Natural Heritage: Green Systems and Sustainability

personal vision statements:

"I see a Shreveport that is much greener, with bike paths and nature walks, bustling with healthy, happy families."

Chapter Summary

This chapter outlines current conditions, goals and strategies around the Shreveport area's system of parks, waterways, urban trees, and natural areas; its "food systems," including urban agriculture, community gardens, and access to fresh food; and its environmental health, sustainability, and energy efficiency. The strategies at the end of this chapter present a blueprint for making the Shreveport-Caddo area a healthier, more sustainable urban region, and thus a better place for all to live, work, and play. With abundant land, trees and water in rolling hills, Shreveport-Caddo has the opportunity to create a signature open space network encompassing greenways, "blueways" (water connections), recreation areas, conservation areas and natural open space, and urban gardens and farms. The City and Parish can become models of energy- and resource-efficiency. While governmental agencies can lead by example, implementation of this "Green Agenda" will depend on a network of partnerships.

Strategies and actions include:

- Preparation of an area-wide greenway plan integrated with a network of on street bicycle and pedestrian routes to connect to community destinations and reduce air pollution.
- Amendment of land use regulations to facilitate park and greenway linkages.
- Adequate funding for park and recreation maintenance and operations, including seeking private partnerships and sustainable practices.
- Permanent protection of public park land, such as the riverfront parks, through open space zoning or a conservation servitude (easement).
- Preparation of a tree canopy and restoration plan to work towards a goal of 30% tree canopy coverage by 2030 for the City of Shreveport.
- Continued development of community gardens and urban agriculture in collaboration with the LSU AgCenter.
- Preparation of a government greenhouse gas audit and implementation of the City Energy Efficiency and Conservation Strategy.
- Continued work with energy companies and regional water management groups to ensure safe and prudent water use for Haynesville shale activities.

GOALS	POLICIES FOR DECISION MAKERS
CONSERVATION	
Important natural areas are preserved and protected as usable habitat networks with ecological integrity.	• Support protection of environmentally sensitive habitat areas, including efforts to create conservation areas.
	• Support protection of wetlands for their stormwater management, flood control, and habitat value.
	• Coordinate capital projects to protect wetlands and other sensitive areas.
Water in bayous and other wetlands, lakes, and the Red River meets or exceeds national clean water standards.	• Support stormwater management best practices to reduce nonpoint source pollution in Cross Lake, the Red River and other water bodies and wetlands.
	• Monitor drilling uses of water resources to avoid contamination or excessive use and use best management practices.
ACCESS AND CONNECTIVITY	
A greenway plan and program using floodplains, drainage basins, and unbuilt land connects neighborhoods with parks, schools, community destinations and downtown.	• Expand and build upon existing green space network plans.
	• Promote and facilitate partnerships with public and private land owners to provide public access to greenways and waterfront areas.
	• Require safe pedestrian links to greenway networks in new development.
Usable green space is within walking distance of every resident inside the loop or in revitalization areas.	• Give priority to underserved areas in developing new parks within the city core.
	• Support partnerships with public and private property owners, such as the Caddo Parish School District and the Caddo Levee District, to increase public access to open space.
A sufficient number of community parks serve residents outside the loop.	• Give priority to underserved areas in developing new community parks outside the city core.
Public access to significant water resources for recreation near or on the water.	• Provide for meaningful public access and nature experiences along Cross Bayou, the Red River, Cross Lake, and other water resources.
	• Continue and enhance partnerships with public agencies, such as the Red River Waterway Commission, to provide public access to water.
Parks, recreational areas, and other green infrastructure is of high quality and is well-maintained.	• Provide adequate resources for maintenance and operations in parks, recreational facilities, and other green public spaces.
	• Promote sustainable maintenance practices.
URBAN FOREST	
The City of Shreveport has more than 30% tree canopy coverage by 2030.	• Promote tree preservation and tree planting on public and private property.
	• Give priority to tree planting along major corridors and other public spaces.
	• Support an Urban Forestry division with appropriate staff within the Office of Public Works.
URBAN AGRICULTURE & FOOD SYSTEMS	
Locally produced foodstuffs are available for local consumption in a variety of outlets.	• Support and promote community garden initiatives and urban agriculture business opportunities through incentives and regulatory frameworks.
	• Support expansion of fresh food outlets, such as farmers' markets, throughout the city.
All residents have reasonable access to healthy, affordable food in close geographic proximity and are well-informed about nutrition.	• Support development and expansion of urban agriculture, fresh food retail outlets, and other sources of fresh foods in areas that are underserved by fresh food outlets.
	• Support and expand nutritional education programs and partnerships with schools to provide gardening and nutrition education.
ENERGY EFFICIENCY AND WASTE REDUCTION	
Greenhouse gas emissions are reduced by 20% in 2030.	• Support a city and parish greenhouse gas audit and local climate action plan.
	• Support an energy audit program for commercial and residential properties.
Government operations and buildings are models of resource and energy efficiency.	• Promote city and parish green procurement and building policies.
	• Promote municipal leadership in alternative and renewable energy use.

