

Conservation and Restoration of Riparian Corridors



Chapter 4 Includes:

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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.

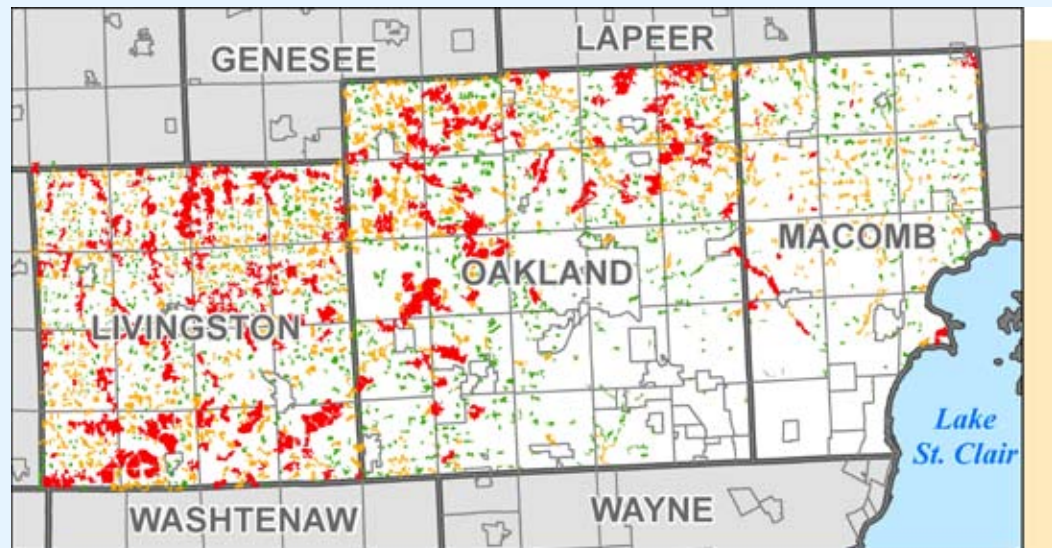


Local stakeholders join together to plan for the preservation of green infrastructure in Oakland County.

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.



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).

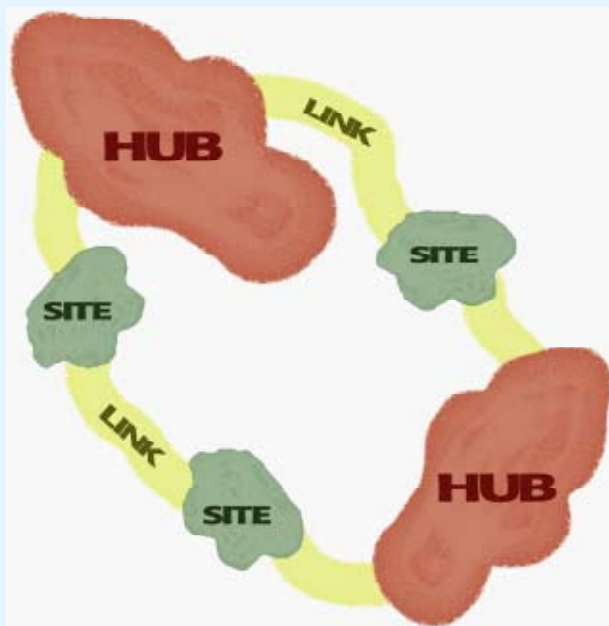


- **Land Acquisition:** Landowners can donate lands with conservation value to land conservancies so that the land can be managed and preserved for its ecological value. Outright donation of land has several benefits including substantial income tax deductions. On occasion, lands with unique natural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

