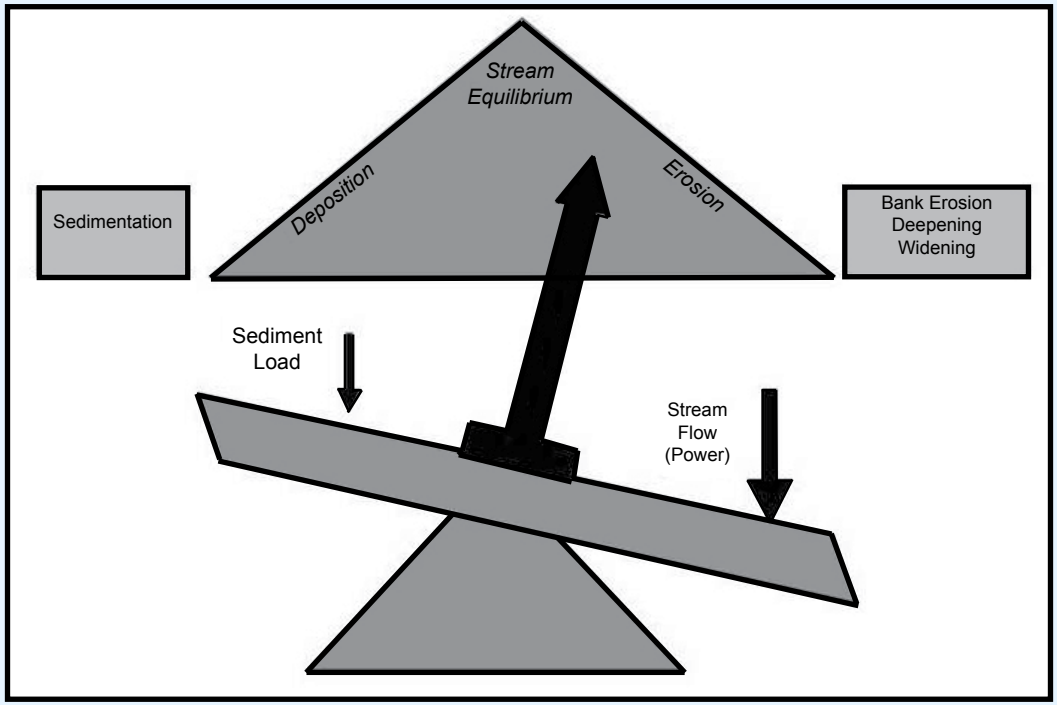
Each component of a riparian corridor has unique characteristics functions and can benefit from specific actions targeted toward that component.

Protecting and Restoring Stream Banks & Instream Habitat

Beyond the riparian buffer, the stream itself may be in need of restoration. The stream can be separated into two main components: (1) the banks and (2) the instream habitat. The banks of a stream are the immediate zone of separation between the streams and their floodplains. They are shaped by "bank full flow", which is the amount of stream flow that occurs when the river is at its full capacity (before it spills over its banks into its floodplain). The instream habitat consists of the continuously varying patterns of rocky substrate, overhanging vegetation, aquatic vegetation, and woody debris.

Unbalanced Flow: Stream Bank & Instream Habitat Degradation

An increase in stream flow resulting from large volumes of stormwater runoff from the watershed is the primary cause of stream bank and instream habitat degradation. Agricultural and urbanizing watersheds have increased amounts of stormwater runoff delivered to their streams as a result of a diminished capacity of the watershed's land surface to absorb rainfall. This diminished absorption capacity is the result of vegetation removal and increased impervious surfaces (roads, rooftops, driveways, and parking lots) that accompany agricultural clearing and urban development.



Streams must change their form in order to accommodate the amount of water and sediment they receive from their watersheds.

When the landscape of a watershed is stable, its streams have reached equilibrium with respect to the rates of erosion and deposition of sediment carried by the stream. Changes in the landscape of a watershed, such as increased impervious surfaces, cause a change in the hydrologic regime and sediment loading regime in that watershed. As a result, streams come out of equilibrium. As streams seek to establish a new equilibrium they must accommodate to changes in runoff and sediment delivery from the watershed. In doing this, they must change form, often deepening and widening, and course, often cutting off existing meanders or migrating to accommodate the increased demands from the watershed.

This rebalancing is a natural process, occurring whether the changes in a watershed's land cover are natural or man-made. Once watershed landscape changes have occurred, it can take decades to reach a new equilibrium after the landscape has once again stabilized. Natural meandering or migration of the stream has implications for development and land uses situated close to the banks. Stabilization or channelization of a stream to prevent or alter this natural migration can have permanent negative consequences for stream banks and instream habitat, but may become necessary to protect or develop property.

Throughout this process, the stream banks, instream habitat, and fish community can become seriously degraded. High flows scour the stream, uprooting vegetation and collapsing banks. Increased sediment loads settle in the stream, choking off the rocky bottom substrates that provide good instream habitat. Frequent stream-scouring flows turn the river into a homogenous conduit, destroying the variation in substrate that provides good aquatic habitat. Straightened stream channels provide less habitat. Human intervention can provide some remedy for these situations, but comprehensive watershed management is the most effective strategy.

This house is threatened by erosion of the banks along the Clinton River as the river works to stabilize itself in response to increased loads of water and sediment from its watershed.

A wealth of information and resources about stream stability and stream bank and instream habitat restoration can be found in Stream Corridor Restoration: Principles, Processes, and Practices, published by the Federal Interagency Stream Restoration Working Group. The document can be downloaded at:

http://www.nrcs.usda.gov/technical/stream_restoration/

This creek has soft-engineering stabilization methods installed to protect the stream banks from erosion.

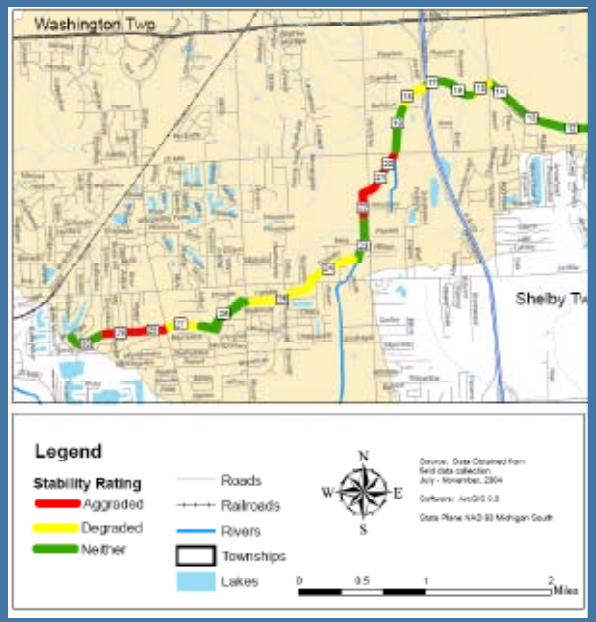
1963

2002

The Paint Creek in the City of Rochester was straightened and re-routed near its confluence with the Clinton River, allowing the development of the municipal library along the banks.

Clinton River Geomorphology Project

This Clinton River Geomorphology Project was conducted through Macomb County and Environmental Consulting & Technology (ECT). A purpose of the project was to evaluate the stability of individual stream reaches to plan for stream restoration projects and highlight areas of the river that require planning consideration for adjacent land uses.



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Environmental Consulting & Technology

Benefits of Stream Buffering

Riverbanks that contain natural vegetation can reduce erosion and flooding, filter pollution, and serve as migration routes and forest connectors between habitats for a variety of wildlife. All streamside landowners, whether in urban or rural areas, can work to reestablish gaps (areas lacking vegetation) along riverbanks.

This stream bank stabilization project along the Rouge River in the City of Birmingham utilized native plants and local materials. The log that is bolted into the stream bank was recovered from a dead tree that had fallen nearby just weeks before the project was installed.

To improve water quality, the design of riparian vegetative buffers must take into account the area's hydrology, topography, soils, pollutant loadings, and adjoining land uses. Riparian vegetative buffers, although very important, should be recognized as only one part of a comprehensive land management plan. Whenever possible, urban and rural parks and open spaces should be linked to form functional wildlife corridors.

This once stabilized, wooded slope is prone to erosion caused by clear-cutting the vegetation.

Stemming the Tide: Stream Bank Stabilization

Stabilization of stream banks is an increasingly common practice as urban streams erode their banks, threatening properties as well as river ecosystems. Options for stream bank stabilization depend on the nature and extent of the erosion, characteristics of the stream, and resources available to address the problem. Two main types of solutions involve “hard” engineering approaches which stabilize stream banks with hard structures such as rock, concrete, and metal, and “soft” engineering which involves the use of natural materials and plants to reinforce the stream banks.

The riparian forest is falling into the river as the Clinton River erodes its banks.

Because stream bank erosion is a natural process that involves the entire watershed, it is critical to have an understanding of what is going on along the entire length of the stream before attempting to manage banks at specific locations. The stream must not be too far from equilibrium, and future changes in the watershed landscape that might drive the stream out of equilibrium in the future must be taken into account. Attempting to stabilize a stream bank that is severely out of equilibrium or whose watershed is likely to have significant increases in impervious surfaces in the near future may prove futile. The stabilization treatment may fail within a short period of time or may cause problems elsewhere along the stream.

These cobbles were installed as part of a stream bank stabilization effort in a city park in the City of Auburn Hills along the Clinton River.

Rock-filled gabion baskets provide stream bank stabilization in the City of Rochester Municipal Park.

From an environmental standpoint, soft engineering methods are preferred and every effort should be made to favor soft approaches when possible. Soft engineering approaches can improve habitat and are generally more aesthetically pleasing than hard approaches. In some situations, soft approaches will not provide the desired stability. Combination approaches may be employed using harder solutions for areas under great stress and softer approaches for less threatened areas. An example may include installing live-stake fascines of woody material higher on a bank but stabilizing the toe of a bank with rip-rap or gabion baskets.

Clinton River Coldwater Conservation Project

The primary goal of the Clinton River Coldwater Conservation project was to assess and develop the coldwater potential and public access opportunities in lower Galloway Creek and the middle mainstream section of the Clinton River to become a designated trout stream. The second goal was to enhance and create trout in-stream and streamside habitat that protects and creates trout spawning habitat.

Managing Instream Habitat

Improvement of the habitat in a stream is an important part of managing for fisheries. A wide range of tools are available for managing instream habitat. Approaches concern the removal of excess sediment, installation of man-made habitat structures, and best management of existing instream habitat resources.

Sediment removal and the installation of sediment traps can improve fish habitat if done in the proper situation. The approach should only be employed when upstream sediment control methods have been implemented. Removing and trapping sediment in an unstable, severely eroding stream system is most likely a waste of resources and will not provide long-term benefit.

Man made habitat structures are designed to provide refuge, spawning habitat, and transportation pathways for fish and include lunker structures, boulders, logs, weirs, dikes, fish passage structures, and off-channel oxbows, ponds and coves. Optimally, the structures should be constructed from local materials. Man-made structures are less effective than natural structures, so maintenance and preservation of existing natural habitat should always be a top priority.

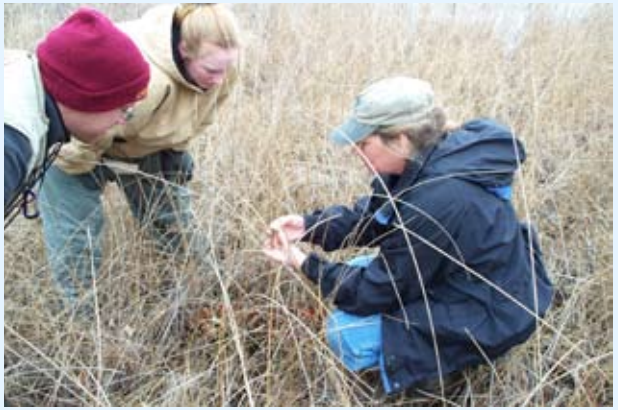
Existing instream habitat resources includes the management of woody debris and rocky habitat in a system. Principles for woody debris management include leaving most logjams in place instead of removing them to clear the stream of obstruction Excess materials from logjams can be used to create habitat structures. Management of rocky habitat focuses on preventing or managing the deposition of sediment around rocky substrates.

This artist's rendition of a lunker structure shows a type of instream habitat improvement which provides shelter and habitat for trout.

Voluntary Actions Engaging Private Land Owners

Well informed citizens not only make day to day decisions that support the river system, but can provide helpful input into the local decision making process. Additionally, these same citizens may take an interest in and support backyard habitat and funding efforts.

The collective positive actions of homeowners and businesses can make a significant difference in the larger landscape while improving the local environment. The challenge of learning about and protecting the environment may at first seem overwhelming. Environmental issues are often complex. The following opportunities should help match particular interests with positive actions that benefit the river system. Small successes can make a tremendous positive impact one home or business at a time.



A stewardship crew learns about managing invasive species.

Stewardship

Stewardship means being responsible for something and taking good care of it so that others can enjoy it, not just for today, but for many years to come. Stewardship programs help property owners protect their lands, reduce management costs, and improve the condition of natural resources. Invasive species can sharply degrade the quality of natural areas by altering natural processes and reducing biodiversity, therefore they should be included as part of the overall stewardship program. Sound Stewardship Programs Include:

- Baseline documentation
- Management plan
- Site boundary markers
- Continuous monitoring and maintenance
- Reliable funding source
- Maintaining communication with surrounding landowners

Resources for Stewardship

The Michigan Stewardship Network, a nonprofit partnership, trains, develops, and supports a core group of volunteer and professional stewardship leaders.

Michigan Stewardship Network
224 Charles Street
Ann Arbor, MI 48103
Phone: (734) 769-6981

Invasive Species

- Invasive species can seriously degrade the quality of the natural system by altering natural processes and reducing biodiversity. Being aware of potential problem species will enable stewards to conduct proactive steps to prevent their entry or to effectively control the species should it become established.

- Knowing what to plant and what to remove is a responsibility of good stewardship.

- Local conservancies can help determine which control method is most effective against the targeted invasive plant, while being the least damaging to the ecosystem.

Native Landscaping

Native landscaping refers to using plant species that are native to the area and adapted to the particular climate and soil conditions. Their root systems are highly developed, which allows the plants to use the water and nutrients available in the soil, eliminating the need for fertilizers, pesticides and watering. Homeowners and developers alike are beginning to appreciate the environmental, economic, and aesthetic benefits of native landscaping.

The benefits of native landscaping include the following:

- **Economic:** Native landscaping has the ability to strengthen community image, increase property values, improve water quality, reduce the need for detention facilities, and reduce the cost of landscaping installation and maintenance.

- **Educational**: Native landscapes are hands-on opportunities for people of all ages to learn about habitats and ecosystems. School yard programs are excellent opportunities for scientific study and can provide a greater understanding of community.

- **Environmental:** Landscaping with native plants helps to enrich the soil, decreases water run-off, and filters the pollution caused by fertilizers, herbicides, and pesticides. Native landscaping can help protect and restore the biodiversity of ecosystems, which in return provide habitat to a variety of plants and animals.

- **Aesthetic:** Native landscape designs can include dozens of species of trees, shrubs, grasses, and wildflowers, all blooming at different times during the growing season. When left standing during the winter months, they provide structure and interest that provide additional opportunities for wildlife viewing and photography.

Community based demonstration projects play an important part in raising awareness and getting volunteer involvement.

Land Trusts

Land conservancies (also called land trusts) are local, regional, or state wide private 501 (c)(3) nonprofit organizations that operate independently of government. They help preserve the character of their communities by working with various partners to preserve key high quality natural resources. Land Trusts are working closely with local communities throughout Southeast Michigan. These nonprofit groups bring a wealth of resource protection ideas to the table. The preservation tools used by the conservancies depend on the nature of the land to be preserved and the needs of the project partners.

Land Conservancies in Oakland County and Southeastern Michigan:

Oakland Land Conservancy
P.O. Box 80902
Rochester, MI 48308
Phone: (248) 601-2816

Michigan Chapter of the Nature Conservancy
101 East Grand River Ave.
Lansing, MI 48906
Phone: (517) 316-0300

Highland Conservancy
205 West Livingston Rd.
Highland, MI 48357
Phone: (248) 887-3970

North Oakland Headwaters Land Conservancy
P.O. Box 285
Clarkston, MI 48348
Phone: (248) 846-6547

Michigan Nature Association
326 East Grand River Ave.
Williamston, MI 48895
Phone: (517) 655-5655

Southeast Michigan Land Conservancy
8383 Vreeland Rd.
Superior Township, MI 48198
Phone: (734) 484-6565

Invasive Plant Species

Common reed (*Phragmites australis*) (above) and Garlic Mustard (*Alliara petiolata*) (below) are two of the most serious exotic invasive plants in Southeast Michigan's riparian ecosystems.

Partnerships, Volunteering, and Community Involvement

Individuals must work together to encourage all members of the community to increase their understanding of ecosystems and to participate in conservation and restoration activities. Public-private partnerships that include rural landowners, urban residents, public agencies, businesses and non-profit groups play an ever expanding role in the long-term protection of the resource.

Volunteer programs should be relevant, achievable, easily understood, and match interests with individual aspirations. Many opportunities exist to learn about and experience firsthand the unique natural heritage. Web-based tools are readily available and provide a wide range of local information about the natural environment. Also, local websites identify opportunities to get involved in activities within the community.

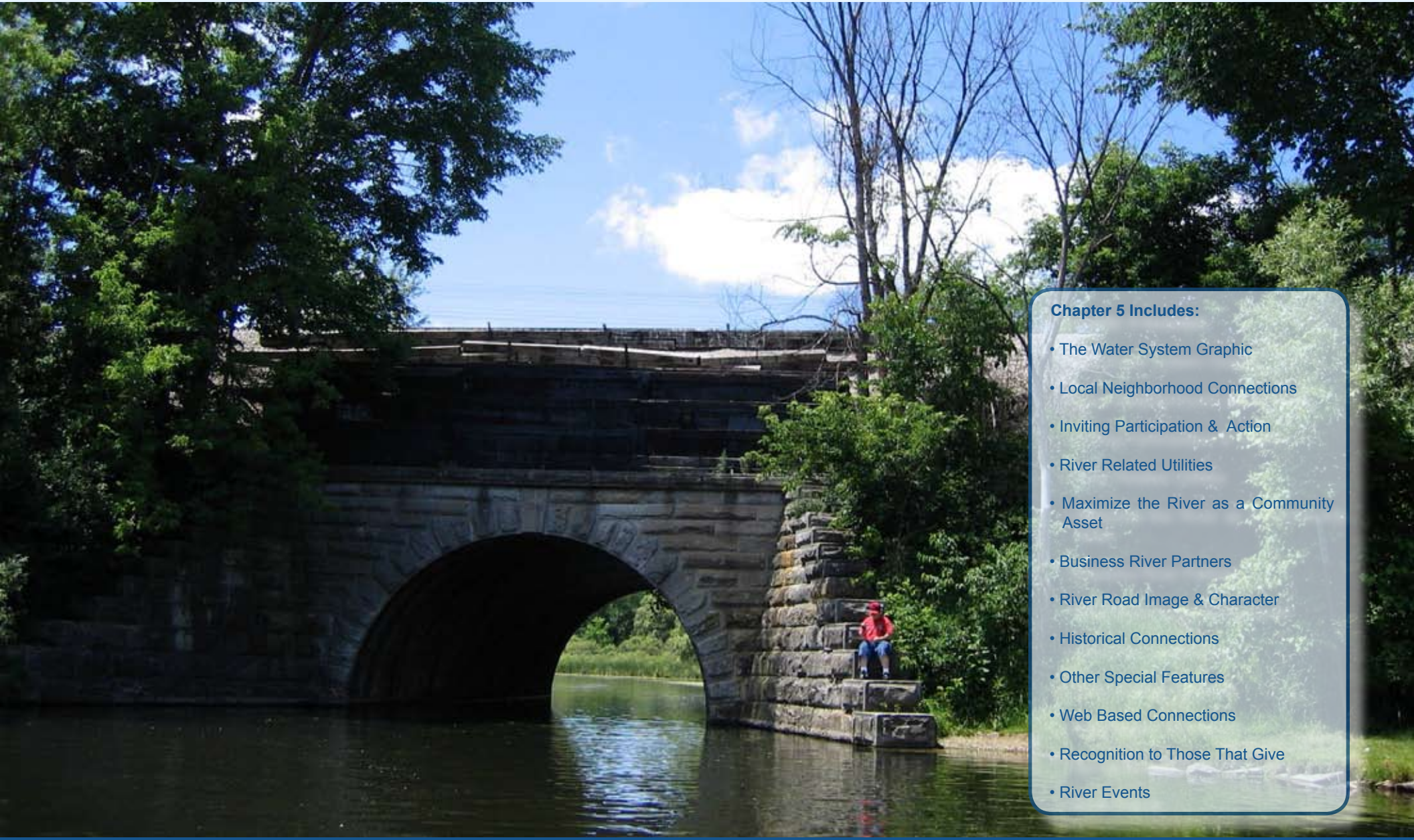
Community-based restoration demonstration projects are an excellent means of raising awareness and getting volunteer involvement. The use of permanent signs and other interpretive markers allow continuing awareness-building within the community.