Findings

- The landscape is characterized by rolling hills, tall evergreen trees, a wet climate, frequent rainfall for most of the year, bayous and other wetlands.
- Habitat loss is due to urban and suburban development, conversion to pine plantations, and logging. Fire suppression in wooded areas has also contributed to habitat degradation for fire-dependent species.
- Major threats to water quality within the Red River Basin include forestry and agriculture, unsewered areas, land development, and road construction
- Most of the master plan area's waterways are not publicly accessible.
- The tree canopy is at risk in urban and developed areas due to lack of maintenance, lack of information about proper care, and development practices.
- The Shreveport region provides good conditions for horticulture and agriculture, but very little food is grown in the Shreveport region.
- "Food deserts"—neighborhoods with limited access to healthy food and nutritional knowledge—exist in the master plan area.
- The historic core of the city inside the loop has a good basic network of neighborhood parks.
- The Shreveport area is well-served by large regional parks but lacks community parks to serve some areas outside the loop.
- Caddo Parish is above the national service standards for gyms, playgrounds, sports fields, and golf courses, but below the national standard for trails and recreational fishing areas.
- The City has created an initial energy efficiency plan.

Challenges

- Providing public access to natural resources, including waterways.
- Protecting native species and eliminating invasive plants.
- Reducing nonpoint source pollution.
- Providing adequate resources to maintain all existing "green infrastructure." Coordinating all relevant city agency and utility activities to protect existing trees and provide space for future tree planting.
- Raising public awareness about the benefits of nearby parks, trails, and other publicly accessible open space.
- Encouraging local agriculture and increasing access to fresh produce.
- Providing educational resources and support to ensure that all citizens have access to healthy food and nutritional knowledge.
- Protecting environmentally-sensitive or otherwise important natural areas. Reintroducing natural systems within developed and urban environments.
- Public education about the benefits of public and private investments in energy efficiency.
- Attaining compliance with EPA standards for clean air. (See the transportation discussion in Chapter 8.)

A. Current Conditions

ENVIRONMENTAL CONDITIONS

Topography, geology and landscape character

Shreveport's downtown—and the city's oldest developed area—sits on a bluff on the Red River, surrounded in all directions by rolling hills. Streams drain away from downtown toward Wallace Lake to the south of the city or toward Cross Lake directly north of downtown, which drains into Cross Bayou and ultimately to the Red River. Pine forests, cotton fields, cattle ranches, wetlands, and waterways mark the outskirts of the city. Rainfall is abundant, with the normal annual precipitation averaging nearly 47 inches, and monthly averages ranging from less than 3 inches in August to more than 5 inches in May. Most areas within the planning district are characterized by gently rolling hills and tall evergreen trees.