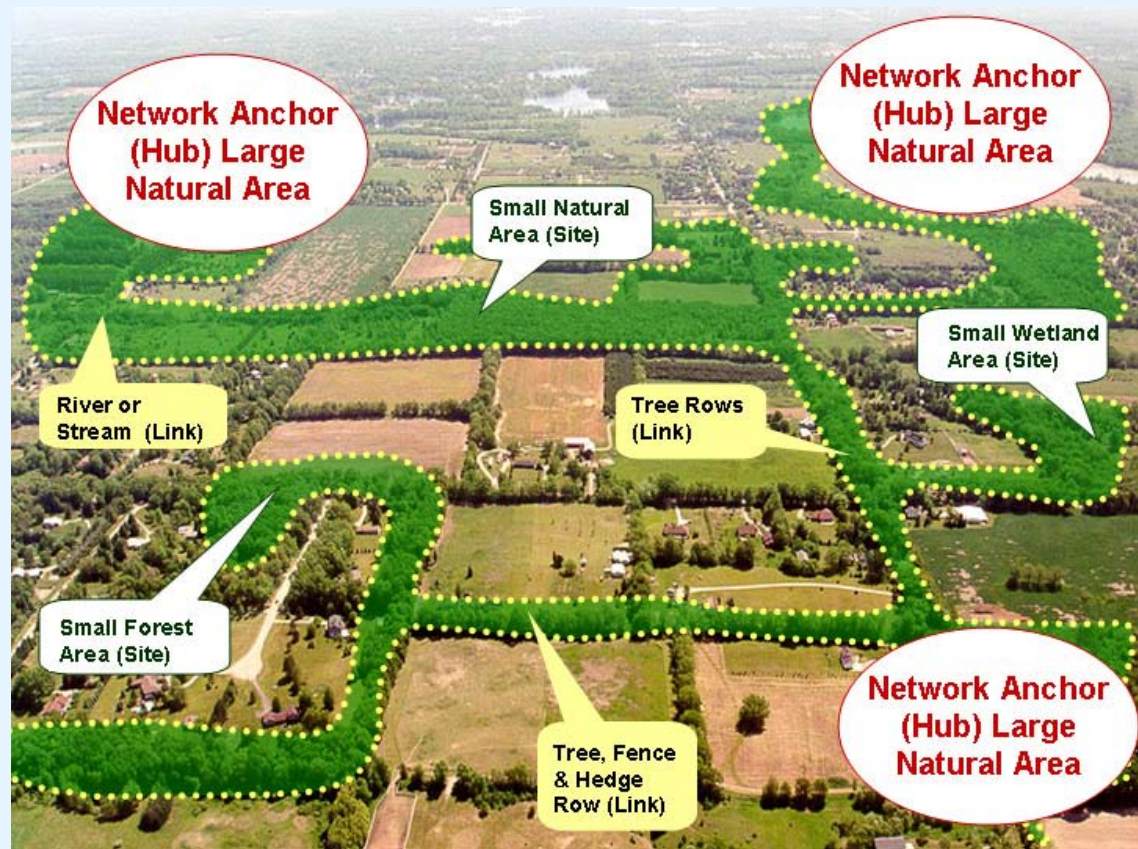


Hubs, Sites, and Links

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

Green infrastructure networks consist of the following components:

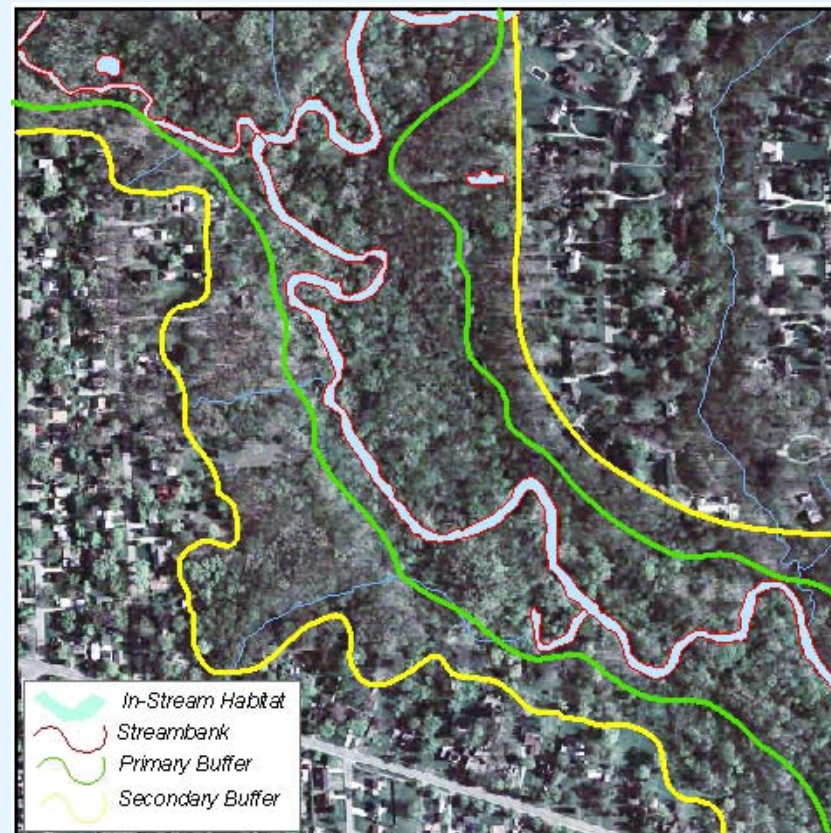
- **Hubs:** Hubs anchor the network and provide an origin or destination for wildlife. Hubs range in size from large conservation areas to smaller parks and preserves. Hubs provide habitat for native wildlife and help maintain natural ecological processes.
- **Sites:** Smaller ecological landscape features 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 <i>From water's edge to water's edge</i>	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