Summary

Conservation of natural resources begins with identifying and prioritizing critical resources. County planners in Southeast Michigan have been working with the Michigan natural Features Inventory (MNFI) to create comprehensive natural area mapping that identifies and prioritizes natural resources and critical ecosystems. Land preservation tools include acquisition and conservation easements. Connecting natural areas through a green infrastructure network of hubs, sites, and links conserves landscape ecological integrity. Special care to protect riparian corridor complexes involves managing in-stream habitat, streambanks, primary buffers, and secondary buffers. Voluntary land management actions involving private landowner stewardship are a critical piece of the puzzle. Management of exotic invasive species and native landscaping has environmental, economic, aesthetic, and educational benefits. Land trusts and local community volunteers are important partners in land conservation and stewardship.

Public support and multi-agency partnerships are key components to any planning project.

Cultural Resources: Building Awareness and Connecting with the River



Chapter 5 Includes:

- The Water System Graphic
- Local Neighborhood Connections
- Inviting Participation & Action
- River Related Utilities
- Maximize the River as a Community Asset
- Business River Partners
- River Road Image & Character
- Historical Connections
- Other Special Features
- Web Based Connections
- Recognition to Those That Give
- River Events

I started out thinking of America as highways and state lines. As I got to know it better, I began to think of it as rivers. Most of what I love about the country is a gift of the rivers. . . . America is a great story, and there is a river on every page of it.

Charles Kuralt

Cultural Resources: Building Awareness & Connecting with the River

Where does it come from?
Where does it go?

In order to maintain the river system, it is important to bring people to the river and make it real for them as a valued resource. Without a perspective on the river's contribution to economy, community, and quality of life, collective stewardship is impossible. Listed are twelve suggestions for connecting people with the river so that it can be broadly experienced and understood as a community asset.

1. **The Water System Graphic**
   Where does the water come from? Where does it go?

2. **Local Neighborhood Connections**
   How do I connect with the river from where I live?

3. **Inviting Participation & Action**
   Connecting the resource with stewardship actions

4. **River Related Utilities**
   Out of site, but not out of mind

5. **Maximize the River as a Community Asset**
   Establishing a variety of place connections

6. **Business River Partners**
   River access at business locations

7. **River Road Image & Character**
   Visual opportunities at crossings

8. **Historical Connections**
   Interpretation opportunities

9. **Other Special Features**
   Use them as identity builders

10. **Web Based Connections**
    The next best thing to being there

11. **Recognition to Those That Give**
    Awards as river connections

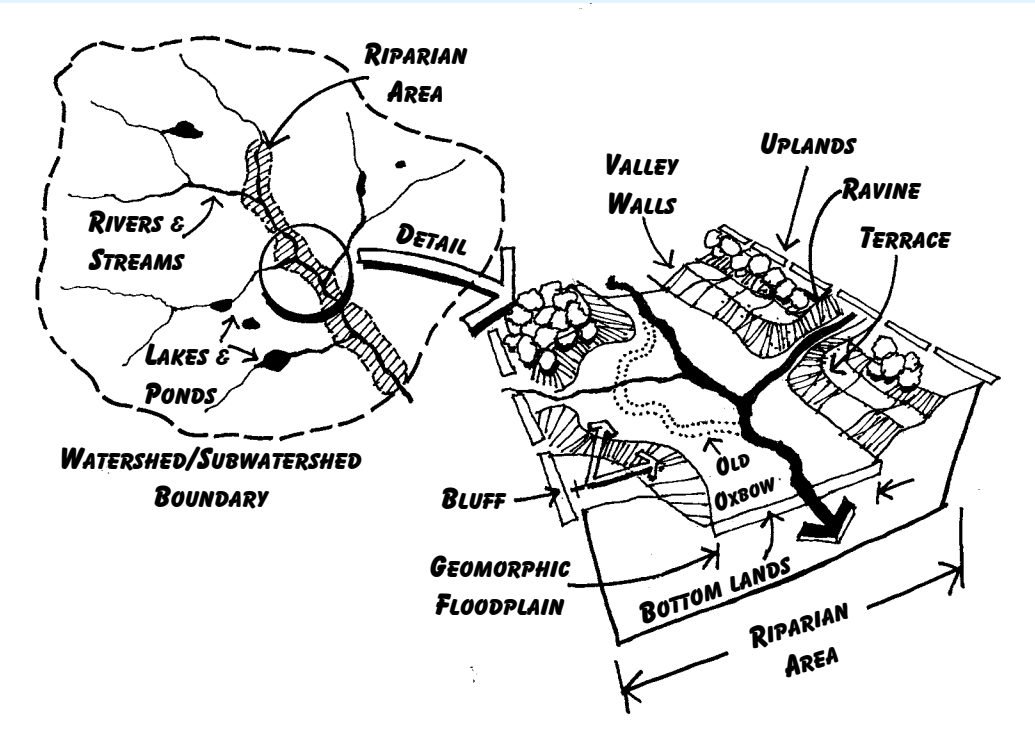
12. **River Events**
    Come to the river to celebrate

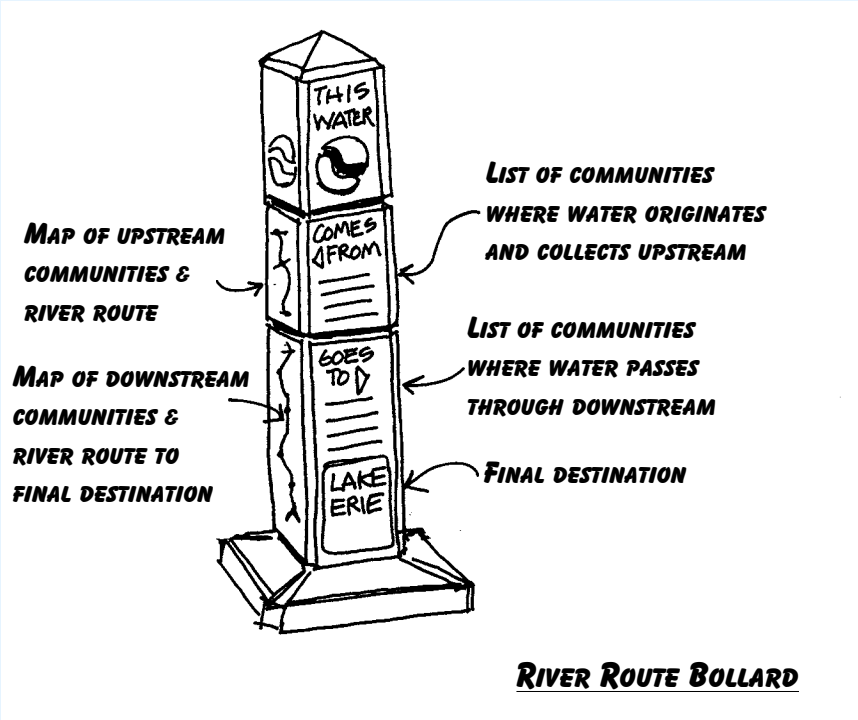
The Water System Graphic

Where does the water come from? Where does it go?

From community to community, landowner to landowner, the river is connected to and dependent upon a collective population for its health and vitality. The river water collection system connects a much larger land area than most people are aware. Watersheds and sub-watersheds are difficult concepts for the general public to grasp.

A simple graphic depicting the extent of the watershed or river corridor at specific points along the system can build an awareness of where the water flowing past a specific point comes from and where it goes.





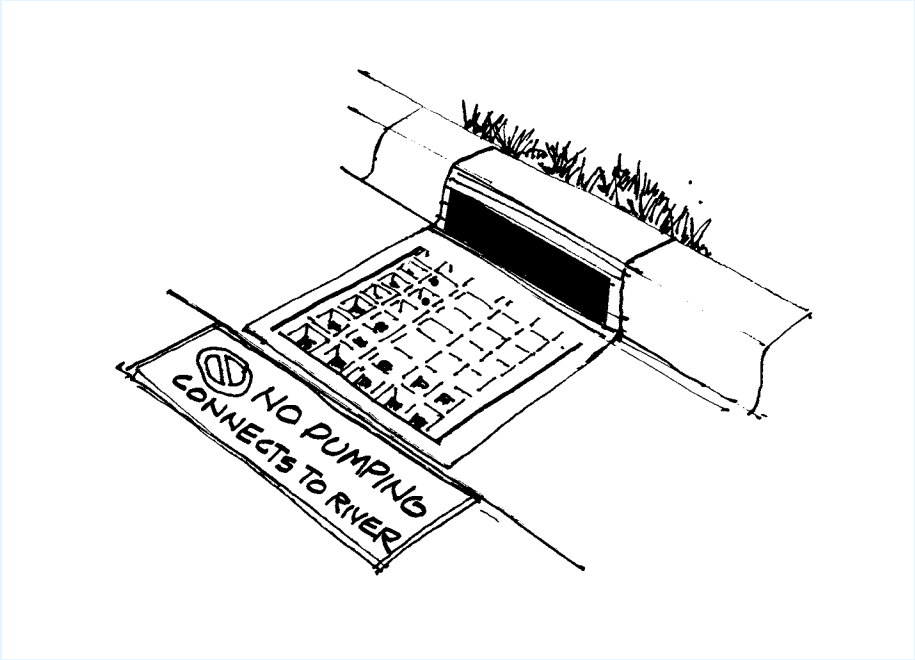
River Route Bollard

Local Neighborhood Connections

How do I connect to the river from where I live?

Building an awareness of the river system's neighborhood location and collective dependence on individual actions is an important step in inviting individual stewardship actions.

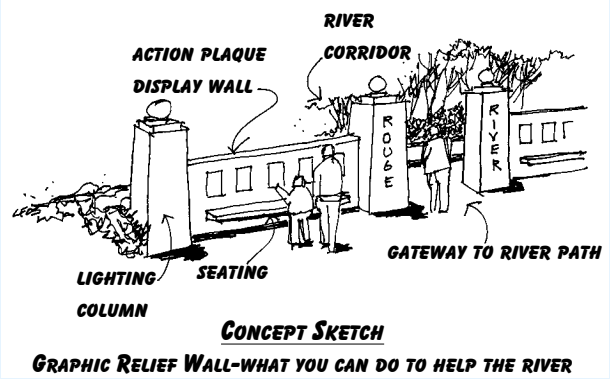
River Partner signs can be voluntarily installed in front yards or other high visibility locations calling attention to the presence of the river and stewardship contributions by individual, street, or neighborhood riparian property owners.



Neighborhood storm drain catch basin inlets can be stenciled with graphics and words highlighting connections to specific neighborhood rivers, streams, lakes and ponds.

Inviting Participation & Action

Connecting the Resource With Stewardship Actions



Concept Sketch

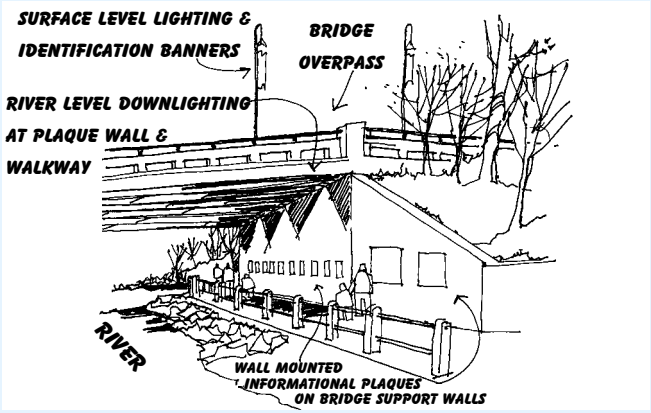
Graphic Relief Wall-what you can do to help the river

The identification of A river corridor by name and requests for stewardship action are at times removed from the presence of the river resource. The names of river resources as well as action checklists highlighting "What You Can Do" can be integrated into river corridor site amenities.

Here are a couple of examples:

1. List stewardship actions at locations where people experience the river. Directly link actions in their daily lives with the experience of the river corridor in front of them (left).

2. Sign the river or related water feature with its name at key locations along the corridor (right).

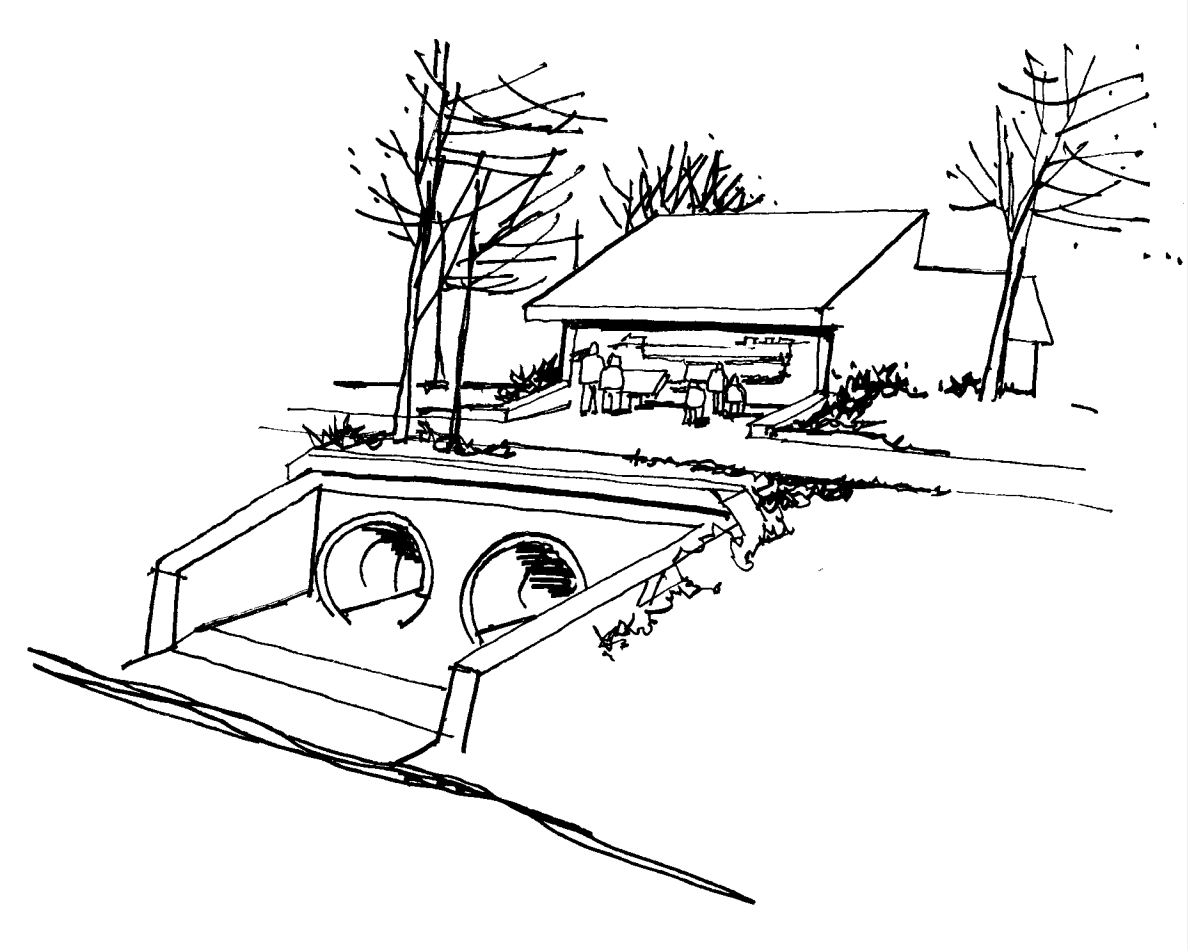


River Related Utilities

Out of site and out of mind?

Historically, stormwater related utility structures have been either buried or aesthetically disguised. The functional elements of the utility system such as underground piping, combined sewer and sanitary sewer overflow facilities, pump stations, etc. are removed from public awareness and as a result an understanding of the functional service they provide is more difficult to communicate. Water resource stewardship, including informed decision making, must begin with an awareness of the system's purpose and function.

Wherever possible communicate the function of both natural and structural water resource system components. Provide site interpretive displays highlighting the function and service of the system components and how they work together to manage water quantity and quality.

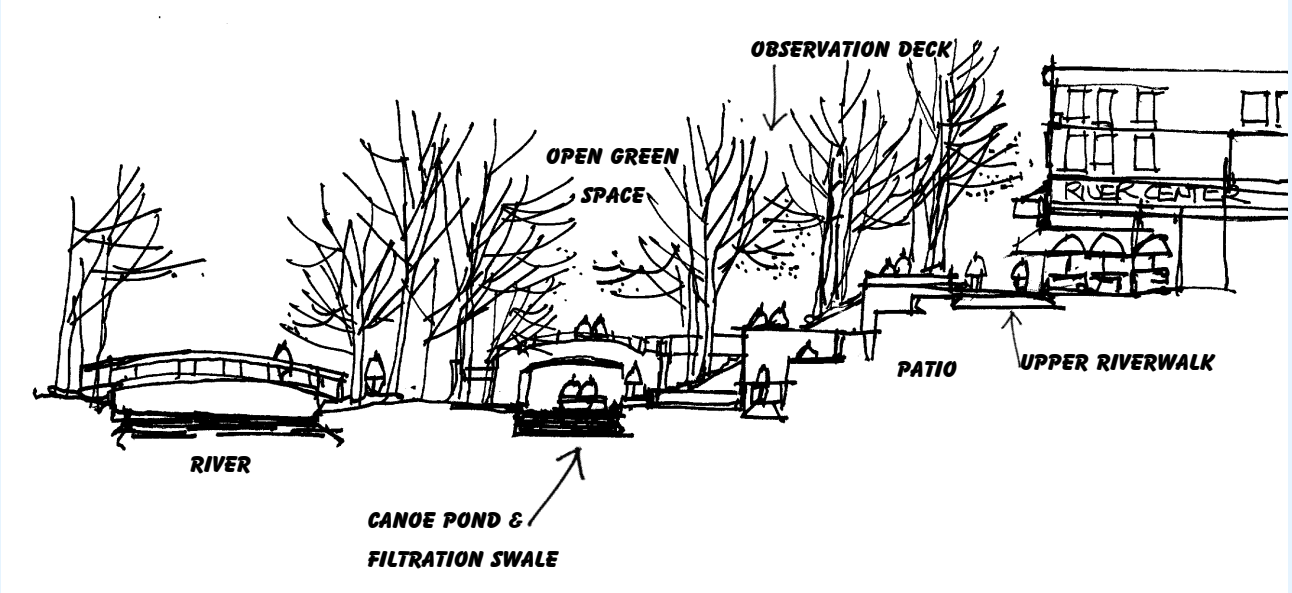


We are often unaware of the existence of utilities that play an important role in our daily lives. Many, such as this large storm and sewer drain, are located right beneath our feet.

