Chapter 1

Environmental Context

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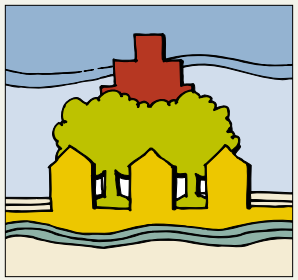
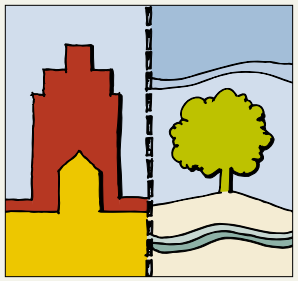
1.1 Environmental context: an urban ecology.

Originally settled along the northernmost navigational point of the Mississippi River, Saint Paul developed within a unique river valley and flood plain system. The city's location on the bluffs above the river provided dramatic views, but also allowed people direct access to the river by way of natural breaks in the limestone bluffs.

Over time, industrial uses and other types of developments, including roads, levees and railroads, have significantly altered the environment and masked the natural connections between the city and the river, isolating the built environment from surrounding natural systems. Development has also heavily impacted many indigenous landscapes.



Efforts should be made to reintegrate the currently isolated natural and built environments (below), creating a unique and healthy urban ecology (above).



The note on this postcard suggests that, historically, people had a close relationship with the river.

The city needs to be understood as part of a functioning ecosystem. This does not mean that future development should be discouraged or that there should be a wholesale restoration of the natural environment. It means instead that efforts should be made to redress the imbalance that now exists between the natural and built environments. The intent is to understand the city as a unique and healthy urban ecology specific to Saint Paul.

The potential to create a special identity and sense of place for Saint Paul will come, in part, from our ability to recognize and interpret the city's rich natural history and celebrate its physical and cultural diversity. Actions should be guided by a set of principles that address appropriate ecological practices within the river corridor and downtown. An ecological charrette/workshop was held in December 1996 to determine these principles, that include:

1. View the river, river valley and downtown as an integrated living ecosystem.
2. Restore and sustain the complex interaction of natural, human and cultural sub-systems.
3. Recognize environmental stewardship as a necessity, not a luxury.
4. Balance nature and development so that both are economically sustainable.
5. Be a responsible upstream community.
6. Recognize that the Mississippi River is, and will continue to be, a working river.

1.2 Environmental goals and objectives.

A number of goals and objectives are identified to encourage the emergence of a unique urban ecology.

Goal 1:

Strengthen Saint Paul's identity by reinforcing its topography and natural environment.

The Mississippi River is a well-spring of opportunity. The wide flood plain is edged with a unique bluff formation that frames the river valley. The city is built on 10,000-year-old glacial till soils, deposited in an undulating topography, providing visual interest and spectacular views. In light of the current diminishing transportation/industrial role of the Mississippi River valley, Saint Paul has a chance to recognize and reconnect to its very reason for existence, the Mississippi River.

Objective: Approach development decisions with a view to establishing a balance between built and natural areas.

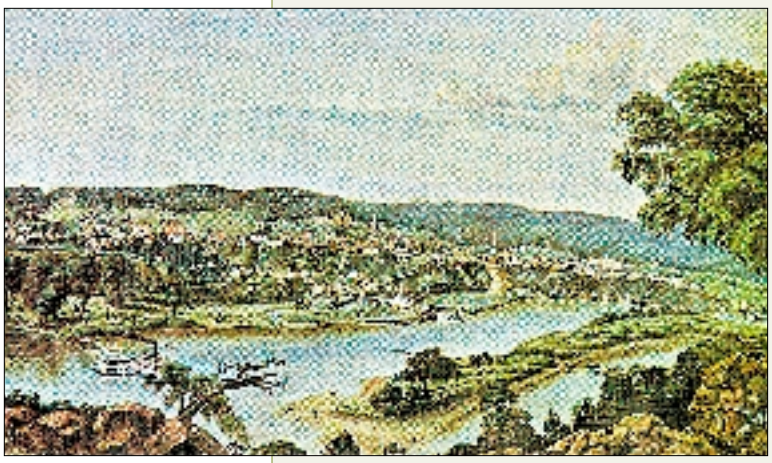
Objective: Develop and undertake strategies to restore the health of local ecosystems.

Objective: Identify and reinforce the key elements of the natural setting that contribute to the character of Saint Paul, including the river, and the bluffs.