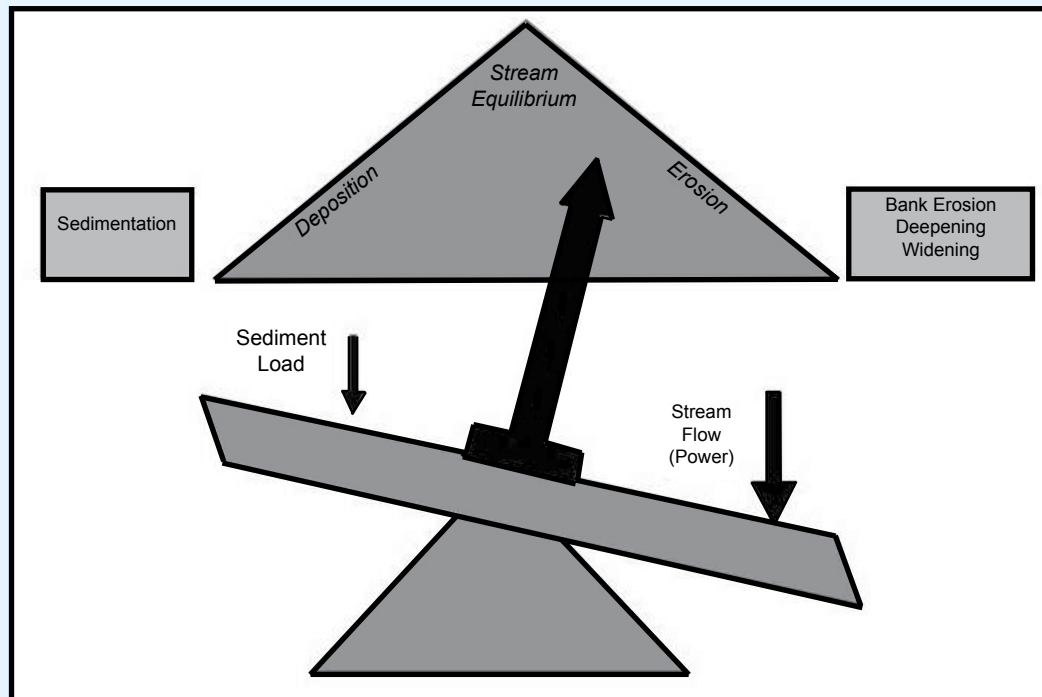
Beyond the riparian buffer, the stream itself may be in need of restoration. The stream can be separated into two main components: (1) the banks and (2) the instream habitat. The banks of a stream are the immediate zone of separation between the streams and their floodplains. They are shaped by “bank 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.

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.