Maximize the River as a Community Asset

Establishing a Variety of Place Connections

The economic, aesthetic, recreational, and health benefits related to the river system cannot be overstated. Connections with and access to a healthy river and its associated green space provide marketable amenities to adjacent development and promote a community's quality of life for purposes of business development and retention.



Capitalize on the river as a community asset by developing pathway connection points, parallel trails, canoe and kayak routes, and related community park, recreation, and interpretive features as appropriate.

Business River Partners

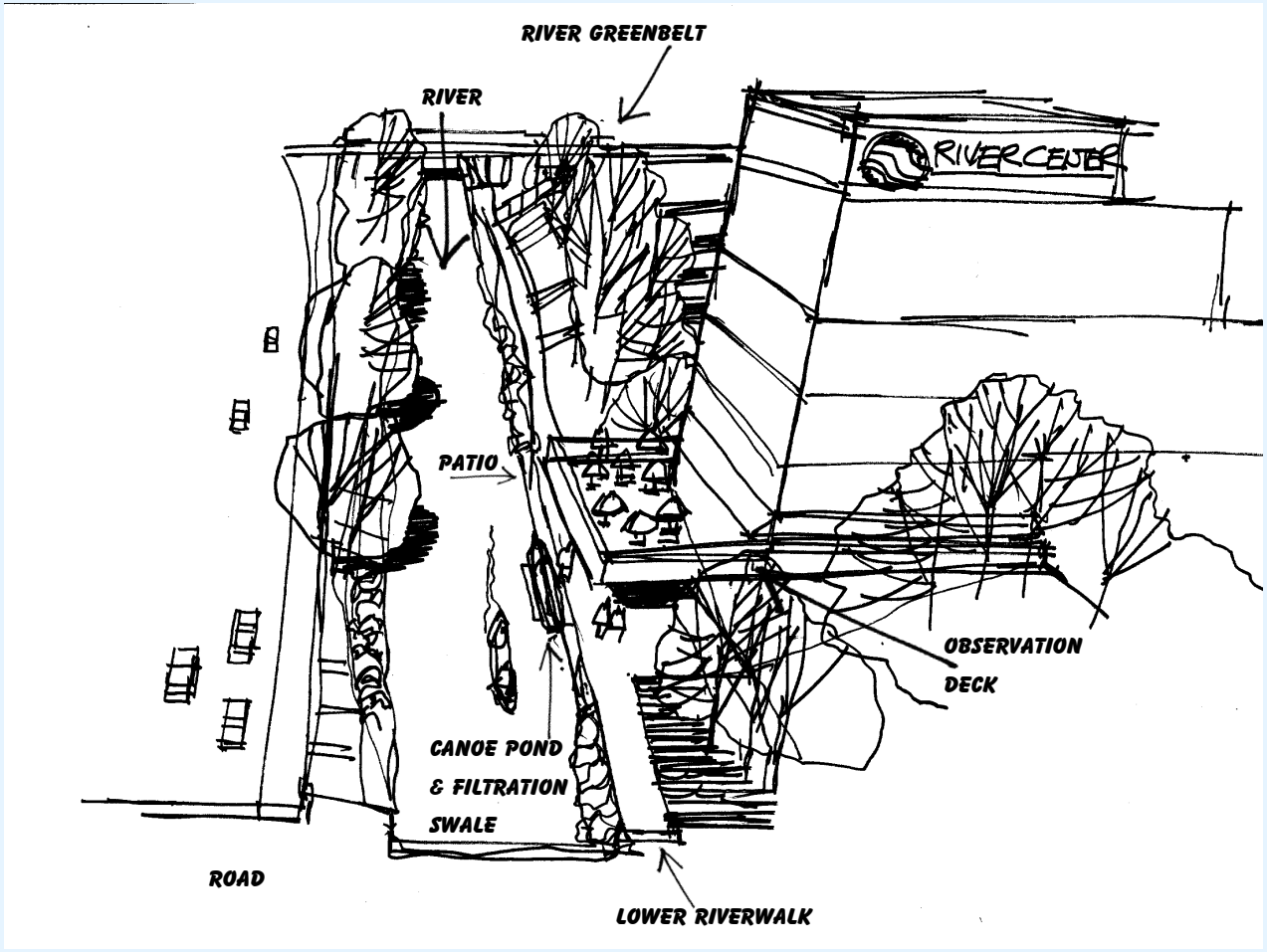
River Access at Business Locations

Historically, the river was a means of transportation and the first source of power for commerce in emerging town centers. Commercial centers formed a relationship with the river out of necessity. Today, the river offers an amenity to commercial centers and business development. To be “on the water” is both attractive and lucrative. Riparian property values are of higher value than like properties without a connection to the water. Town centers, with a water orientated amenity, have a greater appeal than those without.

Where major water tributaries have been buried, explore opportunities for “day lighting” the river.

Encourage the redevelopment of sites that have turned their back on the river. Consider people oriented facilities such as café/restaurants and book stores.

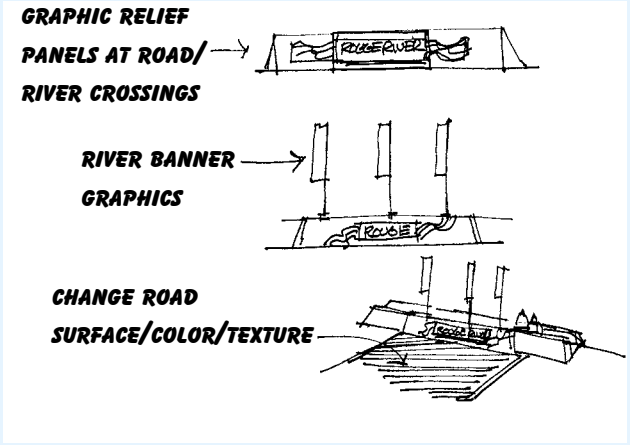
Selectively encourage new development on the river, utilizing green building Leadership in Energy and Environmental Design (LEED) principles and best management practices, to maintain water quality.

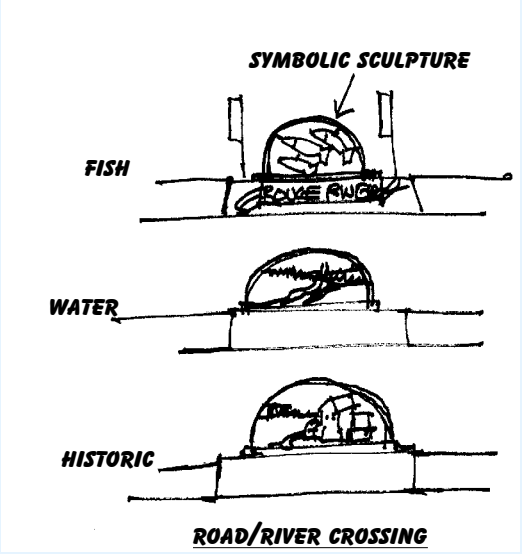


Road Image & Character

Visual Opportunities at Crossings

Natural water resources such as lakes, rivers, and streams can assist in the definition of a positive road image character. Many times however these features are either hidden from view or are framed inappropriately. The result is that the image building potential of the water feature is not realized.





Where natural water resources are found in proximity to major roads, frame or highlight the view and call attention to the presence of the resource. This can be accomplished in a variety of ways including bridge railing design, lighting, banners, name plates, and decorative relief.

Historical Connections

Interpretive Opportunities

The river is both timeless and ever changing. Since the glaciers retreated some 14,000 years ago, the flow of water has maintained its stream but the adjacent lands and even the river course itself have been subject to change. In many instances, significant natural features were formed and remain a part of the landscape. Settlement occurred and commerce related sites along the river were developed.

Today these sites and structures are parts of our historic and cultural past. They are worthy of interpretation for they tell the story of how we arrived at this point in time. Establish events, festivals, and interpretive tours to showcase these features in the community.

A rustic sign lets visitors know they are visiting a special preserve.

Riparian features and geologic features may include: valley walls, terraces and bluffs, oxbows, ravines, bottom lands, uplands, rapids, and riffles.

The historical Clinton River in the City of Pontiac before it was buried in a concrete channel.

Provide connections to the natural and cultural history of the river by identifying and signing the key geologic formations and historic/cultural structures and places.

A historic mill in Linden.

Historic and cultural features could include: Native American trails and villages, mills, weirs, dams, raceways, and town centers.

Stony Creek at Van Hoosen Farms in Rochester Hills connects visitors with the important historic resource (a historic farmstead) and the Stony Creek.

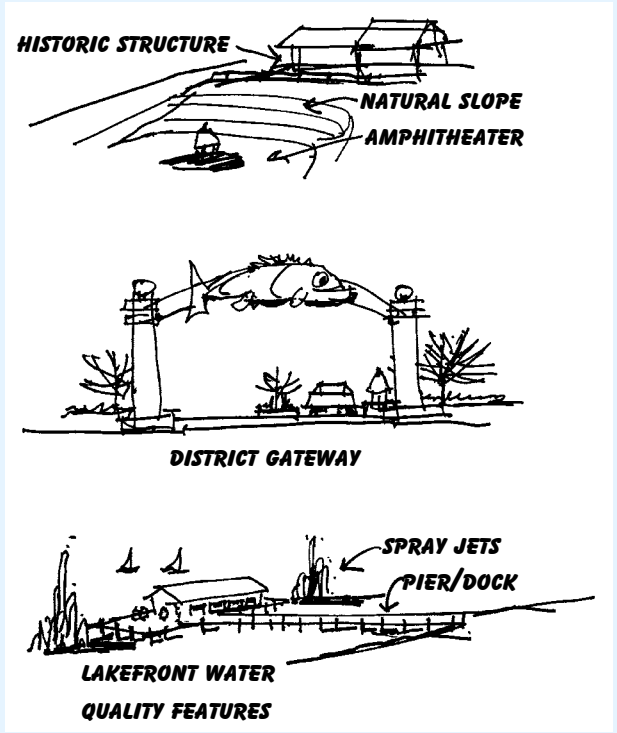
Other Special Features

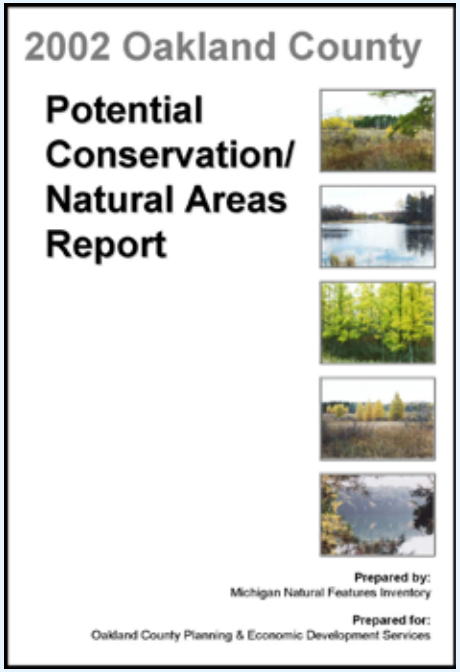
Use them as Identity Builders

Special features in or along the river can be highlighted to create a personal identity for the river corridor. Such natural features as unique geologic formations, views and vistas, rapids and riffles, wetland fens and other intact ecosystems communities, prominent plant and tree specimens etc., can be acknowledged through signage, interpretive maps and brochures, tours, trail/path routing, and web photo logs.

Man-made features such as aeration bubblers, fountains, or river access points, can be both functional in augmenting water quality management practices and river access as well as pleasing amenities with river related design themes.

The naming of features with a character descriptor can further enhance both the feature's and river corridor's identity. For example, instead of the simple map acknowledgement of a rapids with term "Rapids", give it an identity adjective related to its character, historical significance, or person of note such as Snake Rapids, Old Mill Rapids, or Fergusson Fast Waters.





The natural areas report is a tool communities can use to help identify the location of special features. For more information, visit www.oakgov.com/es

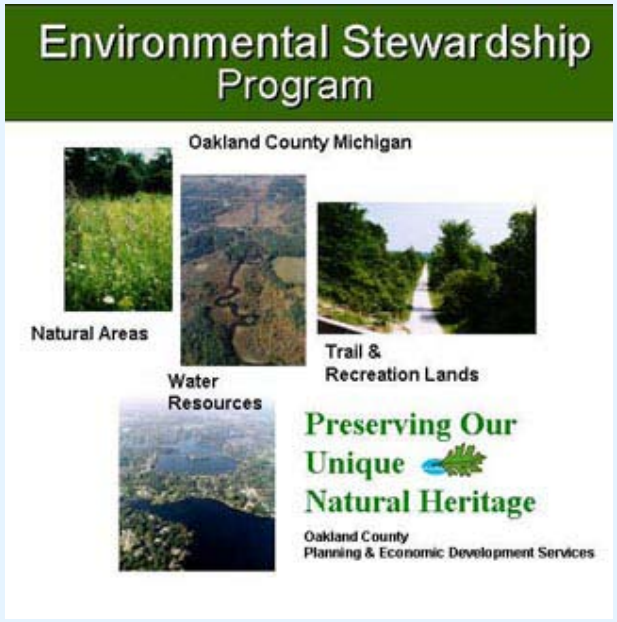
The Shiawassee River Corridor in northwest Oakland County.

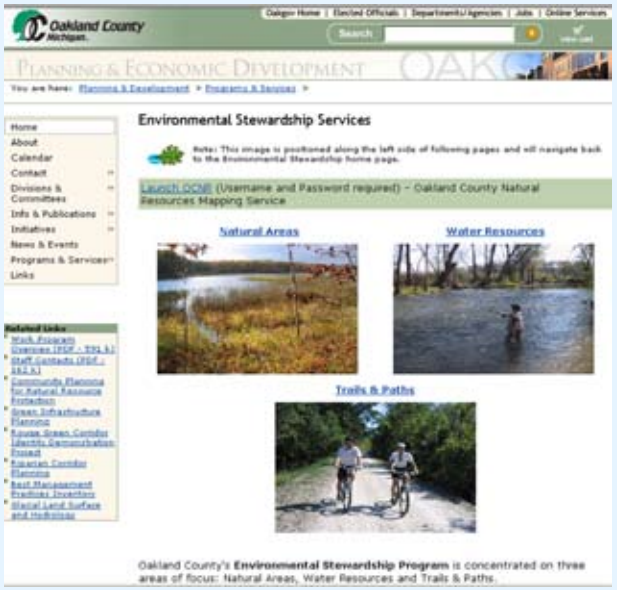
Web Based Connections

The Next Best Thing to Being There

With the advancements in web technology, you can be a virtual visitor to the river. Sights, sounds, and information related to the river corridor offer the virtual visitor an experience that at times carries one to new depths of knowledge and awareness about the corridor. All the information included in the last nine suggestions, plus more can be included on the web. The web is an important tool of communication for connecting to the river.

Develop web based connections to the river corridor including sights, sounds, live cams, video, maps, event listings, partner groups, and more. The types and amount of information that can be provided is almost limitless, but be careful not to overwhelm, confuse, or frustrate the web user.





The Oakland County Environmental Stewardship web site provides information and resources designed to connect people to the natural environment.

Give Recognition to Those That Give

Awards as River Connections

Awards and recognition ceremonies generate much good will, public awareness, and a lifetime commitment from the recipient. Awards supported and sponsored whole or in part by the business community extend ties to the river not only to the business and their employees but an awareness is engendered in their competitors.

Institutionalize a recognition awards program with joint sponsorship from river orientated businesses, public institutions, and nonprofit agencies.

Awards programs can also be established through local schools. Here the river awareness connection extend to the students' immediate and extended families.

Religious organizations offer still another possibility for stewardship recognition awards and connection to the citizen population.

A variety of certificates and awards can bring recognition and a sense of accomplishment to those who give their time.

Photographer Balthazar Korab receives a Heritage Award from Oakland County Planning & Economic Development Services for a lifetime of artistic achievement.

River Events

Come to the River to Celebrate

Events that celebrate the river are excellent ways to highlight cultural resources along rivers and connect with the public. Existing local town festivals that celebrate aspects of a community's character, such as the Rochester Heritage Festival, may be expanded to incorporate river tours, fishing derbies, and other river-centered activities.

Tours of BMPs such as this wetland mitigation project help the public understand how development impacts the natural environment.

Events such as Southeast Michigan's Water Week and River Days, River Cleanups, Creekfests, and other celebration events focused on the river may include tours of historic resources, key infrastructure such as Combined Sewer Overflow facilities, best management practice sites, and geologic features.

Bus tours are another great way to invite the public into a river corridor. Tours sponsored by Friends of the Rouge bring people to river-related locales in and around their communities that they never knew existed. Canoe tours can actually get people out on the river, giving them an entirely new perspective.

A cleanup event on the Clinton River gets people out and into the river corridor.

A young canoeist enjoys a fall color tour on the Rouge River.

Summary

Building awareness of cultural resources associated with a riparian corridor is a critical step in connecting people with the river. Graphics that assist the public in understanding where water comes from and goes are useful. Signs and stencils that demonstrate how stormwater generated in local neighborhoods is directed to the river help people understand their role in protecting the ecosystem. Sign programs that offer stewardship opportunities near to water resources can provide valuable information at the right time and place. Interpretive opportunities should also be applied to water-related utility structures such as storm drains and combined sewer overflow facilities, in order to communicate the critical role such structures manage water quality. Development near river systems should capitalize on the river when possible instead of orienting away from the river. Businesses located along the river are excellent partners. Visual opportunities along roadways and at road crossings provide opportunities to connect with and engage the public. Interpretive opportunities that relate to historic resources along river corridors should also be considered. The internet is a useful tool for connecting people virtually when they can't actually be there on the ground. River events and wards are great ways to connect with and acknowledge those who celebrate and steward riparian resources.

The Role of Community Planning in Riparian Corridor Protection

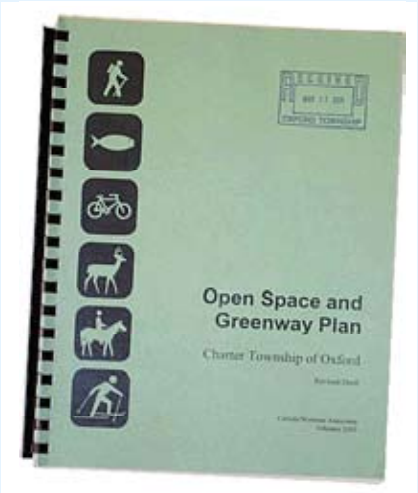
Chapter 6 Includes:

- Planning Policy Tools
- Master Plans
- Regulatory Measures
- Resource Protection Overlay Zones
- Natural Features Setback Standards: Buffer Width Options
- Site Design & Review Standards
- Pre-Application Conference: Setting the Stage for Development
- A Model Site Plan Review Process for Water and Natural Resource Protection
- Map of Existing Resources & Site Analysis
- Design Measures for Riparian Corridor Protection
- Southeast Michigan Model Ordinances for Riparian Resource Protection
- Riparian Corridor Problems and Protection Measures
- Non-Regulatory Options for Protecting Riparian Corridors
- General Guide to Waterfront Laws
- Summary

Any river is really the summation of the whole valley. To think of it as nothing but is to ignore the greater part.
Hal Borland

The Role of Community Planning in Riparian Corridor Protection

Riparian corridors represent a natural resource that offers communities an opportunity to balance the need for growth with environmental preservation. Local governments that plan for the establishment of riparian corridors as community assets can create many benefits for their community. Using innovative site design standards, developers can preserve natural areas and riparian corridors as integral components of a development. These natural features can then be used to market quality of life benefits such as access to open space, and scenic views, to prospective residents. The result is often a win-win situation for the environment, the developer, and the community as a whole. In addition, preserving riparian corridors contributes to the health, safety, and welfare of residents of the community.