Objective: Reinforce, rather than flatten, Saint Paul's topography as a natural asset to which urban form should respond.

Objective: Renew connections with the Mississippi River, urban forests, and floodplain reaches.

Saint Paul's unique topography, which at one time was so readily visible, should be reinforced, not diminished, by urban form.



Goal 2:

Protect, restore and reinforce native vegetation.

Saint Paul is located at the meeting of the prairie and eastern hardwood forests. Historically, the well-drained uplands were vegetated by prairies, savannas, and woodlands that contained rich and diverse wildlife communities. Lakes occupied deeper depressions, while wetlands developed in uplands and lowlands that were not so well drained. A variety of habitat types continue to exist within the Mississippi River corridor, including remnant savannas, prairies, the bluffs, old fields, brown fields, riverine areas, caves, river edge wetlands, floodplain systems, and the river itself. Remnant landscapes are left disconnected from the larger ecosystem, and their health continues to be challenged by a number of factors related to urban development.

There is a wealth of opportunity for preserving and restoring native plant and animal habitats. The creative restoration, integration and reconnection of natural areas, including their linking to urban green spaces, is a primary component of this Framework. Such strategies as the "greening" of downtown Saint Paul and the creation of an interconnected system of natural and structured green elements within urban villages, mixed-use commercial areas, parks, gateways, edges, etc. will help preserve and restore native habitats. The work of Greening the Great River Park, for example, has played an important role in restoring the river valley and contributing to a connected greenway for migrating songbirds.

The intent is to establish a healthy urban ecology that contributes to the sense of place, improves the quality of life, and sets a context within which other strategies of the Framework can be implemented.

Objective: Continue to re-introduce native species. Implement management strategies to assist in achieving sustainability. Many of the existing habitats are seriously deteriorated and will only become healthy again with human intervention. Bluffs and degraded savannas overgrown with European buckthorn shrubs are eroding. Re-introduction of soil-stabilizing native grasses, sedges and wildflowers with a concurrent reduction of the buckthorn is necessary.

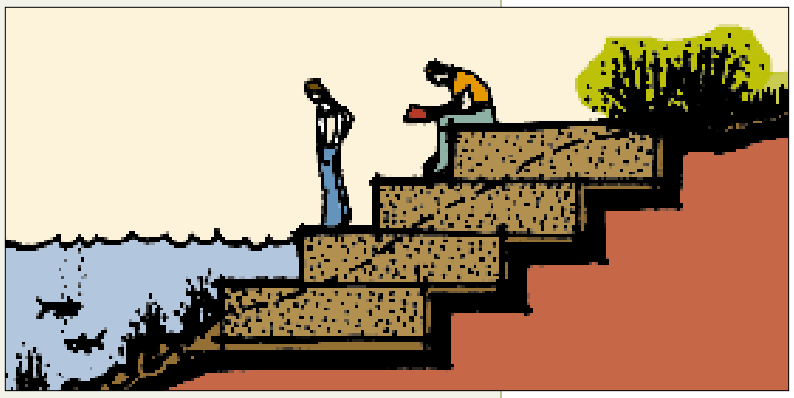
Objective: Continue to develop comprehensive data bases on the quality of ecological systems. Availability of data on the natural resources in the Framework area will be useful in future management programming and decisions. Monitoring the data will be useful to refining management and restoration programs.

Objective: Define protection strategies and incentives essential to the preservation of important habitats. Strategies for involving land owners in habitat protection and restoration are an important element of the Framework. Providing legal, financial and community incentives may be essential to foster preservation and restoration opportunities. (For example, tax incentives may help leverage additional preservation. Inclusion of private lands within greenway networks with appropriate financial incentives may be another option.)

Objective: Integrate future growth and development with restoration programs that reconnect and restore remnant landscapes.

Ben Thompson's 1992 image of a "greened" river valley captured the imagination of Saint Paul's citizens.

Increased pressure to use and enjoy the river challenges us to find means to increase access and improve the shoreline with both hard and soft edge treatments.