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

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



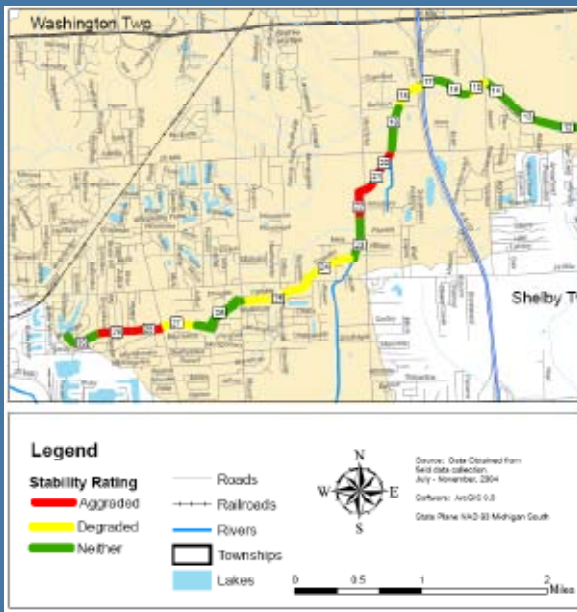
2002



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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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.

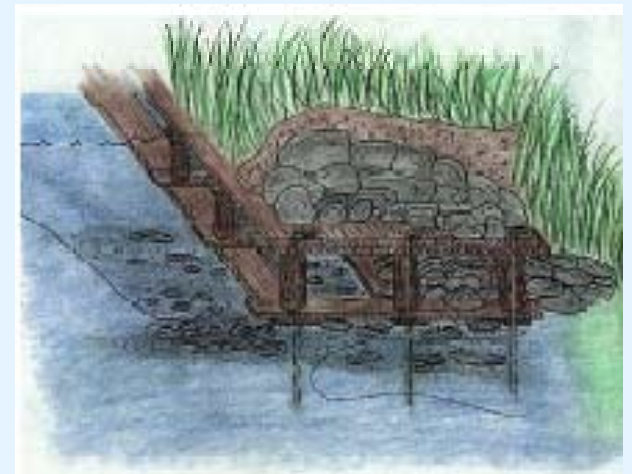
Managing Instream Habitat

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 luncker 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.

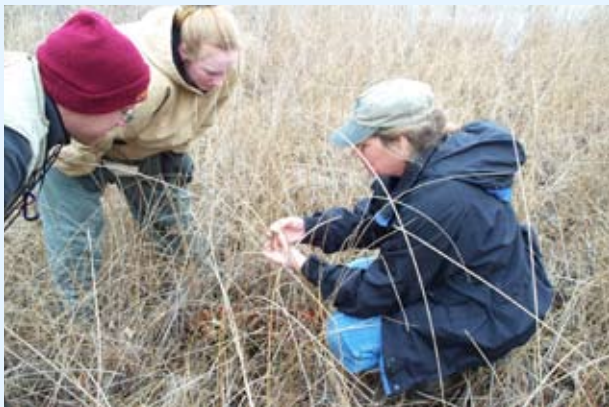


This artist's rendition of a luncker structure shows a type of instream habitat improvement which provides shelter and habitat for trout.

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

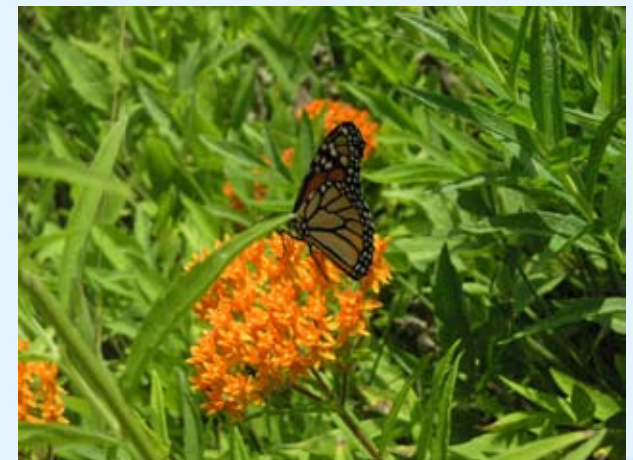
Resources for Stewardship

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.



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

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.





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 (*Alliaria 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.

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

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.