Maximizing community assets related to river corridors requires good community planning.

The conservation and management of riparian corridors can benefit from proactive community planning, sensible regulatory measures, and appropriate development design standards. In Michigan, local governments play a major role in riparian corridor management. Community home rule means that the major responsibilities and choices for implementation of riparian protection and restoration initiatives rest at the local level.

Tools such as local master plans, zoning ordinances, and subdivision regulations can be used to address conservation and management needs of riparian corridors, as well as guide sustainable and profitable development within communities. Non-regulatory tools such as public education and innovative land preservation approaches may also be used by communities to protect and restore local riparian areas.

Friends of the Rouge Fall Bug Hunt Volunteers

Planning Policy Tools

Prior to addressing riparian corridor protection in local plans and ordinances, the community's riparian corridors should be inventoried and mapped (See Chapter 3 for more information on mapping riparian corridors). Inventory and map data should then form the basis for subsequent plans, policies, and ordinances designed to protect riparian corridors at the local level. Making riparian inventory and map data available to community members early in the process will clarify the location of riparian corridors, and allow property owners who may be affected by riparian regulations to understand how they may be impacted. Such efforts may assist community leaders in building public support for riparian corridor protection. In addition, mapped inventories of riparian resources may help communities understand how river corridors transcend community boundaries and make the case for a multi-community approach to protecting riparian corridors on a watershed basis.

Rouge Workgroup
(Photo Credit: Fred Cowles)

Master Plans

The Master Plan is the official document that sets forth policies to guide future land use and development in the community. It provides the legal basis for zoning and land use decisions. A community's master plan can be used to establish both the basis for preservation of riparian corridors and justification for related ordinances.

Communities interested in protecting riparian resources should include goals, policies, and objectives for protecting riparian buffers and corridors in their Master Plan. Riparian corridor protection provisions may also be listed in the Master Plan's implementation chapter. Master Plans should also include an inventory and map of riparian corridors and associated resources identified throughout the community. The riparian corridor map may be presented as a stand-alone piece with descriptive text or as a component of the Future Land Use map.

Presentation on the Cold Water Springs Nature Area Master Plan during Johnson Creek Day in 2005. (Photo Credit: Johnson Creek Protection Group)

Example Goals for Community Master Plans

Adapted from: Wetland Stewardship for Local Governments: Master Plan as a Basis. Clinton River Watershed Council

Goal: To the maximum extent possible, preserve existing riparian corridors and the hydrological systems that they support so that these ecosystems can continue to perform their vital functions of providing terrestrial and aquatic habitat for plants and wildlife, flood and stormwater storage, runoff attenuation, water quality protection, shoreline and stream bank stabilization, aesthetics, and recreation.

Goal: Enhance and restore existing riparian corridors that have suffered degradation.

Goal: Recognize the natural capacity and limitation of riparian lands to support development.

Policies pertinent to riparian preservation should address:

Land Use Intensity: The intensity of development on the land is dependent on the natural capability of the land to support various degrees of development.

Natural Resource Capability: All development respects the natural characteristics of riparian corridors and their constraints.

Site Design Policies: These policies provide model development principles that can be applied to site designs to reduce the impact of development on riparian areas.

Oakland Township Green Infrastructure Design Charrette

Park and Recreation Plans

Adapted From: The Town Planner's Toolbox.
From: Guidance for Communities in the Connecticut River Watershed.

Suggested Allowable Uses for Riparian Corridors

Encourage park and recreation areas with minimal structural development; non-motorized trails; forestry practices that use riparian best management practices (BMPs). Encourage passive use of land for recreation and nature appreciation. Maintain wetlands, flood plains, seeps, and bogs in their natural condition.

Suggested Prohibited Uses for Riparian Corridors

All uses that present a higher potential for pollution. Campgrounds other than dispersed forested tenting sites should be excluded because of their tendency toward deforestation and soil compaction. Towns may wish to guide use of ATVs and mountain biking to less sensitive locations since these higher impact uses can contribute to vegetation loss and erosion within the riparian zone. Buildings that do not depend on proximity to water should be sited outside a riparian buffer.

Early morning nature walk along Johnson Creek.
(Photo Credit: Michael Carr)

Buffer Area in Firefighter's Park in Troy, MI.
(Photo Credit: SEMCOG)

Allowable & Unallowable Uses in the Stream Buffer Zone

Use	Allowed	Denied
Footpaths	60	8
Utility Line Crossings	52	5
Water Dependent Uses	45	10
Bike Paths	30	15
Stormwater BMPs	28	10
Home Additions/Decks/Gazebos	10	55
Maintenance for Flood Control	Often Allowed	
Pumphouses	Restricted	
Sewage Treatment Plants	Restricted	
Golf Courses	Restricted	
Campground	Restricted	
Timber Harvesting	Restricted	
Hydropower	Restricted	
Roads/Bridges	Restricted	
Athletic Fields	Restricted	
Playground Equipment	Restricted	
Compost/Yard Waste	Unrestricted	
Landscaping	Unrestricted	

No Uses Permitted (30%)
No Uses Denied (15%)

Percentages of buffer programs that specifically allow or deny a given use. The "Restricted" and "Unrestricted" entries refer to other stream buffer uses that are not commonly addressed in local ordinances. (Source: Heraty, 1993)

Park and Recreation Plans

Park and Recreation Plans can adopt the goals, policies, and objectives for riparian protection that are listed in the community master plan, or include its own park and recreation-specific recommendations for riparian corridor management. Content may focus on defining appropriate and inappropriate recreational uses for riparian areas located within parks. Park and Recreation Plans may also provide guidelines for proper construction and maintenance of river access points, and rules and regulations for public access as these topics relate to potential impacts on riparian buffers.

Regulatory Measures

A zoning ordinance provides the authority to regulate private use of land by creating land use zones and applying development standards in the various zones or districts.

Adopting a comprehensive local ordinance, or series of local ordinances designed to reduce the adverse effects of common human activities on riparian resources will better enable implementation and enforcement of the goals, policies, and objectives for riparian protection set forth in the Master Plan.

Ordinances and regulatory measures for riparian corridor protection should focus on encouraging the use of various riparian conservation techniques. Zoning ordinances might include two important riparian conservation tools: overlay zones and natural feature setback standards for rivers, lakes, floodplains, and associated riparian corridors and buffers.

Resource Protection Overlay Zones

Overlay zones can be used to apply special restrictions to areas with unique conditions such as rivers, lakes, floodplains, and associated riparian corridors and buffers. Parcels included within these zones retain their underlying zoning classification but are subject to additional requirements specified in the overlay zoning ordinance. It is important to note that if enacted correctly, riparian conservation zoning is not a "taking" because it doesn't inherently reduce development density or alter allowable uses otherwise specified. In preparing an overlay zone, it is first necessary to identify the geographic limits of the areas to be included. A riparian corridor map inventory is a critical component of the overlay process. The purpose for the zone and any use restrictions or development requirements must also be clearly stated.

Communities may sign environmentally sensitive areas included in their resource protection overlay zones.

The adoption of an overlay district can accomplish any of the following, depending upon how it is structured:

1. Require all parcels within the zone to be inventoried.

2. Alert developers that the parcel contains potentially significant resources, and development of the site would be subject to special restrictions.

3. Allow the community to identify priority protection areas that a developer must refrain from developing or develop with minimal site disturbance.

Parcels falling within a riparian overlay zone may be inventoried on a lot-by-lot basis or via a comprehensive survey. During the inventory process it is important that the full ecological significance of a parcel in relationship to its surroundings is considered. Communities are encouraged to adopt riparian-based conservation overlay zones that can be used to direct development away from sensitive riparian areas, require significant riparian buffers, and be coupled with conservation easements or land donations to preserve riparian lands in perpetuity.

Natural Features Setback Standards: Buffer Width Options

A natural features setback establishes a minimum setback (buffer width) from natural features to prevent physical harm or destruction of the feature. This ordinance recognizes the relationship that terrestrial and aquatic ecosystems have to one another and should be applied to both small streams and larger rivers. Each community establishes buffer width standards at their discretion. In general, the wider the buffer the greater the number of ecological functions the riparian zone will provide. Communities may choose to establish fixed or variable width buffers or a combination of the two.

Fixed-width Buffer

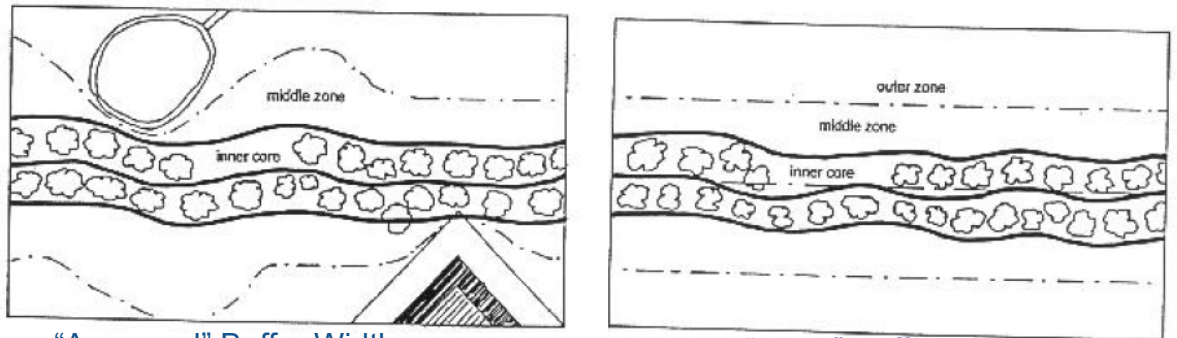
The community can establish a fixed-width riparian buffer similar to a utility right-of-way, whose width is determined before construction begins. The fixed width should be determined by selecting a distance that protects the community's most desired riparian functions. Fixed-width buffers are simplest to administer but may be ecologically inadequate in many situations.

Variable-width Buffer

While more difficult to administer, adopting a variable width buffer ordinance provides communities the opportunity to tailor riparian protection to the land, and eliminates a cookie-cutter approach to buffer management. Variable-width buffers are more ecologically-based, and address site-specific conditions such as slope and intensity of land use. Because the goal of variable-width buffers is to account for ecological variation in every stream and parcel, they require more site evaluation than fixed-width buffers.

Communities may opt to enact a combination of fixed and variable-width buffer standards by determining a standard width, and specifying criteria for expanding or contracting the buffer. Often this is achieved through buffer averaging that allows exceptions to the fixed-width standard to account for the 100-year floodplain, steepness of slope, adjacent wetlands, critical habitat, stormwater ponds, limited lot size, and pre-existing structures.

Stream Buffer: Averaging in the Middle Zone



"Averaged" Buffer Width

"Fixed" Buffer Width

(Reprinted with permission from "Site planning for Urban Stream Protection" (Schueler, 1995))

Fall colors along a well-vegetated portion of the Lake Angelus shoreline.
(Photo Credit: Oakland Land Conservancy)

Site Design & Review Standards

Riparian zoning ordinances, regulatory measures, and design standards should guide the placement of development, not prohibit it. When possible, specific sustainable site design, construction methods, and review standards should be outlined in the community's ordinances and other regulatory documents. This will help make the community's expectations for riparian preservation clear, and provide development professionals with a greater degree of certainty in the development and permitting process. Communities may enforce the riparian conservation techniques presented in their planning and regulatory documents by right or by special exception.

The site plan development and review process provides a forum for communities and developers to discuss possible development approaches, and for communities to determine developer compliance with riparian (and additional natural and water resource) protection provisions specified in community planning and regulatory documents.

Pre-Application Conference: Setting the Stage for Development

Communities can facilitate quality decision-making and collaboration by holding a pre-application conference with the developer. At the meeting, staff or consultant planners, engineers, and local officials familiarize the applicant with the policies and procedures of the community, and discuss the vision of the community as it relates to the piece of land in question. A site visit may also be scheduled early in the review process to assess and discuss the environmental sensitivity of the property, and to help the developer save time and expense designing around it. This is a good opportunity to discuss the value of riparian buffers and the reasons to implement site design measures for riparian corridor protection.

Community residents tour a CSO basin construction site.
(Photo Credit: SEMCOG)

Potential Ordinances and Regulatory Measures for Riparian Corridor Protection

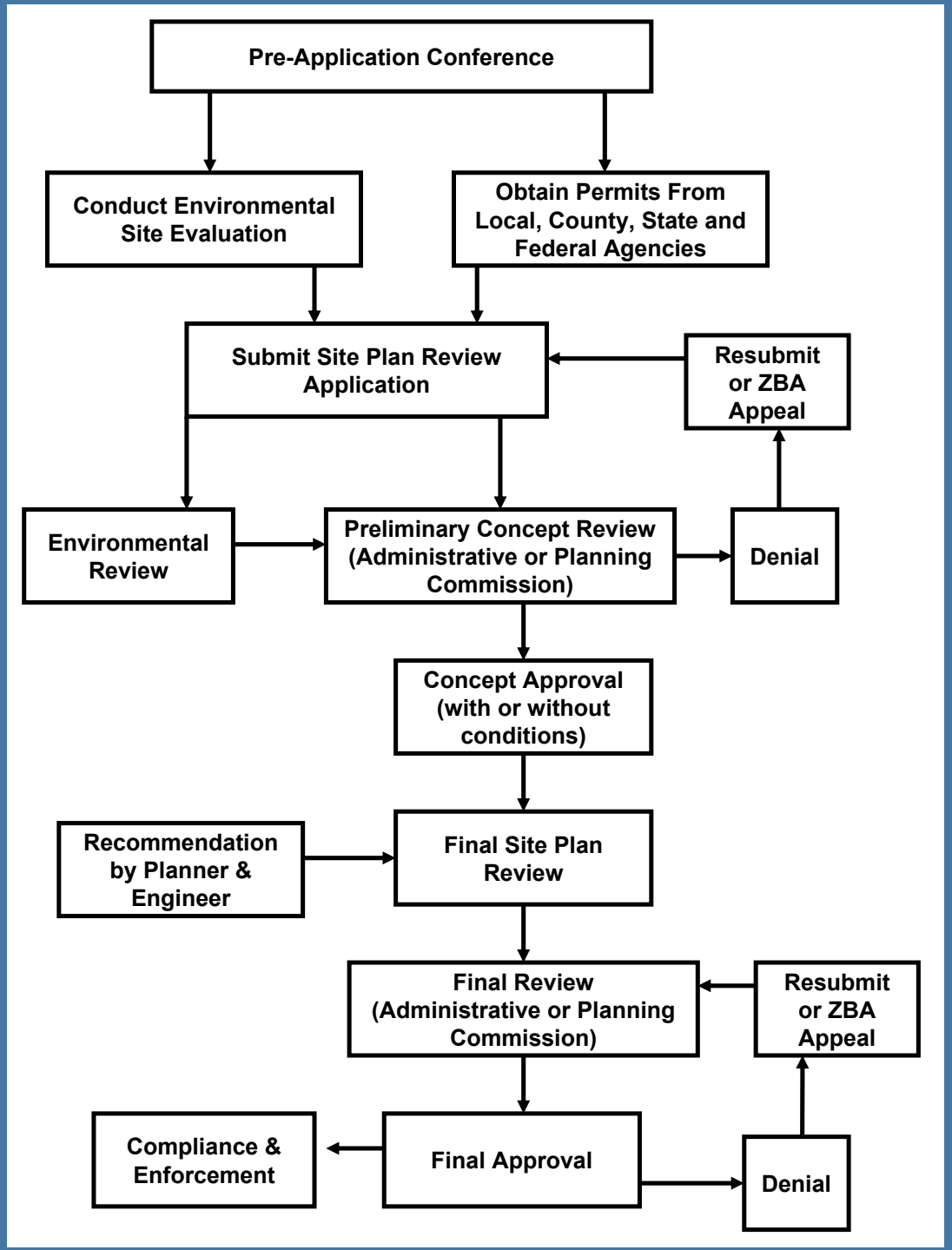
1. Resource Protection Overlay Zones
2. Natural Feature Setbacks
3. Storm Water Ordinance
4. Impervious Surface Limitations
5. Soil Erosion and Sedimentation Control
6. Steep Slope Regulations
7. Trees & Woodland Protection Ordinance
8. Native Vegetation Ordinance
9. Establishing Wildlife Corridors & Greenways
10. Controls on Docks and Other Water Dependent Structures

A Model Site Plan Review Process for Water and Natural Resource Protection

The following diagram outlines a model process that may be used to guide actions during site plan development and review. Not every step of the process may be necessary with every site plan decision; however the model process illustrates potential steps a community can take that may have a positive impact on the quality of decision-making.

During the site plan review process, careful consideration should be given to the potential impacts a proposed development may have on adjacent water resources and associated buffers.
(Photo Credit: SEMCOG)

Site Plan Review Process



Map of Existing Resources & Site Analysis

The most important documents to have in place for the pre-application conference are professional land surveys and GIS maps that delineate the property's riparian resources and related natural features. These documents should be used to guide ecologically-sound decisions regarding site-appropriate development design measures for riparian protection.

The following elements should be included in the land survey and/or GIS maps of the property. It may be useful to distribute this list to the applicant prior to the conference.

Proposed Development Information

- Available infrastructure (existing utilities)
- Special districts (resource overlay)
- Site topography (2-foot contours or less)
- General construction zone, building location, and orientation
- Professional tree and natural features survey
- Site improvements, building locations, and conceptual stormwater management plan
- Pre-development drainage area delineation (total area tributary to site)

Natural Features

- Sensitive headwaters area
- Lake, river, or stream
- Wetlands (note acreage, type, functional values of wetland)
- Floodplain
- Groundwater recharge and discharge areas
- Landmark trees
- Woodlands and tree rows
- Wildlife corridors
- Fragile land (high erosion areas)
- Unique geological features
- River valley features (bluffs, terraces, ravines)
- Sloped land
- Endangered or protected species present
- Wellhead protection area
- Natural drainage pathways
- Soil types

Heritage Features

- Designated agricultural/orchard area
- Human pathway/trail connection
- Cultural features
- Historic features
- Viewsheds or vistas

Site Description

- Property boundaries
- Existing zoning
- Master plan designation
- Current land use
- Adjacent property zoning
- Adjacent property land use
- Legal history (easements/deed restrictions)

This Clinton River Trail pedestrian bridge, over the Clinton River in Rochester Hills, represents an important heritage feature.

Based on the information gathered and discussed at the pre-application conference, the community may require the applicant to submit a professional environmental survey as part of the preliminary site plan preparation. At this time, the applicant should investigate necessary permits. Permits should be secured after preliminary site plan review and prior to final site plan approval. During site plan review, the community's staff planner or planning consultant, and planning commission should thoroughly review the proposed plan to evaluate potential impacts on riparian and related natural resources. The community should be mindful of opportunities to minimize environmental damage and leverage opportunities presented by the development project.

Conventional Subdivision Layout
(Conservation Design Forum, 2003)

Design Measures for Riparian Corridor Protection

The following elements represent a menu of design measures for riparian and natural resource protection that communities may choose to encourage or require developers to incorporate during the site plan review process.

Conservation Subdivision or Open Space Regulations:

- Can require a developer to prepare a natural features inventory on proposed project sites.
- Can require a certain percentage of total parcel acreage to be retained as open space.
- Can reference minimum buffer widths for riparian corridors and identify upland areas adjacent to riparian corridors as preferred green space designated for low-impact residential recreation activities.
- Can advocate cluster development that concentrates construction on land with less conservation value, and allows owners of house lots in the development to share undivided ownership of the portion of the property remaining in a scenic and natural condition.
- Can advocate lot averaging standards for retention of riparian resources and natural features on smaller sites.

Lot Size & Density Regulations:

- Provide flexible lot size and density standards to guide development away from a stream buffer or other sensitive land.
- Provide developers with density bonuses for land-conserving design and density and disincentives to actively discourage land-consuming layouts.