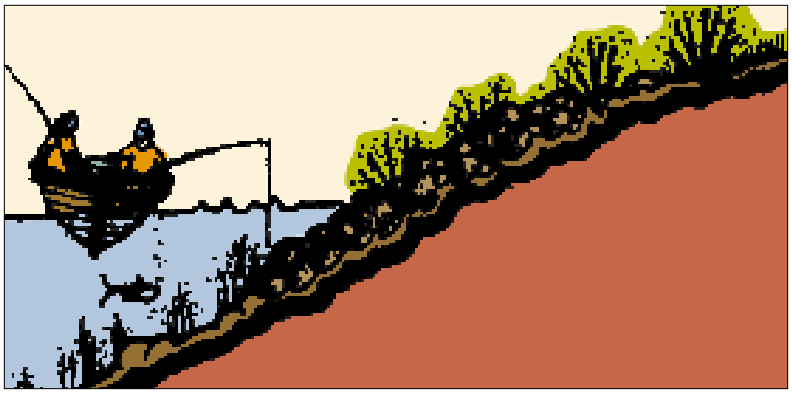


Goal 3:

Develop creative design alternatives for river edge treatments.

Historically and at present, the functional needs of industry and transportation dominate the overall character and quality of the river shoreline adjacent to downtown Saint Paul and the West Side. Natural shorelines have been converted to hard edges using stone, rip-rap and steel pylons, rendering these edges inaccessible and unattractive. Increased pressure to use and enjoy the river, both from the shore and on the water, challenge us to provide better access and to promote creative improvements to the shoreline that incorporate both hard edge and vegetative systems.

A variety of walkways, bikeways, walls, bulkheads, boat ramps, docking areas, fishing piers and other river edge features are currently in use along Lower Landing Park, Harriet Island Park, Raspberry Island and the Esplanade. In addition to these amenities, the City of Saint Paul Division of Parks and Recreation has already defined plans for stronger connections to the water's edge, additional greenway/park space within this corridor, and potential for increased recreational uses in and adjacent to the river.



Future improvements should strive to include native plantings and natural earth forms as part of site grading and flood control operations. The intent is to respond appropriately to local conditions and needs, incorporating a blend of hard and soft edge treatments along the river. Design recommendations should recognize the regional context of natural plant and animal communities within the Mississippi River corridor.

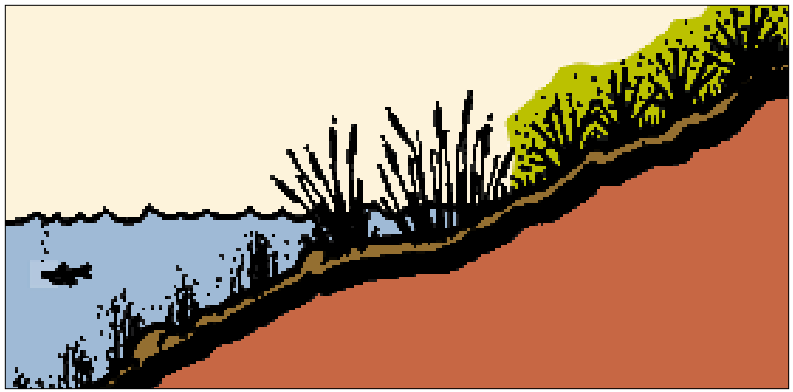
Objective: In areas where hard edge or shoreline armoring is necessary, use a number of methods, including walls, ramps, steps and terracing. A range of materials are appropriate, including large, square-cut limestone blocks.

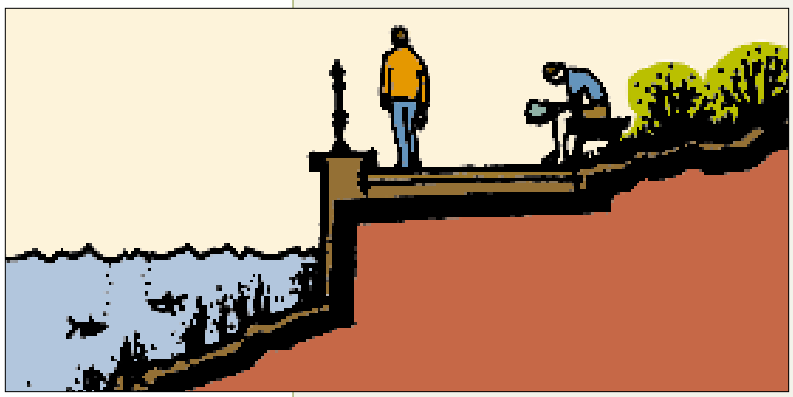
Objective: Where appropriate, when redeveloping or stabilizing the river's edge, use soil bio-engineering techniques and plantings in combination with more traditional engineered solutions. These combined solutions are usually less expensive than conventional river bank treatments, and they increase in strength as plant material continues to grow.