Minimum Frontage & Road Setback Regulations:

- Provide flexibility in frontage and road setback standards to minimize development intrusion on riparian buffers.

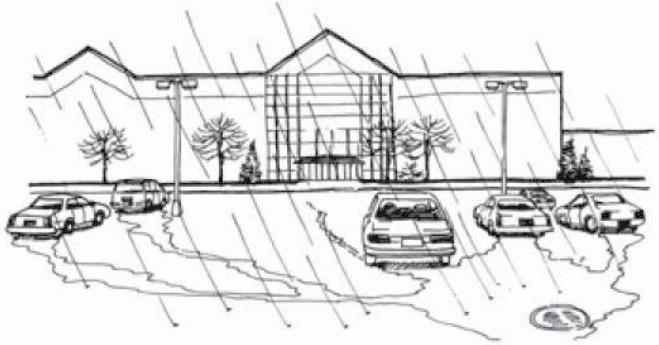
Conservation Subdivision Layout
(Conservation Design Forum, 2003)

Impervious Surface Reduction Regulations:

- Limit land disturbance and grading.
- Set standards that limit the overall area of impervious surfaces and suburban lawns.
- Encourage developers to use alternative materials that allow rain and snowmelt to soak in rather than run off, such as porous pavement, bioretention areas, filter strips, and/or vegetated swales.
- Set guidelines for designing roads, sidewalks, driveways, and other parking areas to minimum width standards.

Stormwater Management Guidelines:

- Regulate erosion control before, during, and after construction.
- Encourage developers to retain natural vegetation already at work protecting waterways.
- Create a variable-width, naturally vegetated buffer system along all perennial streams that also encompasses critical environmental features such as the 100-year floodplain, steep slopes, and wetlands.
- Limit clearing and grading of forests and native vegetation at a site to the minimum amount needed to build lots, allow access, and provide fire protection.



Conventional Stormwater Conveyance System
(Photo Credit: Carlisle/Wortman Associates, Inc.)

Alternative Stormwater Conveyance System
(Photo Credit: Carlisle/Wortman Associates, Inc.)

- Promote forested buffers as part of stormwater management planning.
- Allow the pollution removal effectiveness of buffers and infiltration devices to be credited in stormwater plans and calculations.

Wastewater Management Specifications:

- Include erosion and sedimentation control, stormwater management, landscaping, and provisions for special investigative studies.

Important Planning & Regulatory Elements of a Local Riparian Corridor Protection Program*

- Provide ample set-backs for sanitary facilities on corridor areas
- Preserve a native vegetative buffer strip immediately adjacent to the watercourse. The wider the buffer strip, the greater the water quality protection and habitat value
- Establish structural setbacks from rivers and streams
- Regulate road placement adjacent to the riparian corridor
- Restrict clearing, construction, and development within the 100-year floodplain
- Zone areas adjacent to riparian corridors for low intensity development
- Establish minimum lot size, frontage, and width requirements
- Include reference to floodplain, soil, and sedimentation controls administered by other agencies in corridor regulations
- Screen new structures with native vegetation
- Limit industrial use along riparian corridors and regulate through special use permits subject to pre-designated standards
- Limit the amount of impervious surfaces allowed adjacent to the corridor
- Clearly outline appropriate and inappropriate use of riparian corridors (recreational activities, water access, etc.)
- Promote intergovernmental coordination of regulations among communities along the river corridor

** Adopted From Michigan Wetlands - Yours to Protect*

Southeast Michigan Model Ordinances for Riparian Resource Protection

The model ordinances listed here are intended to provide language and ideas that southeast Michigan communities can incorporate when developing their own ordinances. The sidebar of community resources provides additional references that address planning for riparian corridor and natural resource protection at the local level.

Storm Water Management Ordinance

- Canton Township
- Salem Township
- Washtenaw County
- Wayne County

Floodplain, Watercourse and Wetland Protection

- West Bloomfield Township
- Ann Arbor Township

Natural Features Setback Ordinance

- Waterford Township

Soil Erosion and Sedimentation Control

- Novi

Riparian Corridor Problems and Protection Measures

Comprehensive conservation and management of riparian corridors requires that communities address the following factors in their planning and ordinance documents:

Riparian Corridor Protection Measure	Problem	Action Steps	Applicable Planning & Regulatory Tools
Erosion & Sedimentation	Removing or reducing riparian buffer vegetation leads to bank erosion and associated sedimentation of surface waters. Erosion and sedimentation seriously impact water quality and aquatic ecosystems. Much of the erosion and sedimentation problem is associated with construction sites. With an anticipated 390,000 new and replacement households in the SE MI region by 2025, removal of riparian vegetation and associated erosion and sedimentation are serious threats to our resources.	Ensure that the agency responsible for enforcing soil erosion control permits has proper funding to administer regular inspections, and enforce permit compliance, if not conducted by the County. Educate riparian property owners on how they can prevent soil erosion on their property and report non-compliance.	Incorporate a riparian buffer system into master plans and zoning ordinances to prevent erosion and sedimentation into aquatic systems. Link development approvals to compliance with soil erosion protections. Reduce or limit the amount of impervious surfaces around the water resource through mechanisms such as overlay zoning. Assure that all erosion control permit requirements have been satisfied before issuing the local occupancy permit.
Habitat Protection	Riparian corridors provide high-quality habitat for a wide variety of wildlife, and often serve as protective corridors that facilitate wildlife movement and allow access to critical terrestrial and aquatic resources in urbanized landscapes. Land use that compromises the width and quality of riparian corridors can have far-reaching repercussions on local wildlife populations.	Inventory riparian corridors for native and non-native vegetation species. Advocate the use of native riparian vegetation and backyard conservation programs to riparian property owners. Contact a local land conservancy to discuss options for maintaining high-quality riparian corridor areas in perpetuity.	Advocate for a multi-community, watershed-based, riparian corridor greenway initiative in the community master plan. In the community master plan, include goals, policies, and objectives to remove invasive species from riparian corridors. Encourage use of native vegetation in the riparian planting guidelines of local zoning ordinances and prohibit use of invasives. Establish and require minimum riparian buffer widths in site design standards and development regulations.

Riparian Corridor Protection Measure	Problem	Action Steps	Applicable Planning & Regulatory Tools
Stream Corridor and Floodplain Protection	Riparian vegetation plays an especially critical role in protecting water quality and preventing flood damage to properties located adjacent to streams and floodplains.	Conduct a stream corridor inventory to identify opportunities to mitigate impacts of existing or future development on stream corridors and floodplains. Educate residents on the benefits of protecting stream corridors and floodplains and provide a mechanism to report those not complying with floodplain or stream buffer ordinances. Actively strive to achieve and maintain the natural land use in riparian zones. Advocate the use of native plants in stream corridor and floodplain restoration projects.	Incorporate measures into community master plans and ordinances to protect 100-year floodplain areas such that no building encroachments should be allowed that will significantly impact flood storage capacity, water quality, or wildlife habitat. Adopt a buffer ordinance for stream corridors. The wider the buffer, the more protective it will be. Many communities have adopted 25 foot buffers; however wider buffers may be more protective of very sensitive features. This buffer should be extended to include adjacent sensitive areas where present. Advocate the use of a variety of conservation development techniques to protect the ecological integrity of stream corridors and floodplains including: cluster development, transfer of development rights, land acquisition, land purchase, or conservation easement. Include an assessment of the impact of riparian areas as part of the site plan review process.

Volunteers removed invasive garlic mustard from areas bordering Johnson Creek. This event was sponsored by Visteon as part of Johnson Creek Day in 2005.
(Photo Credit: Johnson Creek Protection Group)

Pebble Creek Stabilization Project
(Photo Credit: Wayne County Department of Environment)

Riparian Corridor Protection Measure	Problem	Action Steps	Applicable Planning & Regulatory Tools
Watershed Management	Riparian corridors do not stop at municipal boundaries. Riparian corridors are often most effectively managed at the watershed level through multi-municipal partnerships coordinated to address concerns specific to upstream and downstream portions of the riparian corridor.	Contact neighboring communities concerning interest in watershed-wide and subwatershed planning for protecting and managing riparian corridors. Engage in watershed and subwatershed planning and implementation.	Local government ordinances that regulate private development should be protective of riparian corridor quality and quantity.
Public Education and Participation	Local riparian protection programs will not be successful without the support of the public. Public education and participation programs provide communities with an opportunity to build support and stewardship within their jurisdiction for riparian corridor protection initiatives.	List environmental education mechanisms that could be used within the community. Identify and prioritize opportunities for each mechanism. List environmental education partners with expertise in riparian corridor stewardship. Provide public education workshops that promote the identity and value of riparian corridors within the community and provide information on how citizens can become involved in riparian protection and stewardship activities at the local level.	Provide goals, policies, and objectives within the community master plan that advocate raising public awareness about the importance of a local riparian corridor protection program. Provide language in the master plan that advocates supporting the efforts of the local watershed councils.

Riparian Corridor Protection Measure	Problem	Action Steps	Applicable Planning & Regulatory Tools
Wetland Protection	Wetland health and function are intricately linked to the presence of riparian buffers. Wetland buffers function to maintain water quality by filtering stormwater run-off, preventing shoreline erosion control, and providing food and nesting habitat for wetland-dependent species. Impacting the integrity of riparian buffers can have far-reaching negative impacts on wetland systems.	Inventory and map the wetlands in your community. Identify wetland buffer restoration needs within the community. Educate residents about the benefits of wetlands and associated buffer zones and provide a mechanism to report non-compliance with the wetland and wetland set-back ordinance.	Include goals, policies, and objectives for preserving and restoring wetland buffer zones within the community master plan. Establish a wetland protection ordinance or set-back ordinance to protect wetland buffers. Provide a list of recreational activities that are acceptable within riparian buffer zones in the community's recreation plan.

Volunteers Participate in the Rouge Rescue in 2002
(Photo Credit: Friends of the Rouge)

Benthic Sampling Volunteer Training in Superior Township
(Photo Credit: Friends of the Rouge)

Non-Regulatory Options for Protecting Riparian Corridors

Communities can also employ a number of non-regulatory tools to promote riparian corridor protection at the local level.

Public Education

Successful implementation of a riparian corridor protection program will require community support. Involving the community in educational programs that provide instruction on the tools and techniques most appropriate for riparian corridor management can garner support for riparian protection, as well as facilitate corridor-friendly land use practices on privately-owned land.

Communities are encouraged to emphasize the following riparian conservation topics:

- Native landscaping education
- Riparian corridor management Education
- Downspout disconnection

Community members gather to support the launch of a public education poster for the Rouge Green Corridor.

Educate homeowners about the value of riparian resources. Emphasis should be placed on conveying the message that individual resident's conservation practices can have a positive, lasting effect on the region's riparian areas and water resources. Inform residents that activities such as unintentional encroachment, dumping, vegetation removal, or altering drainage can reduce buffer function.

Reduce Mowing

Encourage road agencies to avoid mowing vegetation in riparian buffers where roads are close to streams. Excessive mowing of riparian buffers and adjacent upland areas reduces the buffers ability to moderate stormwater run-off and keep trash, road pollutants, and excessive sediment out of the community's waterways.

Land Purchase or Conservation Easements

Work with a local land trust to acquire riparian development rights through purchased or donated conservation easements. An easement should include both the streambank and adjacent riparian buffer.

Guidance on timber harvesting, land conversion, construction, or road building within the buffer can be written into the easement. A conservation easement need not require the landowner to provide public access, and it can offer significant tax advantages.

Provide Recognition for BMPs

Recognize landowners who do maintain buffers: designate annual "watershed friendly residence, business, and development" awards from the planning commission, and provide publicity.

Land Protection Tax and Credits

Communities can also consider providing property tax incentives for landowners who set aside buffers, and can acquire especially sensitive waterfront lands for public space.

Students learn about benthic organisms found in the Rouge River. (Photo Credit: Friends of the Rouge)

Model Zoning Ordinance Language for Riparian Protection

Source: Conservation Design Resource Manual: Language and Guidelines for Updating Local Ordinances. Northeastern Illinois Planning Commission and Chicago Wilderness. March 2003. 102pp.

The [Municipality or County] recognizes the importance of riparian buffers that preserve, provide access to, or otherwise serve as necessary adjuncts to natural areas by protecting streams, lakes, and wetlands. Buffers include, but are not limited to, areas of predominantly deeply rooted native vegetated land adjacent to channels, wetlands, or lakes for the purpose of stabilizing banks, reducing contaminants including sediments in storm water that flows to such areas. The function of the buffer is to create a transition to the area targeted for protection. The buffer absorbs and withstands the impact of harming activity. For this reason, the ongoing healthy function of the buffer must be assured. Accordingly, the harmful activity cannot be allowed to overpower the buffer. Natural areas and buffers shall be preserved on the site, including, without limitation, native vegetation, wetlands, natural floodplain storage, or other valuable environmental and biological resources.

A. An area designated for natural area and buffer protection purposes may be:

   1. preserved or restored to its natural state

   2. designed and intended for the passive use and/or enjoyment of residents of the proposed development

   3. preserved in order to expand and extend the usefulness of existing preserved open space and natural areas

B. Dedicated buffers and natural areas shall be designed and located to conserve significant natural features located on the site.

C. Dedicated natural areas shall be interconnected with open space areas, greenways, and trails on abutting parcels where possible and appropriate.

Summary Guiding Principles for Protecting Riparian Corridors at the Local Level

Communities should strive for a balance between protecting riparian habitat and water quality and changing land use patterns, leading to a more sustainable region.

Communities should have natural features inventories performed and use this information to update master plans, zoning, and other ordinances.

Communities should work with other communities to develop greenway plans that connect valuable riparian habitat areas.

Communities should encourage preservation and restoration of riparian buffers through set-back and floodplain ordinances, and soil erosion and sedimentation standards.

Communities should incorporate native plants into riparian landscape practices and should require it as part of their site plan review process.

Communities and developers should work to promote and facilitate innovative design strategies such as open space or cluster developments that reflect the natural capacity of the land to support development, and conserve natural features such as riparian corridors.

Communities and businesses should work together to maintain riparian buffers and the natural drainage system when proposing and reviewing site plans.

Rights and Responsibilities of Riverfront Property Owners

General Guide to Waterfront Laws*

The rights of riparian land owners and the waters of Michigan are protected and regulated by a number of laws. Much of the general concepts for Michigan's water use laws developed through court cases and rulings given over the past 200 years. The State Legislature also has passed comprehensive laws, such as the Natural Resources and Environmental Protection Act, 1994, PA 451 which includes Part 301, Inland Lakes and Streams, and Part 303, Wetlands Protection. Both regulate certain uses of riparian areas. The Oakland County Drain Commissioner also has jurisdiction over certain drainage ways within Oakland County to minimize flooding and ensure conveyance of stormwater.

**Regulations about the use of water in the State are complex and continue to evolve. The information included here was gathered from a number of sources: Public Rights of Michigan Waters, published by the Law Enforcement Division of the State of Michigan, 1997; the Michigan Waterfront Alliance website, and the Michigan Lakes, Streams and Watersheds Association website. It should not be construed as legal advice, nor a comprehensive evaluation of the topics discussed.*

Jurisdictional Boundaries

There are several general concepts that form the basis for Michigan's riparian laws. Several are explained here:

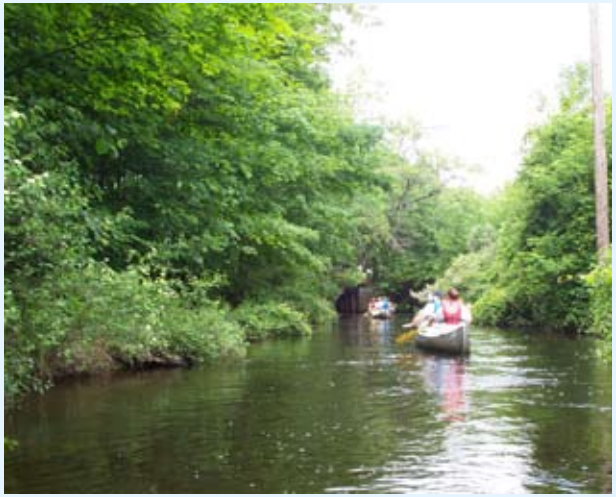
- In general, the State of Michigan has jurisdiction over "navigable" waters, fish, and water-oriented construction operations, such as marinas, docks, canals, bridges, dredging, filling, and impoundments. The State uses the definition of navigable waters to determine if a lake or stream is public (navigable) or private (non-navigable). The definition of navigable has been developed through a series of judicial decisions, but there is significant uncertainty regarding the public or private character of most of the State's streams. Many streams are designated public or private after some type of litigation has been settled over the use of the stream by someone other than the riparian land owner.

- A riparian land owner (or Riparian) is one who owns land or property abutting water. The Riparian also owns the submerged lands adjacent to his or her property to the center of the lake or stream. However, a Riparian does not own the water, or in most cases, the fish. These are held in public trust for the benefit of all the people. The surface of a lake, whether open or frozen, is shared equally by all riparian property owners that abut the lake. They may fish or boat on any part of it.

- The Oakland County Drain Commissioner is given jurisdiction by municipalities to establish drainage districts and implement drain projects. Application is made by a community for both tasks. Once an application is made, it is evaluated by the Drain Commissioner's office and either accepted or denied. Natural drainage ways may be designated as a County Drain, and this designation may only cover portions of a natural stream, as opposed to the entire length of the stream. A drain also can be an underground pipe, retention pond, ditch or swale that conveys stormwater.

Rights of Passage within a Watercourse

If a stream is navigable, the public has the right to wade up a stream and fish, but cannot trespass on the uplands. However, if the stream is obstructed or in case of an emergency, the fisherman can make reasonable use of the upland to go around the obstruction or get help. An abutting property owner may not create obstructions to keep the public from wading, swimming or fishing a navigable stream. If the stream is not navigable, the public cannot wade up the stream, or access the stream by boat. Hunting, on the other hand, is a right that goes with land ownership and permission from the landowner is required.



Portions of the Shiawassee River may not be accessible during the hot summer months, when the high water mark is down.

Drawing Water for Irrigation

As indicated earlier, riparian land owners do not own waters adjacent to their lands, but do have the right to reasonable use of the water for their own purposes, including irrigation. However, the landowner cannot impair the water as it passes along or decrease the benefits of the water for other riparian landowners. Non-riparian owners are not entitled to similar water use rights, and extraction of water for their own purposes is considered trespassing against the rights of the riparian owner. Further, a riparian landowner cannot permit a non-riparian landowner to withdraw water.

Footbridges

The Inland Lakes and Streams laws do not allow property owners to structurally interfere with the natural flow of a stream, nor construct anything within the bottomland of a stream without a permit from the MDEQ. In addition, the Oakland County Drain Commissioner, who is charged with ensuring drainage of stormwater throughout Oakland County, prefers that homeowners refrain from constructing footbridges because of the possibility of debris collecting under these small bridges and obstructing the flow of the stream.

A footbridge over the Clinton River allows nearby residents entry into the Drayton Plains Nature Center.

Riparian Activities Requiring a Permit

The Inland Lakes and Streams legislation describes activities where a riparian land owner must obtain a permit from the Michigan Department of Environmental Quality (MDEQ). These include the following:

- Dredge or fill bottomland (Bottomland is the area that lies below the ordinary high-water mark and may or may not be covered by water)
- Construct, enlarge, extend, remove, or place a structure on bottomland, such as a permanent dock. Seasonal structures for noncommercial recreational use do not require a permit as long as they do not interfere with the use of the water by others entitled to use the water or interfere with water flow.
- Erect, maintain, or operate a marina
- Create, enlarge, or diminish an inland lake or stream
- Structurally interfere with the natural flow of an inland lake or stream

What Waters Are Considered Navigable or Public?

A navigable inland stream is:

1. Any stream declared navigable by the Michigan Supreme Court
2. Any stream included within the navigable waters of the United States by the U.S. Army Corps of Engineers
3. Any stream that floated logs during the lumbering days, or a stream of sufficient capacity for the floating of logs in the condition which it generally appears by nature, notwithstanding there may be times when it becomes too dry or shallow for that purpose
4. Any stream having an average flow of approximately 41 cubic feet per second, an average width of some 30 feet, an average depth of about one foot, capacity of flotage during spring seasonal periods of high water limited to loose logs, ties and similar products, used for fishing by the public for an extended period of time, and stocked with fish by the State
5. Any stream which has been or is susceptible to navigation by boats for the purposes of commerce or travel
6. All streams meandered by the General Land Office Survey in the mid 1800's. Note that the Michigan Supreme Court designated the Rouge River navigable from its mouth to 15 miles upstream from the mouth. Navigable is not whether a boat can be used in a lake or stream, but is based on the "floating log" test, which was a very useful tool during logging days in Michigan. If a log can float down a waterway, then it is considered navigable, and usable for commerce, travel, and trade. Navigable waters are considered public, which brings with it rights for public use. Even though we do not use rivers to float logs to market any more, this standard is still used as the legal test to define public waters.

- Construct, dredge, commence, extend, or enlarge an artificial canal, channel, ditch, lagoon, pond, lake, or similar waterway where the purpose is ultimate connection with an existing inland lake or stream, or where any part of the artificial waterway is located within 500 feet of the ordinary high-water mark of an existing inland lake or stream.

- Connect any natural or artificially constructed waterway, canal, channel, ditch, lagoon, pond, lake, or similar water with an existing inland lake or stream for navigation or any other purpose. Wetlands and floodplains are regulated in a similar way through Part 303, Wetlands Protection, of the Natural Resources Environmental Protection Act, 1994 PA 451. This law specifically applies to wetlands connected to an inland lake, pond, river or stream, or a wetland located within 500 feet of an inland lake, pond, river, or stream. Wetlands that are not connected and are greater than five acres in size are also protected, as are non-connected wetlands of any size that the MDEQ determines are essential for protection of the State's natural resources. The property owner must obtain a permit from the MDEQ for any of the following activities: deposit or permit the placing of fill material in a wetland; dredge, remove, or permit the removal of soil or minerals from a wetland construct; operate, or maintain any use or development in a wetland; drain surface water from a wetland. A guidebook, called the Permit and Licensing Guidebook, has been developed by MDEQ to explain the permit requirements for these activities. Refer to the MDEQ website or contact the Land and Water Management Division for more information.

Summary

Community planning plays an important role in the management of riparian resources. Planning policy tools include relevant background information, goals and objectives in community master plans, parks and recreations plans, and other planning documents. Master planning provides the legal basis for regulatory actions (such as zoning) and also provides a solid foundation and direction for non-regulatory community programs. Relevant regulatory measures to protect riparian corridors include resource overlay zones, natural features setbacks, and site design and review standards. A pre-application conference with developers is a useful way to influence site design without necessarily depending on regulatory measures. Pre-application meetings should include mapped information describing the natural resources of the site. Many design measures to reduce impacts on riparian resources may be employed, including open space cluster design, lot size flexibility, frontage and road setback requirements, impervious surface reductions, and stormwater and wastewater management. Other non-regulatory options for protecting riparian corridors include public education, reduced mowing, land acquisition, land protection, and best management practices.

Funding Riparian Initiatives

Chapter 7 Includes:

- **Local Funding: The Keystone to Conservation Financing**
- Local Funding Strategies
- Designing a Ballot Measure for Local Conservation Financing
- Crafting Successful Ballot Language: An Example from Rochester Hills, MI
- Federal Funding, Federal Grants, and State Grants
- Federal and State Cost-Share Programs
- Private Funding: The Role of Foundations and Non-profits
- Summary

A billion here and a billion there, and pretty soon you're talking real money.

Everett Dirksen

Funding Riparian Conservation Initiatives

Much of the information presented in this section is based on The Conservation Finance Handbook, published by The Trust for Public Land in 2004.

Communities that have created a comprehensive plan for local riparian conservation and restoration are faced with the challenge of identifying and securing funds to implement their vision. Often riparian conservation initiatives require substantial monetary support over time. Because the duration and cost of preserving and restoring riparian systems can be significant, it is important that communities develop a multi-faceted funding base that avoids reliance on a single, potentially unpredictable or easily exhaustible, source. Most communities have a variety of funding sources available to them at the federal, state, private, and local levels.

The Detroit Riverwalk along the Detroit River.

Local Funding: The Keystone to Conservation Financing

Federal, state, and private funds frequently serve as supplemental matches to primary funds raised at the local level. Therefore, consistent local funding is the keystone to effective conservation financing. Several incentives exist for pursuing conservation financing at the local level:

- Local funding means local commitment and local control of funds
- Local funds can be used to leverage federal, state, and private dollars
- Public awareness and support for local conservation initiatives can be elevated
- Successful measures set a precedent for future conservation financing proposals
- Securing local conservation funds strengthens a community's ability to attain supplemental funding from federal, state, and private sources

Many conventional and innovative tools exist for raising conservation revenues at the local level. Funding may be raised through traditional measures such as budget appropriation, sales and property taxes, or voter-approved conservation taxes and bond issues. Communities may also choose to pursue unconventional conservation financing options such as tapping local income and cell phone taxes. Innovative conservation financing measures, such as impact fees is also and option. The levying of a stormwater tax, based on the impermeable surface area of a property, is one example. In Michigan, this form of conservation financing is currently prohibited by the *Bolt* decision.

Local Funding Strategies

In general, conservation financing tools can be classified into one of two categories: 'pay-as-you-go' or 'borrowing'. Each funding approach has its own advantages and disadvantages. Pay-as-you-go measures provide funding from general appropriations or dedicated revenues. Funding sources can include property assessments, sales tax set-asides, real-estate transfer taxes, onetime environmental fines, and budget surpluses. Such financing can be appealing to debt-resistant voters and public officials because it entails year-by-year accountability and does not incur borrowing costs. On the downside, pay-as-you-go measures tend to generate relatively small annual revenues, and are vulnerable to changes in community politics.

Conservation financing through long-term borrowing can provide a community with substantial revenue and the ability to fund large-scale conservation initiatives on a multi-year basis. General obligation bonds comprise the most common source of borrowing. Additional borrowing measures include Revenue Bonds and Certificates of Participation. Challenges of passing bond measures for conservation funds include convincing voters of the merits of incurring debt and paying financing costs, and competing with other local programs in need of financing.

In an effort to improve the water quality of Johnson Creek and the Rouge River, Northville Township facilitated the creation of the Johnson Creek Protection Group. This advisory group of residents, businesses and local officials works together to identify actions in which the community can partake to preserve and restore water quality, as well as educate the public regarding their role in this on-going endeavor.

(Photo Credit: Johnson Creek Protection Group)

Table Source: Trust for Public Land Conservation Financing Department, 2003

Common Local Financing Options

Method	Definition	Pros	Cons
Property Tax	Tax on real property paid for by commercial and residential property owners	• steady source of revenue • relatively easily administered • tax burden fairly broadly distributed • small increases create substantial funding • popular with voters when focused on compelling land conservation needs	• competition for other public purposes • overall concern among taxpayers about high rates
Sales and Use Tax	Tax on the sales of goods or services	• relatively easily administered • low reporting costs • can generate large sums, even at small tax levels • may be paid in part by out-of town visitors • can tap into tourism profits generated by open space amenities • may include exemptions such as food and medicine	• revenues can drop when economy slows • considered regressive
Real Estate Transfer Tax	Tax on the sale of property, paid by either the buyer or seller	• funds can be substantial • nexus between taxing new development and protecting open space	• opposition from real estate/ development interests that makes passage difficult for some communities • less predictable revenue stream
Impact Fee	One-time fee paid by developer to offset costs of infrastructure caused by new development	• nexus between taxing new development and protecting open space	• parks and open space projects might require direct link to new development • may make housing development unaffordable
Special Assessment District	Special tax district for an area that benefits from an open space project	• users finance acquisition and management • predictable revenue stream • accountability in government spending • sense of ownership of and responsibility for area parks and services • taxable in small increments • ability to set own election date and process	• possibly time consuming to implement • overall concern over high rates among taxpayers
General Obligation Bond	Loan taken out by a city or county against the value of the taxable property	• allows for immediate purchase of open space, locking in land at current prices • distributes the cost of acquisition over time	• extra interest costs of borrowing • voter approval required, sometimes by supermajority levels
Revenue Bond	Loan paid from proceeds of a tax levied for a specific public project, or with proceeds of fees charged to those who use the financed facility	• not constrained by debt ceilings of general obligation bonds • voter approval rarely required	• more expensive than general obligation bonds

Designing a Ballot Measure for Local Conservation Financing

Creating sustainable funding for land conservation has been accomplished far more often via ballot measures for pay-as-you-go or borrowing options than through local legislation. Ballot measures give community voters an opportunity to make a judgment on the methods by which government will fund local conservation initiatives.

Conservation ballot measures should be designed around the results of background research and polling. Research to determine which local options and funding levels are economically prudent often takes the form of a feasibility assessment that includes thorough fiscal analysis. Public opinion polling is then used to determine the level of support for each viable option.

Questions to address in background research and community polls include:

Feasibility Questions:

- What types of financing options are legally permissible and historically used in the community?
- How much will each conservation financing option raise?
- What is the process for designing a measure and putting it on the ballot?
- Are there any controversies about the environment, land use, or the local government that could negatively impact a conservation financing measure at this time?
- Who are the most prominent and credible groups and individuals, including public officials, who might support or oppose a conservation funding measure?

Public Opinion Questions:

- Within the context of land and water conservation, what are community voters' top priorities?
- Is there community support for funding land conservation, and if so, how much are voters willing to spend?
- What are the arguments for and against increasing public funding for local land and water conservation?
- What other community priorities might be linked to conservation funding measures (for example smart growth, economic opportunities, linkages to tourism and recreation)?

If research and polling indicate that success of a conservation ballot measure is possible, it is time to design the specifics of the conservation measure (funding size and mechanism), craft the ballot language, and determine the best time to seek voter support. A community that takes time to build a successful conservation ballot measure will significantly strengthen its chance of becoming a successful applicant for matching funds from federal, state, and private sources.

Voters pick up their ballots at a polling place in the University of Michigan's Union in Ann Arbor. In 2003, Ann Arbor residents passed a half-mil, 30-year tax to preserve open space and farmland.

Photo Credit: Paul Jaronski, U-M Photo Services

Crafting Successful Ballot Language: An Example from Rochester Hills, MI

Michigan voters cast their ballots

Elements of Effective Ballot Language:

- A ballot title that clearly conveys the essence of the ballot measure
- Clear expression of voter priorities/public purpose as quickly as possible
- A funding level in line with voters' spending thresholds
- Fiscal safeguards that reassure voters that money will be spent wisely
- Simplified ballot language that easily communicates the terms of the millage to voters
- An absence of unnecessary technical jargon that is not required by law

MILLAGE PROPOSAL TO PROVIDE FUNDING TO PERMANENTLY PRESERVE GREEN SPACES AND NATURAL FEATURES WITHIN THE CITY OF ROCHESTER HILLS.

Shall the City of Rochester Hills permanently preserve natural green spaces, wildlife habitats and scenic views; protect woodlands, wetlands, rivers and streams; and expand the Clinton River Greenway and other trail corridors by funding the purchase of land and interests in land, and enable the City to seek matching grant funds by levying a new millage of up to 0.3 mills ($0.30 per $1000 of taxable value) for ten years, 2005 through 2014, inclusive. If approved, the estimated revenue the City will collect in the first year if the millage is authorized and levied in full is $1,020,593.

____ Yes
____ No

Communities throughout the country are showing a willingness to finance conservation initiatives with locally-raised revenues. In 2005, voters faced 63 state and local conservation ballot measures. Of these, 86 percent passed, generating more than $1 billion in new conservation funding nationwide.

From 1994 - 2005, Michigan voters passed 28 out of 43 proposed conservation measures, approving $715,196,433 in conservation funding. Source: www.landvote.org

Michigan 2005: Successful Conservation Financing Ballot Measures

Community	County	Finance Mechanism	Purpose	Funds Approved	% Yes	% No
Webster Township	Washtenaw	• Property Tax • 5-year • .5 mill.	Farmland, open space, habitat, watershed protection, and trails	$851,840	69%	31%
Rochester Hills	Oakland	• Property Tax • 10-year • 3 mill.	Open Space	$10,205,930	53%	47%
Grosse Ile Township	Wayne	• Property Tax • 3-year • 1 mill.	Open Space	$1,836,000	61%	39%

In 2005, Michigan voters passed 3 out of 5 conservation measures, approving $12,893,770 in conservation funding. (Source: Trust for Public Land LandVote)

Researching Grants: Questions to Consider

- Where is there geographical or programmatic convergence in funding?
- What grants could help fund your community's specific riparian conservation goals?
- What grants have been awarded to neighboring communities with similar riparian initiatives?
- Are there new legislative developments that impact potential funding?
- What political allies might support the community's grant application?
- Are there additional partners (conservation groups, land conservancies, non-profits) that could support the grant application by providing match?

Federal Funding

Federal conservation funds are made available to state and local governments and nonprofit organizations through grants and incentives. Many federal programs have a matching-funds requirement that can be met by using primary funds raised at the local level. Competition for federal conservation dollars is exceptional. Therefore, it is important to keep in mind that federal funds should play a supplemental rather than primary role in supporting local conservation initiatives.

In general, federal assistance with assembling a comprehensive funding program for local conservation efforts may fall into one of three categories:

1. Direct federal grants
2. State directed federal grants
3. Direct federal acquisition

State Directed Federal Grants

Grants within this category are awarded directly to states, which are given authority to determine how the federal funds are spent. States may in turn allocate the federal funds to local conservation initiatives on a competitive basis. State Directed Federal Grants include the Land and Water Conservation Fund "Stateside" program, the Transportation Efficiency Act; and Clean Water Act Funds (including Clean Water State Revolving Fund and Drinking Water State Revolving Fund).

Direct Federal Grants

Direct Federal Grants eliminate the State as a middle-man, and award funds directly to local communities and non-profit conservation organizations. Decision making in these programs is retained at the federal level. Direct Federal Grants that provide support for conservation-based initiatives vary greatly in their function and extent of funding. Examples include the Land & Water Conservation Fund; Farm and Ranch Land Protection Program; Forest Legacy Program; Coastal and Estuarine Land Conservation Program, National Coastal Wetlands Conservation Grants, and the North American Wetlands Conservation Act.

Direct Federal Acquisition

Occasionally, the federal government may make direct acquisitions of ecologically significant lands or natural resources for its own federal units. Local communities that harbor natural resources of regional, national, or global significance may find merit in lobbying for Federal acquisition and protection of the resource. Ecologically significant parcels located adjacent to national parks, national forests, wildlife refuges, or existing military bases, may make good candidates for federal acquisition.

Federal Funding for River Corridor & Wetland Restoration: The EPA 5-Star Restoration Challenge Grant

The Five Star Restoration Program brings together students, conservation corps, other youth organizations, citizen groups, corporations, landowners and government agencies to provide environmental education through projects that restore streambanks and wetlands. The program provides challenge grants, technical support, and opportunities for information exchange to enable community-based restoration projects.

The EPA Five Star Restoration Program provides challenge grants, technical support and opportunities for information exchange to enable community-based restoration projects for local wetlands and streams.

EPA Five Star Streambank Stabilization effort

The Five Star Restoration Program was established so the U.S. Environmental Protection Agency (EPA) can work with its partners for education through community-based wetlands restoration projects in watersheds across the U.S. The National Association of Counties, the National Fish and Wildlife Foundation, and the Wildlife Habitat Council have joined together with EPA for this effort. Funding for the program is provided by EPA's Office of Wetlands, Oceans and Watersheds, and by the National Marine Fisheries Service's Community-based Restoration Program for selected projects in coastal areas.

Michigan Natural Resources Trust Fund

The Michigan Natural Resources Trust Fund (MNRTF) provides financial assistance to local governments and the Department of Natural Resources (DNR) to purchase land or rights in land for public recreation, or protection of land because of its environmental importance or its scenic beauty. It also assists in the appropriate development of land for public outdoor recreation.

By law, no more than 25 percent of the Trust Fund revenues available for appropriation each year can be used for development, therefore the majority of funding is allocated for acquisition projects. The program is supported by annual revenues from the development of State-owned mineral resources (largely oil and gas), and is administered by the MNRTF Board of Trustees and the Grants Management office of the Michigan DNR.

Since 1980, a total of $42,619,119 has been allocated for acquisition and development projects in Oakland County.

Year	Amount Awarded
1980-1984	$2,883,750
1985-1989	$6,413,000
1990-1994	$10,989,600
1995-1999	$8,974,427
2000-2005	$13,358,342

State Funding

Although the responsibility for implementing conservation initiatives rests at the local level, the backbone of conservation financing rests at the State level. States play a key role in enabling local conservation financing and program implementation by encouraging or providing the following funding tools:

1. **Substantial State Funding**
   Constitutionally or statutorily dedicated conservation funds, and/or annual budget appropriations.

2. **Local enabling authority**
   States grant their local governments legislative authority to seek conservation funds through ballot measures.

3. **State incentives for local conservation finance**
   Provision of matching grants and low interest loans, encourage local governments and nonprofit conservation organizations to develop programs and create financing mechanisms to leverage state funds.

4. **Purchase of Development Rights**
   State-level PDR program for open space and natural resource protection.

5. **Public private partnerships**
   State facilitates public-private conservation partnerships.

6. **Federal partnerships**
   Active participation by state governments in federal conservation programs can promote land conservation partnerships between federal, state and local governments and with nonprofit partners.

7. **Tax credits (with careful design)**
   State laws can provide income or other tax credits to private landowners who donate land or easements to public or private, nonprofit entities for conservation purposes.

Federal and State Cost-Share Programs

Both federal and state agencies offer a number of cost-share incentive programs to assist private (mainly agricultural) landowners manage their land for the benefit of riparian resources. Such programs may assist communities in implementing their riparian conservation vision by providing individual landowners with the tools and incentives they need to join local conservation efforts.

The following websites provide more information on these programs:

Michigan Department of Natural Resources
www.michigan.gov/dnr

Farm Services Agency
www.fsa.usda.gov

Natural Resources Conservation Service
www.nrcs.usda.gov

Michigan Association of Conservation Districts
www.macd.org

Cost-Share Programs that Address Riparian Conservation on Private Lands

Program	Description	Contact Organization
Conservation Reserve Program (CRP)	Provides cost share for establishing permanent cover and conservation practices, and annual rental payments for land enrolled in 10 to 15-year contracts.	Natural Resources Conservation Service (NRCS) or Farm Service Agency (FSA)
Conservation Reserve Enhancement Program (CREP)	Designed to improve the water quality of Macatawa, River Raisin, and Saginaw Bay Watersheds. Practices eligible for cost share are: filter strips, riparian buffers, wetland restoration, field windbreaks, and planting of native grasses. Landowners can receive annual rental payments and cost-share assistance to establish long-term, resource conserving covers on eligible land.	Michigan Department of Natural Resources (MI DNR) and local NRCS Office
Environmental Quality Incentives Program (EQIP)	Provides up to 75% cost-share for conservation practices in accordance with 1 to 10-year contracts, and incentive payments for certain management practices.	Local NRCS or Conservation District Office
Landowner Incentive Program (LIP)	U.S. Fish and Wildlife Service program that supports: grasslands and wetlands in southern Michigan.	MI DNR Wildlife Division
Partners for Fish and Wildlife Program (PFW)	Up to 100% financial and technical assistance to restore wildlife habitat under minimum 10-year cooperative agreements.	Local office of the U.S. Fish and Wildlife Service (USFWS)
Private Stewardship Grants Program (PSGP)	Provides grants or other federal assistance to individuals and groups engaged in private conservation efforts that benefit species that are threatened or endangered, candidates for listing, or other at-risk species on private lands within the U.S.	Local office of the USFWS
USDA Stewardship Incentive Program (SIP)	Provides up to 65 percent cost share for forest management plan development, tree planting, riparian and wetland improvement, and recreation and wildlife habitat improvement. Participants must have at least one acre, but less than 1,000 acres of nonindustrial private forestland.	Local NRCS or Conservation District Office
Wetland Reserve Program (WRP)	Assists in restoring and protecting wetlands on retired agricultural land. Agreements can be 10-year, 30-year, or permanent.	Local NRCS or Conservation District Office
Wildlife Habitat Incentives Program (WHIP)	Provides up to 75% cost-share for conservation practices under 5 to 10-year contracts.	Local NRCS or Conservation District Office

Private Funding: The Role of Foundations and Non-profits

Private funds from foundations, corporations, and individuals can serve as an important supplementary component to a local conservation program. Foundations in particular can provide early funding and visioning support, help communities frame the conservation issue(s), study best practices, solicit community input, design conservation strategies, and leverage state and federal resources. Like federal and state funds, however, private dollars are best relied on as supplements to a significant and steady local funding stream.