Objective: Where appropriate and feasible, re-establish a littoral zone, a band of vegetation where the shoreline meets the river edge. This vegetation is important for dissipating wave energy and for aquatic organism habitat.

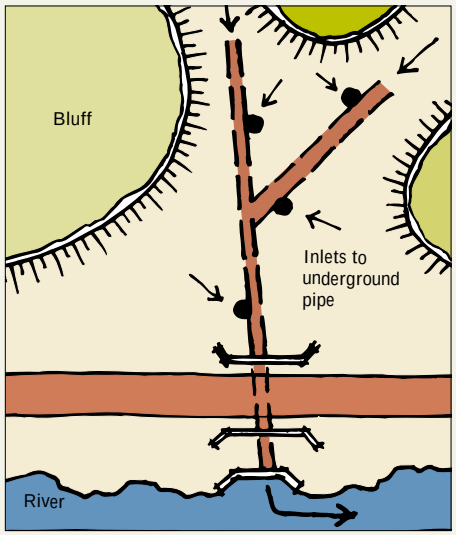
Objective: Improve the overall visual/aesthetic character of the shoreline and river edge.

The shoreline treatment should respond to local conditions and needs.

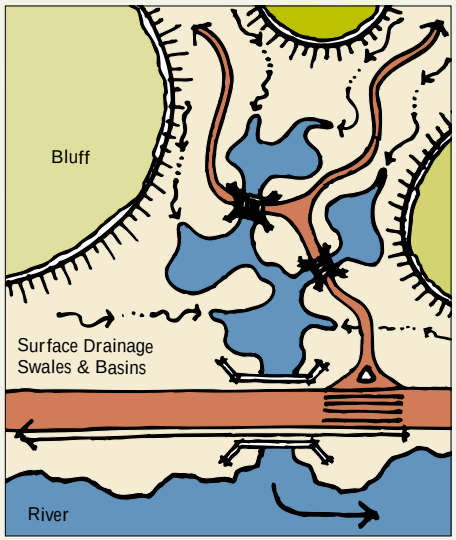




Conventional techniques for stormwater management have focused on the rapid removal of water via pipes, ditches or overland on impermeable surfaces.



Alternative strategies, including pre-treatment in upland plantings, sediment traps, and created wetlands, assist in improving water quality.



Goal 4:

Intensify the use of natural stormwater management solutions.

Conventional techniques for stormwater management in urban areas have focused on the rapid removal of water via pipes, ditches, or overland across impermeable surfaces. These solutions have effectively removed runoff water. However, pipe construction is often expensive when sized to take peak flow directly to receiving waters, and carry more sediments and pollutants to the discharge point. Speedy removal does not allow for groundwater recharge, and the discharge of high volumes of runoff can often cause flooding in small receiving waters.

Saint Paul's solution to managing stormwater runoff incorporates other alternatives in addition to piping systems. Wetlands and ponds have been acquired and created to minimize peak flows by temporarily detaining runoff. Benefits include: smaller piping systems downstream, sedimentation of materials and recharging of groundwater.

City site plan review includes strict stormwater management requirements that limit the rate of runoff from new development to the equivalent from a residential area and requires storage for the 100-year rainfall. Landscape solutions are frequently used to meet this requirement. The city has also constructed sumps, small detention containers, and intersection drains (catchbasins). Sumps trap sediment before they enter the storm sewer system. Saint Paul is also experimenting with citizen education to eliminate pollutants at the source. This is easily the least expensive solution to remove pollutants and improve downstream water quality.

These and other creative stormwater management strategies can continue to be integrated with development or retrofitted within an existing area. Although the Mississippi River is an important working river, its health would benefit from increased ecological approaches to stormwater management. Pre-treatment in upland plantings, sediment traps, and created wetlands will assist in improving the quality of the river water and other water bodies. Ecological solutions for managing stormwater may be more cost-effective in the short term, and typically offer long-term economy even when short-term costs are higher.

Objective: Apply appropriate codes and procedures already used in Saint Paul for stormwater management. Work closely with local, state, and federal representatives to explore and apply new technologies and innovative approaches that maximize the natural treatment of stormwater.