Partnering with nonprofit land trusts is another sound strategy local governments can adopt when raising conservation dollars. Nonprofit land trusts may assist local communities with conservation financing by sponsoring private fundraising campaigns that raise money from corporations and individuals. In addition, nonprofits can solicit donations from foundations, many of which have policies against awarding grants directly to governmental agencies.

Volunteers help to stabilize an eroding streambank along the Johnson Creek in Northville Township. Volunteer efforts such as this augment funding and partnership support for preserving the stream's unique brown trout habitat.

Photo Credit: Michael Carr

Summary

Successful community conservation initiatives are based on a well-diversified funding mechanism that supplements consistent, local funding revenues with a variety of federal, state, and private financing measures. Because each community is unique, the combination of funding measures used to create successful conservation programs will vary. Nonetheless, the following checklist summarizes a generalized but useful approach communities should consider when securing funds to implement their local conservation programs.

Checklist for Securing Conservation Funds

1. Identify Local Funding Options ✓ Determine all available funding options, including pay-as-you-go and borrowing	**4. Identify Federal Funding Sources** ✓ Evaluate federal funding sources ✓ Determine the federal or state agency that distributes funds and the process by which funds are allocated
2. Design a Local Ballot Measure ✓ Assess funding options in detail, including various funding levels and corresponding costs to taxpayers ✓ Research legal constraints of referring a measure to the ballot ✓ Conduct a professional, public-opinion poll that tests voters' conservation priorities and spending tolerance ✓ Design a measure that reflects public opinion and addresses conservation challenges	**5. Evaluate a State's Conservation Funding Landscape** ✓ Assess a state's role in providing direct funding (grants and incentives) and authorizing local funding ✓ Consider the following best practices: • a substantial, dedicated state funding source • significant local enabling options • a program of incentives for local governments • a purchase of development rights program • public-private partnerships • conservation tax credits
3. Understand Community Values and Cost/Benefits of Open Space ✓ Design a greenprinting plan and secure a local funding source ✓ Research potential grant and incentive programs to determine where there is geographic or programmatic convergence ✓ Forge alliances with public- and private-sector leaders who can facilitate funding and champion local efforts	**6. Assess Private Funding Sources** ✓ Consider funding from foundations, corporations, and individuals ✓ Partner with nonprofit land trusts that can sponsor private fundraising campaigns and solicit foundation funds

Table Source: Trust for Public Land Conservation Financing Department, 2003

Case Study: Riparian Corridor Planning and Implementation in the Rouge Green Corridor

Chapter 8 Includes:

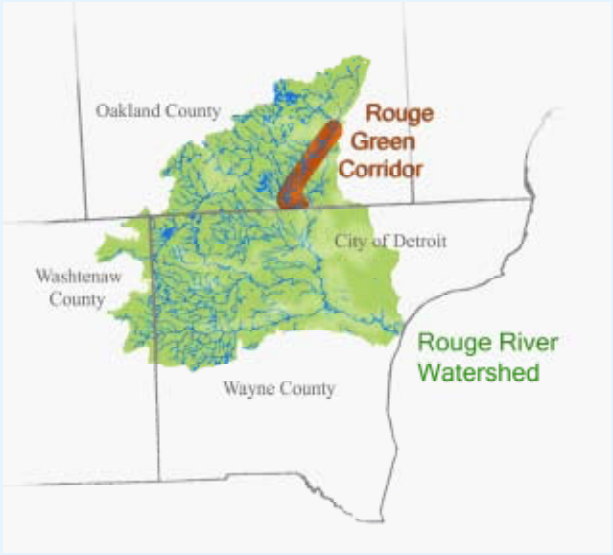
Modern society will find no solution to the ecological problem unless it takes a serious look at its lifestyle.

Pope John Paul II

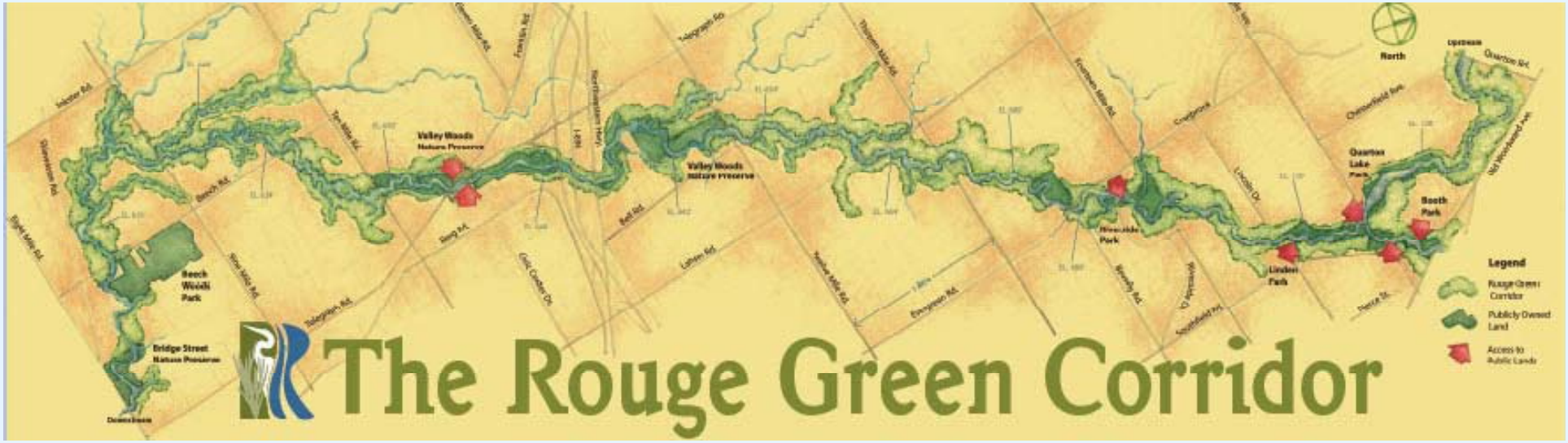
Case Study: Riparian Corridor Planning and Implementation in the Rouge Green Corridor

The Rouge Green Corridor

The Rouge Green Corridor is part of the headwaters of the Rouge River system in Oakland County and flows through the City of Birmingham, Village of Beverly Hills, and City of Southfield. The river valley is very steep and is influenced by episodic glacial lake level lowering and base level readjustment in the ancestral Rouge River, resulting in unique and beautiful river valley features such as bluffs, terraces, and ravines.



The steepness of the river valley combined with the very intense surrounding commercial and residential land uses result in the river being hidden from view in most locations. As such, it is truly a hidden jewel or oasis that flows through these developed communities. Public access is limited to a string of public parks and preserves, many of which have limited or no vehicular access.



Credits: Illustration: Janice Das, InSite Design
Graphic Design: Margot Campos, Margot Campos Design.

Threats along the Rouge Green Corridor are related to the extensive development that has occurred near the corridor and within the watershed. Issues include invasive species, erosion and sedimentation, water quality concerns, and stormwater runoff issues.

A unique opportunity exists along the Rouge Green Corridor to preserve and manage a significant natural amenity within an urban landscape. Because the land surrounding the Rouge Green Corridor is mostly developed, there is little threat of additional fragmentation of the existing natural vegetation. Opportunity exists to properly manage and expand the habitat while increasing public awareness of the resource and access in some areas.

A significant factor contributing to the integrity of the Rouge Green Corridor is the intact band of riparian vegetation that protects the river from the surrounding intensive development.

Mike Penskar of the Michigan Natural Features Inventory and Sally Petrella of Friends of the Rouge explore the Rouge Green Corridor by kayak.

Native plants and wildlife can be seen along the Rouge Green Corridor

Building Partnerships

The Rouge Green Corridor planning group came together to pursue various activities in support of the Rouge Green Corridor in 2004. Partners are comprised of local interests including the Southeastern Oakland County Water Authority, Friends of the Rouge, the Oakland Land Conservancy, Oakland County Office of the Drain Commissioner, Oakland County Planning & Economic Development Services, the City of Southfield, the Village of Beverly Hills, and the City of Birmingham.

Residents of the City of Southfield explore the Rouge Green Corridor.

The group proceeded to address one of the goals of the Rouge Main 1-2 Subwatershed Plan. Under this goal, the group addressed the following objectives in the plan:

1. Provide information to residents and public officials on existing access to public corridor lands and available uses

2. Encourage private riparian landowners to manage their waterfront in an ecologically-sustainable manner

3. Invest in improvements in existing publicly-owned lands, parks, and greenways to encourage nature study, wildlife viewing, and scenic enjoyment, land stewardship practices and water quality improvements, and other recreational uses as designated by municipalities

4. Identify areas where water quality improvements, habitat improvements, public acquisition of land, or conservation easements will benefit fish and wildlife values

5. Identify opportunities for collaboration and partnerships among municipalities and supporting organizations

Activities have included public information and visioning workshops, breakfast meetings targeted to raising the awareness of local public officials, multiple stewardship activities targeting invasive species management, analyses of land use opportunities, outdoor educational tours and outings, a biodiversity study, and an identity and branding study.

Business interests have partnered with the planning group, providing both financial contributions and assistance with events. Contributors have included DENSO Corporation and RaymondJames.

Oakland Land Conservancy

Multiple independent stakeholders have joined forces in support of the corridor.

Identity and Branding

The Rouge Green Corridor Identity Demonstration Project was a project funded by the Rouge River Wet Weather Demonstration Project through the United States Environmental Protection Agency. This initiative developed an identity concept for the Rouge Green Corridor and created an educational poster and self-guided tour map for riparian homeowners, businesses, and the general public.

A logo and a design for a sign appendage to the existing Rouge River Watershed road sign system were developed. In addition, the set of planning and communications guidelines that you are currently reading for riparian greenway corridor planning was developed.

Rouge Green Corridor

The Rouge Green Corridor road sign will be appended to the existing river crossing road signs that are installed at every road/river intersection in the entire watershed. This method will expose thousands of motorists and pedestrians to the rouge Green Corridor logo on a daily basis.

An array of communication tools were created to communicate and showcase the Rouge Green Corridor's Brand Identity.

Conservation

Conservation of a 16-acre parcel known as the “Rivers of Southfield” in the City of Southfield was achieved through a partnership effort between the City of Southfield and the Oakland Land Conservancy in 2004. The parcel was acquired by the city with the assistance of a Michigan Natural Resources Trust Fund Grant through the Michigan Department of Natural Resources and a GreenWays Initiative grant through the Community Foundation of Southeastern Michigan. The Oakland Land Conservancy continues to provide stewardship assistance for the site. The preserve contains scenic vistas atop steep bluffs and an intact floodplain forest including a special concern species twinleaf (*Jeffersonia diphylla*). The site is located at the confluence of the main branch of the Rouge and Franklin Rivers within the Valley Woods Nature Preserve.

A scenic vista atop a steep bluffs and an intact floodplain forest in the Valley Woods North “Rivers of Southfield” Nature Preserve.

Restoration

Quarton Lake is a 13.2 acre impoundment on the Rouge River situated at the northernmost end of the Rouge Green Corridor in the City of Birmingham. Over 30 years of sedimentation resulted in the lake filling with debris and polluted sediment. Water quality was severely degraded, lake oxygen levels depleted, and fish biodiversity in decline (carp exceeded 90% of all captured fish). In addition, shoreline erosion degraded the aesthetic quality of the lake and contributed further to the sediment load.

In 2003, the City of Birmingham successfully applied for a 1.5 million dollar federal EPA grant through the Rouge River Wet Weather Demonstration Project to restore the lake. The project included removal of sediments from the lake by dredging, installation of a sediment trap, removal of carp and stocking with game fish species, deterrence of waterfowl, stabilization of the shoreline using bio-engineering methods, wetlands creation, aeration of the lower level of water, and habitat enhancements.

Twinleaf (*Jeffersonia diphylla*) is a special concern species found in the “Rivers of Southfield” preserve.

The lake is “coming back to life”, according to Bob Fox, assistant director of Public Services for the City of Birmingham. The project has sparked a renewed interest in the lake and the Rouge River within the City. Additional restoration projects within City of Birmingham parks along the Rouge Green Corridor have followed, including removal of invasive woody vegetation and restoration of native species, and bank stabilization projects implementing woody debris management.

Quarton Lake has undergone an extensive restoration and improvement program.

Community Education: School Programs

In order to promote the use of Rouge Green Corridor parks and preserves for classroom education, two projects were undertaken with high school classes between October 2003 and November 2004 under a grant from the USEPA through the Rouge River National Wet Weather Demonstration Project under the coordination of the Southeastern Oakland County Water Authority (SOCWA). The projects focused on science, community action, and communication skills. Students involved lived in Birmingham, Beverly Hills, and Southfield and most had never visited any of the Rouge Green Corridor parks or preserves.

The projects were organized as education partnerships between SOCWA and the lead teachers with the purpose of demonstrating how the Rouge Green Corridor landscape can help teachers address their curriculum requirements. Program planning meetings provided for brainstorming of options that met the needs of both partners. SOCWA provided resources and organization to the field studies; the teachers assisted with follow-up and in the classroom.

Schools visit the prairie restoration site at the Douglas Evans Nature Preserve to learn about the plants and animals that live there.

The following types of activities were organized:

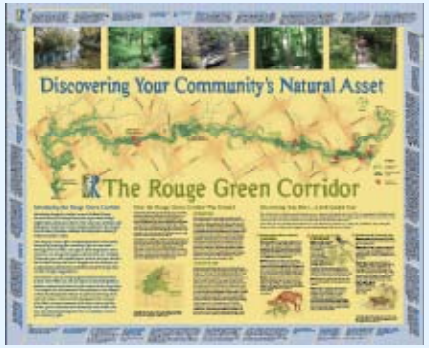
- Classroom presentations
- Work days
- Nature journaling and photography
- Habitat scavenger hunt

The project also included public education action steps to make residents aware of Rouge Green Corridor parks and the problem of invasive species. Students prepared posters, logos and a website. Students articulated their concerns and recommendations at a public forum organized by SOCWA and the Rouge Green Corridor Group. The outcomes for the classrooms and SOCWA volunteers were positive and strong. For some students, the field trips were among the most meaningful of the school year. Teachers reported that the activities were particularly helpful for students who learn in non-traditional ways.

Poster and Brochure

In addition to the school programs, an educational poster about the Rouge Green Corridor was created as part of the Rouge Green Corridor Identity Demonstration Project. The poster includes a historical timeline, watercolor map of the corridor, overview and history, a self-guided tour, as well as information on challenges and opportunities facing the Corridor, guidance for riverfront property owners and general stewardship information, and additional resources. The project partners will disseminate the poster to local residents and Rouge Green Corridor stakeholders.

This colorful, double-sided poster was created to educate local residents and watershed stakeholders about the Rouge Green Corridor.



Managing Utilities as Assets

The Oakland County Drain Commissioner's Office (OCDC) has actively worked to maintain its utilities as assets to the community throughout Oakland County. For example, the Combined Sewer Overflow (CSO) facilities constructed in the Rouge Green Corridor were designed to blend into the existing area. OCDC-operated CSO facilities in the Rouge Green Corridor began operating in 1997 and are examples of how architectural detail can result in a beautiful building that blends well and adds value to a community while serving its primary function of improving water quality. The Birmingham and Acacia Park structures are two examples of integrating local community character into the architectural detail of a utilitarian structure. The Acacia Park CSO Basin is located in the Douglas-Evans Nature Preserve and was designed to look like a horse stable. The Birmingham basin is located in Linden Park and was designed to look like a grist mill. The buildings blend so well into their neighboring community, a local realtor once mistook one facility for a residential home and was interested in listing the property.

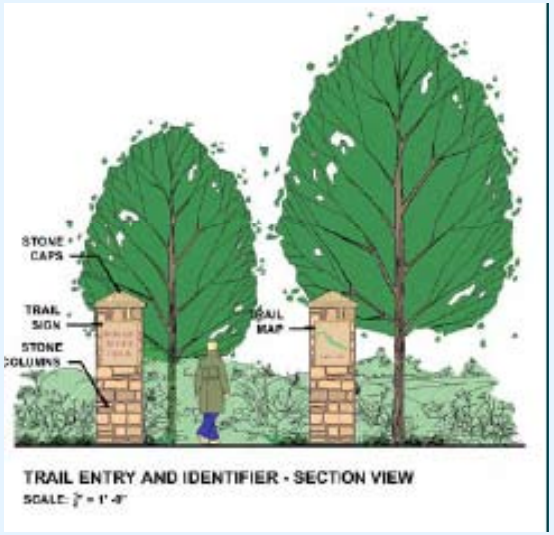
The Birmingham (left) and Acacia Park (right) Combined Sewer Overflow (CSO) facilities were constructed with the local community character in mind.

Another example is the Jacobs Drain project in West Bloomfield Township. As part of this detention basin enhancement project about 20 acres of diverse habitat will be planted and a half mile trail will be constructed around the detention pond. The detention basin will contain a variety of native grasses, flowering forbs, shrubs, and trees. The detention pond will serve as a place for quiet retreat and nature enjoyment while adding habitat value in addition to its utility as a stormwater detention structure.

The Jacobs Drain site plan.

Planning Policy Tools

In addition, OCDC looks for opportunities during county drain restoration projects to combine traditional flood control with improved environmental benefits in order to manage open drains as community assets. For example, the Edwards Relief Drain stream bank stabilization project in West Bloomfield Township restored over 1,100 feet of severely eroded stream banks with bio-engineered stabilization techniques. The project includes a 20-foot wide native buffer along each side of the drain in an area that was previously mowed to the waters edge. More than two acres of native plantings were added which significantly improved habitat.



Conceptual designs for trails throughout the Rouge Green Corridor in the City of Birmingham are included in the Rouge River Trail Master Plan.

Over the years, the City of Birmingham has seized opportunities to acquire property along the Rouge River to provide continuous public access, connect neighborhoods and downtown with the river, protect water quality, buffer development, and preserve ecosystems. The City prepared and adopted a "Rouge River Trail Master Plan". This plan details numerous capital improvements for city parks along the Rouge River designed to enhance public access to the Rouge Green Corridor and promote the city as a "walkable community". The total projected costs for the improvements exceed 2.4 million dollars and include paths, trails, boardwalks, sidewalks, overlooks, pedestrian bridges, signage, viewing shelters, benches, stream bank restoration, stormwater management, invasive vegetation removal, and restoration of native ecosystems. Funding for the improvements will be supplied through a successful bond measure voted in by Birmingham residents.

Public comment on the plan highlighted the need to balance public access with ecosystem protection. A dedicated cadre of volunteers is active in the removal of invasive species and restoration of native flora in the City's Rouge Green Corridor parks. This group in particular is concerned with "overdevelopment" of the Rouge Green Corridor. Other interests want to see improved public access, particularly in the form of trails and overlooks.

The Edwards Relief Drain before restoration in October 2004 (top). The Edwards Relief Drain after restoration in October 2005 (bottom).

Volunteer Actions

Volunteers are critical to the continued success of realizing the Rouge Green Corridor as a community asset through long-term stewardship and conservation. Volunteer efforts such as ecological gardening, invasive species removal, trash and debris clean up, and amphibian monitoring are actively coordinated by local non-profit partners in the Rouge Green Corridor.

The Southeastern Oakland County Water Authority (SOCWA) provides education to residents about water conservation, and has organized a large number of key volunteers in its Ecological Gardening class. The purpose of the course is to educate gardeners about ecological principles and the local ecology and eco-region as a first step leading toward creating and maintaining sustainable home landscapes. Areas of the Rouge Green Corridor were used as reference sites for the course. As part of the Ecological Gardening Sites, native plant garden demonstrations have been installed by SOCWA volunteers at numerous public and private sites along the Rouge Green Corridor. SOCWA volunteers are also active in invasive species removal programs and workdays. SOCWA annually recognizes these "Rouge Green Corridor Stewards" at an annual picnic luncheon.

Identifying and removing invasive species are vital to preserving the ecological integrity of the Rouge Green Corridor. The Oakland Land Conservancy (OLC) is a local land conservancy, and has coordinated several invasive species removal workshops and workdays on its preserves and other public lands in the Rouge Green Corridor. Topics have included "Buckthorn Busters" in which participants were educated about the invasive shrub *Rhamnus cathartica* and participated in its removal from a local natural area. Other workshops have included removal of the highly invasive Garlic Mustard (*Alliara petiolata*) from natural areas.

Volunteers in the annual Frog and Toad Survey in the Rouge Green Corridor learn about amphibians while documenting their occurrence in the watershed.

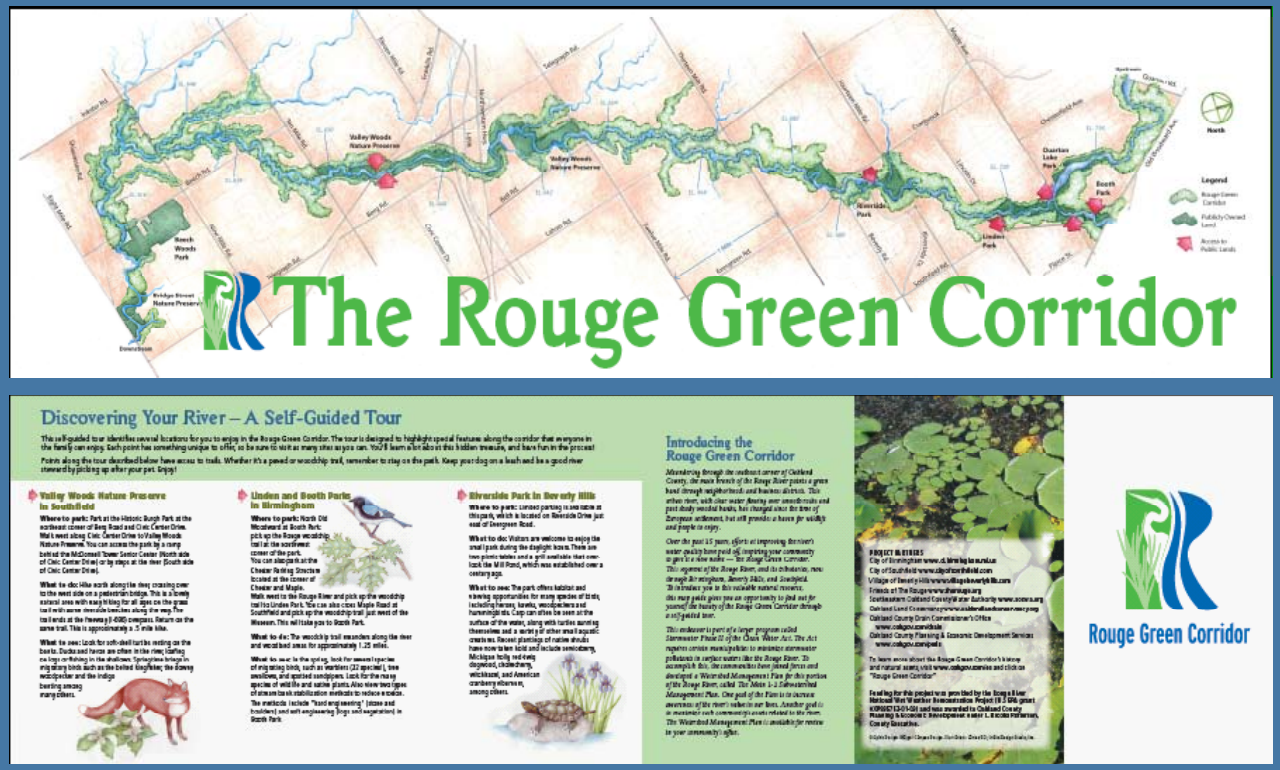
Friends of the Rouge (FOTR) is a non-profit organization dedicated to educating the public about the Rouge River Watershed and the need for public participation in watershed stewardship activities. Since the mid-1980s, watershed-wide events sponsored by FOTR have included participation in the Rouge Green Corridor. Initially geared toward engaging citizens in cleaning up trash and debris in the Rouge River, including removal of log jams, Rouge Rescue has shifted toward woody debris management and other stewardship activities such as native plantings.

In addition to Rouge Rescue, FOTR administers an annual Frog and Toad Survey that employs local residents to survey amphibian habitat in their own neighborhoods. Volunteers document frog and toad calls in an effort to assess the distribution, diversity, and health of amphibian populations in the Rouge Watershed. Since 2001, 225 volunteers have surveyed the Rouge Green Corridor communities and identified eight species present in Birmingham, Beverly Hills, and Southfield. To date, a total of eight species have been documented, including wood frogs, chorus frogs, spring peepers, American toads, leopard frogs, tree frogs, green frogs, and bull frogs.

Connecting People to the River

A self-guided tour map about the Rouge Green Corridor was created as part of the Rouge Green Corridor Identity Demonstration Project. The guide folds to pocket-size and includes information about access to public lands in the Rouge Green Corridor (left).

The City of Birmingham is connecting people to the river through the creation of trails and other public access amenities in their city parks within the Rouge Green Corridor (below).



This colorful self-guided tour map was created to encourage local residents and watershed stakeholders to explore the Rouge Green Corridor.

This bridge design in the City of Birmingham recognizes the Rouge River as a community asset by informing pedestrians and cyclists that they are crossing over the river.

This rain garden installed in the Village of Beverly Hills in the Rouge Green Corridor absorbs rainwater, preventing it from entering the storm drain system.

Funding

There is no formal entity to govern the Rouge Green Corridor; rather an ongoing committed, multi-jurisdictional partnership between county and local government and non-profit agencies provide initiative and direction. There is no direct funding source for Rouge Green Corridor activities. The diverse nature of interests, land uses, economic resources, ecological management, issues, and needs in the Rouge Green Corridor require a diversity of funding sources for projects and enhancements. Funding has been provided through federal, state, regional, local, public, and private channels. Federal EPA grants through the Rouge River Wet Weather Demonstration Project (for more information see www.rougeriver.com) have provided the largest share of funding for biodiversity studies, public visioning and workshops, school programs, and a branding and identity study.

State grants through the Michigan Natural Resources Trust Fund and regional grants through the Community Foundation for Southeast Michigan's GreenWays Initiative provided funding for the acquisition of the "Rivers of Southfield" preserve. Local funding provides the resources for local park management and improvement. Private contributions by local businesses such as DENSO Corporation have provided resources for public outreach by the Oakland Land Conservancy.

Rouge Green Corridor volunteers and experts kayak in Hidden Rivers Nature Preserve in the Village of Beverly Hills, as part of a federal grant to document the biodiversity of the corridor.

Planning Approaches: Lessons Learned

A comprehensive planning approach for managing the Rouge Green Corridor was not undertaken due to the significant differences in preferences, needs, and community resources among the three communities. The planning group found it feasible to work together on coordination and a guiding vision while addressing planning and implementation at the local municipal level according to local needs and resources.

The group embraced the Rouge Main 1-2 Subwatershed goal of maximizing community assets related to the river and its related objectives as their guide. Further corridor-wide vision statements were derived from public visioning work sessions and addressed habitat enhancement, walking and jogging, nature study, canoeing and kayaking, removal of invasive species, riparian landowner education, access via walking and cycling, and connecting to complementary land uses adjacent to the corridor. Planning beyond these general goals and vision statements was not undertaken as a group. This model is similar to the approach taken by communities under the watershed planning approach to Phase 2 Stormwater Regulations in which multiple communities come together to develop watershed-wide goals but implement those goals locally according to unique local needs and resources.

This flexible arrangement accommodated the differences between each municipality and allowed each community to progress towards implementing the Rouge Green Corridor concept at a speed appropriate to their own needs. For example, while the City of Birmingham committed substantial resources to increasing the public access and visibility of the Rouge Green Corridor, the City of Southfield has had fewer resources to contribute to such capital projects but has increased the amount of land preservation in the Corridor through grants. Meanwhile, the Village of Beverly Hills is primarily interested in maintaining the privacy of its residents and has avoided placing the names of several of its preserves on maps to discourage visitors in an effort to maintain a lower profile, but has embraced local neighborhood efforts to steward and educate residents about the river. Each community has experienced successes on their own terms throughout the duration of the project.

As a result of this work, the governing bodies of the Cities of Birmingham and Southfield have adopted resolutions in support of protecting and promoting the concept of the Rouge Green Corridor. The Village of Beverly Hills has not yet followed suit. Unfortunately, support for the Rouge Green Corridor concept by public officials has not been as uniform or consistent as the partners would like; the successes of this project were driven largely by municipal staff and local active citizens. Challenges to gaining political support have included coordinating schedules between the staff, volunteers, and political officials of three autonomous municipalities, as well as frequent turnover of political officials.

Although this flexible and adaptive planning arrangement has been beneficial in many ways, the lack of a comprehensive planning approach may challenge future efforts to identify and target funding sources for the ongoing conservation and management of natural resources. Several stakeholders have expressed an interest in developing a corridor-wide natural resources management plan. Ongoing challenges will include maintaining the cohesion and participation of the planning group and identifying next steps and attaining funding for projects.

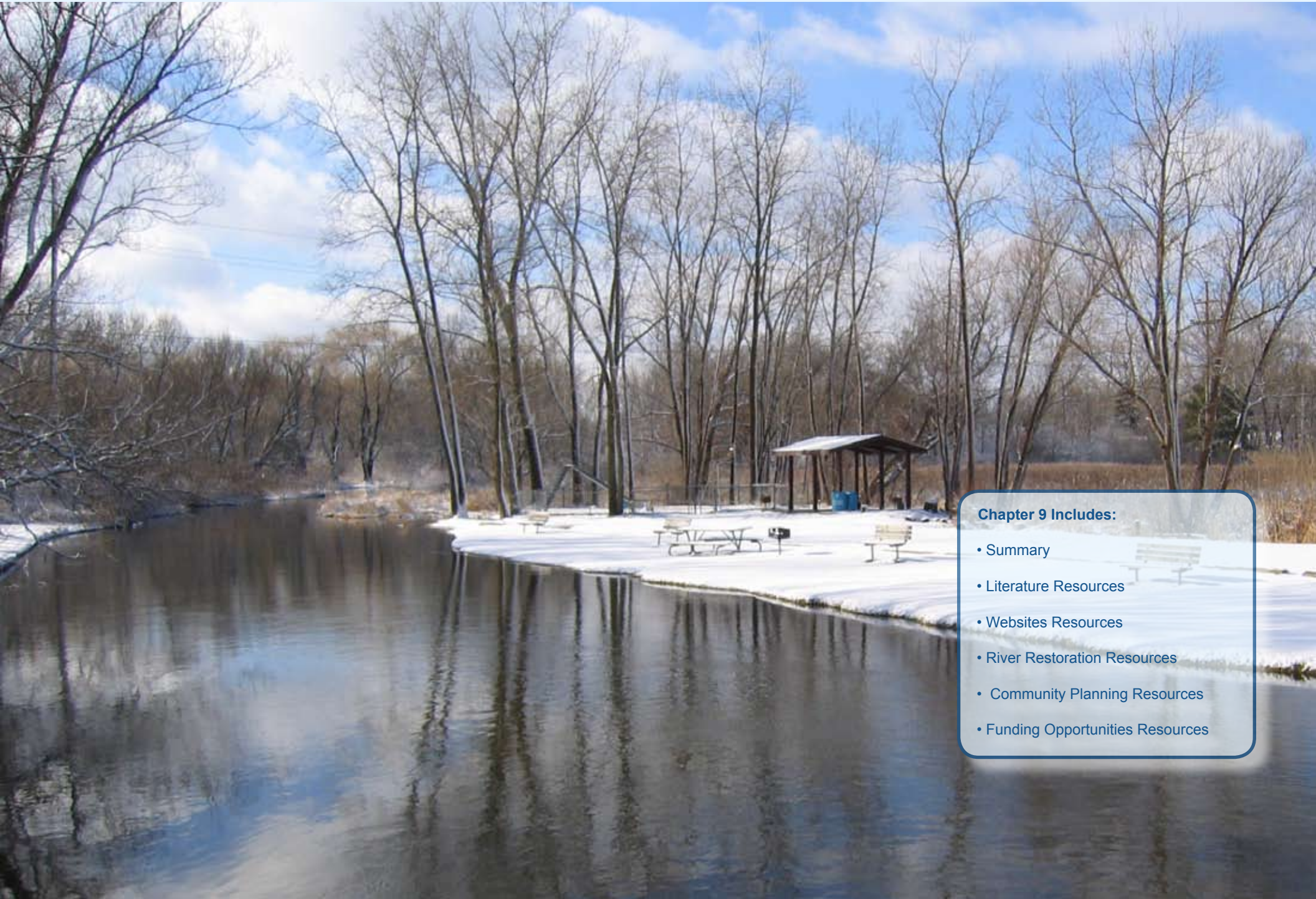
Howard Knorr, local resident of the Village of Beverly Hills, describes the native plantings and wildlife of this wetland along the Rouge Green Corridor in the Village.

Summary

The Rouge Green Corridor is part of the headwaters of the Rouge River system in Oakland County and flows through the City of Birmingham, Village of Beverly Hills, and City of Southfield. A unique opportunity exists along the Rouge Green Corridor to preserve and manage a significant natural amenity within an urban landscape. The Rouge Green Corridor planning group came together to pursue various activities in support of the Rouge Green Corridor in 2004. The Rouge Green Corridor Identity Demonstration Project was a project funded by the Rouge River Wet Weather Demonstration Project through the United States Environmental Protection Agency.

This initiative developed an identity concept for the Rouge Green Corridor and created an educational poster and self-guided tour map for riparian homeowners, businesses, and the general public. Projects in the Rouge Green corridor have included conservation of high quality parcels, restoration of degraded ecosystems, community education, management of water utilities as community assets. Municipal planning and volunteer actions have contributed to the enhancement of the corridor. Funding has come from diverse sources.

Summary & Additional Resources



Chapter 9 Includes:

- Summary
- Literature Resources
- Websites Resources
- River Restoration Resources
- Community Planning Resources
- Funding Opportunities Resources

Summary

The guidelines contained within this document were designed to give the reader background about and ideas for planning the protection, restoration, and enhancement of riparian corridors in Southeast Michigan. The special opportunity for maximizing the community asset provided by riparian corridors through connecting people with the natural environment, regardless of whether a community is rural or urban, is emphasized. Information about the how rivers in the region were formed geologically and clues about how the landscape we see today tells us stories about the past is described, as is the landscape ecology of riparian corridors and how they interact with and are influenced by the regional landscape ecosystems of Southeast Michigan. A dual planning process combining planning for the landscape as well as creating an identity concept for the riparian corridor is presented. Implementation techniques including conservation, restoration, connecting with cultural amenities, and community planning are described. Funding opportunities are outlined. Finally, a case example is presented, reviewing the successes and challenges of a project to preserve, restore and enhance the Rouge Green Corridor in Southeast Oakland County.

It is the sincere hope of the authors of these guidelines that local stakeholders will use them and learn about the local rivers in their community, seeing them as special community assets and finding ways to maximize those assets into the future.

Urban, suburban, and natural rivers provide community assets that can be maximized with strong planning and communication.

Additional Resources

Literature:

Allen, David J., Stream Ecology: Structure and Function of Running Waters. 1995. Chapman & Hall London, UK

Bay, James William, Glacial History of the Streams of Southeastern Michigan. Bulletin No. 12. 1938. Cranbrook Institute of Science

Dorr, John A. and Donald F. Eschmann, The Geology of Michigan. 1970. University of Michigan Press, Ann Arbor, Michigan

Forman and Godron, Land Mosaics: The Ecology of Landscapes and Regions. 1986. Cambridge University Press, Cambridge, UK

Hauer, F. Fichard and Gary A Lambert, Methods in Stream Ecology. 1996. Academic Press, London, UK

Humphrys, C.R., and Green, R.F., Michigan Lake Inventory: Bulletin 63, p. 63A-63H. 1962. Michigan State University Department of Resource Development.

Malanson, G.P. Riparian Landscapes. 1993. Cambridge University Press, Cambridge, UK

Otto, Betsty, Kathleen McKormick, and Michael Leccese, Ecological Riverfront Design: Restoring Rivers, Connecting Communities. March 2004. American Planning Association. Washington, D.C.

Riley, Ann L., Restoring Streams in Cities: A Guide for Planners, Policymakers, and Citizens. 1998. Island Press, Washington, DC.

SEMCOG: Land Use Tools and Techniques: A Handbook for Local Communities

Websites:

Regional Landscape Ecology:
Regional Landscape Ecosystems of Michigan, Minnesota, and Wisconsin: A Working Map and Classification.
http://www.npwrc.usgs.gov/resource/habitat/rlandscp/rlandscp.htm

River Restoration:

Stream Corridor Restoration by the Federal Interagency Stream Corridor Restoration Working Group
http://www.nrcs.usda.gov/technical/stream_restoration/

Community Planning:

SEMCOG: Putting Southeast Michigan's Water Quality Plan into Action:
http://semcog.org/products/pdfs/wqtools.pdf

Center for Watershed Protection:
http://www.cwp.org

The Rouge River Project: Ordinance Information Page:
http://www.rougeriver.com/ordinance

Macomb County Department of Planning & Economic Development: Model Environmental Ordinances:
http://macombcountymi.gov/planning/environmentalordinances.html

Growing Greener Ordinance Language an Interactive CD-ROM:
http://www.greenerprospects.com/products.html

Illinois Planning Commission and Chicago Wilderness: Conservation Design Resource Manual:
Language and Guidelines for Updating Local Ordinances:
http://www.nipc.org/environment/sustainable/content.htm#Conservation

Department of Urban & Regional Planning, University of Wisconsin & WI-DNR: Planning for Natural Resources: A Guide to Including Natural Resources in Local Comprehensive Planning:
http://www.dnr.state.wi.us/org/es/science/publications/SS_964_2002.pdf

Minnesota Planning Environmental Quality Board: From Policy to Reality: Model Ordinances for Sustainable Development:
http://server.admin.state.mn.us/pdf/2000/eqb/ModelOrdWhole.pdf

Funding Opportunities:

The Conservation Finance Handbook, published by The Trust for Public Land in 2004.
http://www.tpl.org

The Trust for Public Land: National LandVoteTM Database:
http://www.landvote.org

“A Guidebook of Financial Tools: Paying for Sustainable Environmental Systems”. EPA Environmental Finance Program. 1999. Produced by the Environmental Financial Advisory Board and the Environmental Finance Center Network.
http://www.epa.gov/efinpage/guidebook/guidebooktp.htm