Objective: Reduce the rate and improve the quality of stormwater runoff into the Mississippi River without major detention basin pre-treatment. In each development, continue to require a detained rate of water removal from properties, providing settling and infiltration prior to discharge. Redevelopment of the Upper and Lower Landings, the West Side and the Northeast and Northwest Quadrants of downtown present immediate challenges for more natural stormwater management.

Objective: Use stormwater management elements such as ponds and swales to unite development areas with the natural environment. Emphasize what these elements add to site development in terms of aesthetic benefits and cost-effective stormwater management. Incorporate public use as a site amenity whenever possible in designing stormwater management systems.

Objective: Create upland buffers and wetland biofiltration systems to enhance the quality of water leaving developed areas.

Objective: In a number of locations, streams are now piped below ground. Initiate a program to daylight these streams, and integrate them with open space systems and restoration programs. The city should identify which streams can be reclaimed over time and gradually acquire properties as they become available.

Objective: Immediately pursue approaches to remove and eliminate pollutants at the source before they contaminate runoff. Expand the public education program to alert citizens about the dangers of disposing of various chemicals into the newly separated storm sewer system. Regulate the chemical content and use of lawn fertilizers in public and private areas of the city. Meticulously follow requirements for soil and erosion control on all projects within the city.

Continue to work with government organizations, neighborhoods and environmental groups to coordinate a city-wide education program that addresses watershed awareness, illegal dumping into the storm sewer system, lawn care practices and other non-point pollution issues.

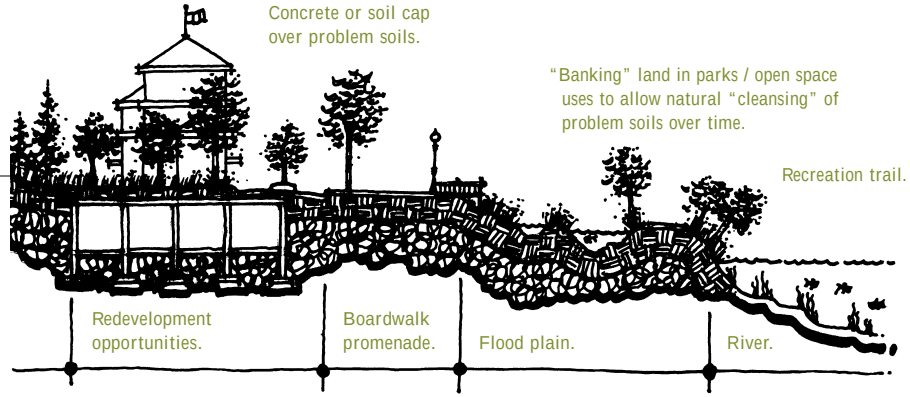
Upland buffers and wetland biofiltration systems enhance the quality of water leaving developed areas.

Goal 5:

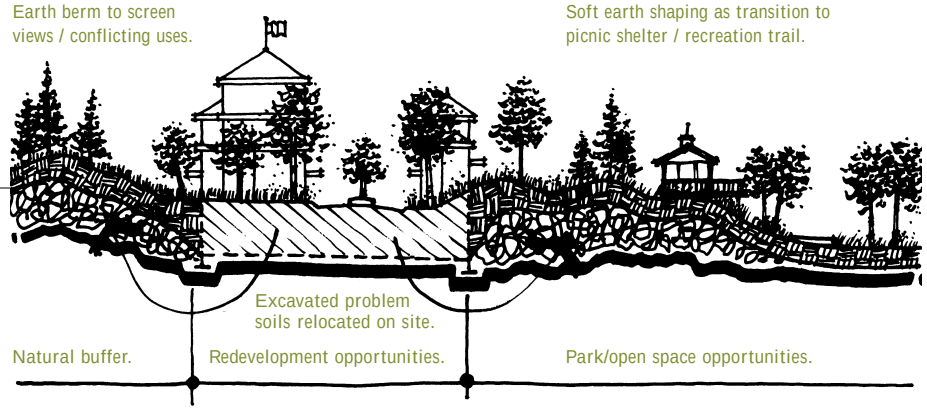
Support a variety of clean-up efforts and programs for adaptive re-use of contaminated properties.

The adaptive reuse and creative redevelopment of "brownfield" sites within the downtown core and Mississippi River corridor represent not only a significant challenge, but also a wealth of opportunity. The varying degrees of contamination now present in some areas reflect the legacy of past uses during the industrial period in Saint Paul. Strategies for cleanup and available technology to implement these initiatives are rapidly changing. At the same time, regulatory agencies continue to look for innovative, realistic, and economically feasible approaches that address current needs while making a strong commitment to explore new technologies for the future.

Capping of contaminated soils allows for natural recovery.



Contaminated soils can be excavated for use in on-site earth shaping, creating natural buffers and open space.



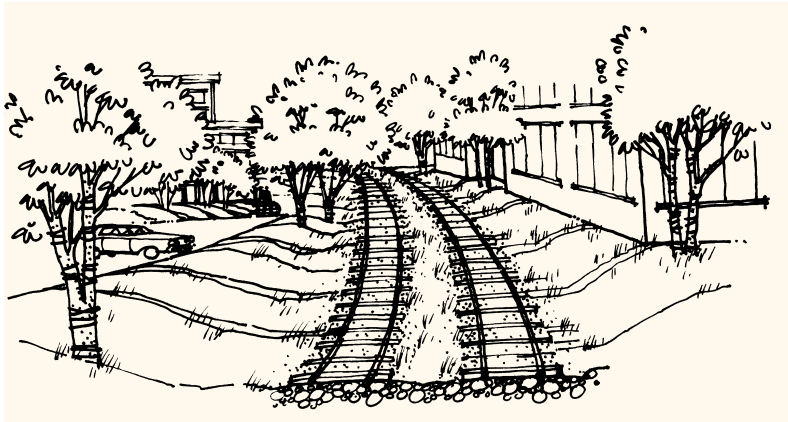
Objective: Develop cost-effective strategies for addressing site contamination, both in the short- and long-term. Establish a regional team of technical experts to assist in the design of acceptable strategies for handling hazardous materials and other contaminants.

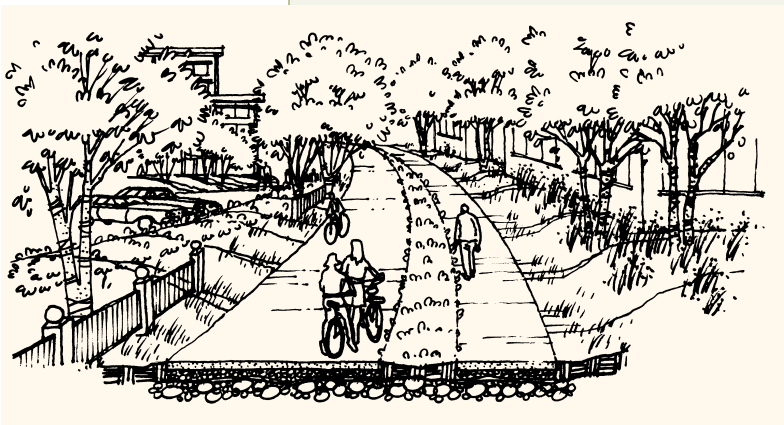
Objective: Develop case study pamphlets for distribution to the community that provide sample projects that have constructively dealt with hazardous materials and related concerns. Promote an information exchange process with stakeholders to share the latest technologies and best approaches for addressing these concerns.

Objective: Develop a regional inventory that documents potentially contaminated properties and estimates cleanup costs.

Objective: Promote natural recovery of contaminated sites through increased coordination and cooperation with pollution control agencies and land use policies.

There are opportunities to convert existing railroad corridors (left) to valuable recreational trail/greenspace (right).





Local initiatives, such as Greening the Great River Park, have created a powerful constituency of advocates for the Mississippi River valley.

Goal 6:

Develop an advocacy of people and corporations to participate in restoration and gain proprietary interest in ecological resources.

The preservation, restoration and inclusion of natural habitats in redevelopment areas is entirely dependent upon the people who have the knowledge and will to do it. Our natural resources need to be managed and maintained, protected from incompatible uses, and connected with humans. They should not be isolated enclaves separated by fences.

Preservation and stewardship require an investment by caring people. Building this advocacy, with a commitment from both public and private sector groups and individuals, is key to the long-term success of these efforts.

Objective: Provide awareness, educational, and social opportunities through participation in natural areas management for citizens. For example, brush clearing, native plant seed harvesting and other management activities can be implemented in a stewardship program by the community.

Objective: Provide recreational opportunities compatible with the protection of natural areas. Access to natural habitats is important for people to develop an appreciation of nature.