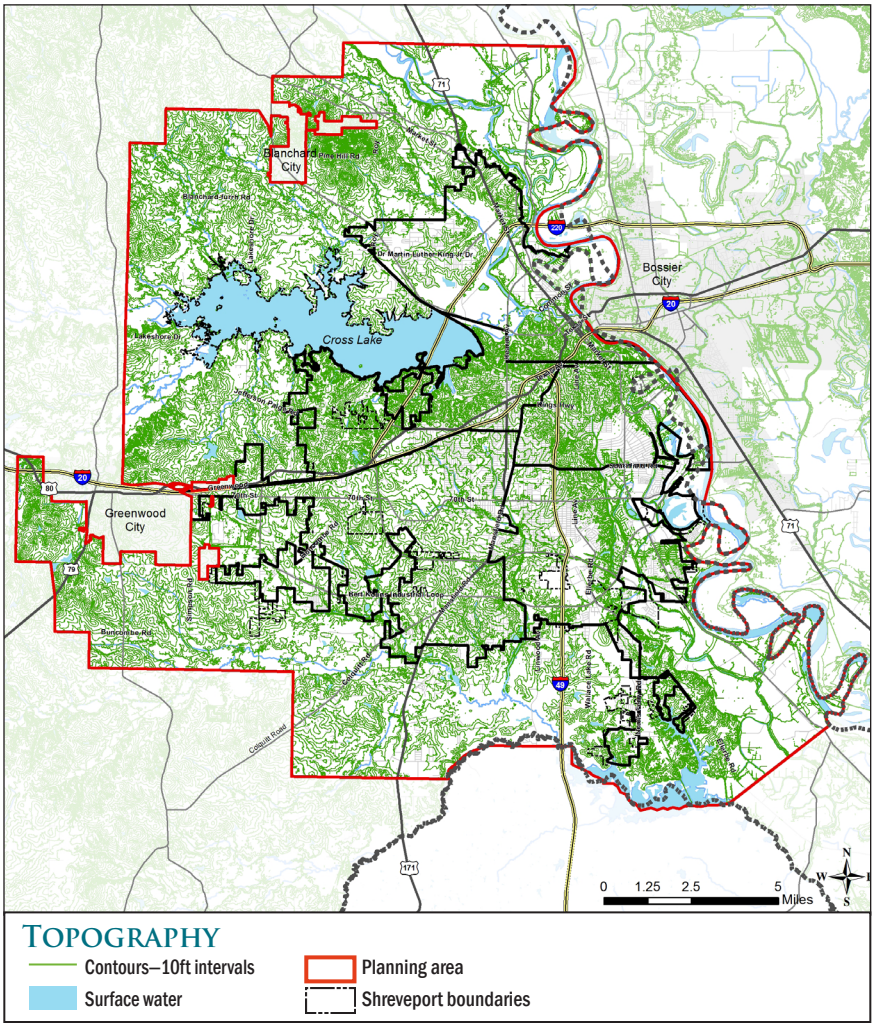
Hydrology

Water has shaped Northwest Louisiana in many ways. The conquest of the "great raft," or logjam, on the Red River in the 1830s–1840s made possible the establishment of Shreveport as a gateway to Texas. Today the Red River defines the city's eastern edge. A wet climate and frequent rainfall (except in summer) give the region its distinct ecological traits: surface water and wetland areas are common, though most bayous within the city limits are no longer natural and have been channelized with concrete basins for drainage purposes. Cross Bayou is the largest stream in the master plan area and is a frequently-mentioned public asset due to its natural beauty and proximity to the center of the city. Other natural bayous include Twelve-Mile Bayou and the Red River Channel. A 2008 report published by LDEQ found that most areas of the Red River basin fully meet their designated use as recreational areas, but that most areas within the basin do not fully meet established goals of fish and wildlife propagation.[1]

- **Rivers and streams.** Caddo Parish lies within the Red River Basin, with numerous tributaries forming sub-watersheds. The Red River was once a very active river whose channel moved numerous times, but it is now managed to control natural changes. In 1994, the U.S. Army Corps of Engineers completed the Mississippi to Shreveport Reach of the Red River Waterway Project. The project increased the river's navigability through realignment and stabilization of the banks by means

[1] Available at: http://nonpoint.deq.louisiana.gov/wqa/default.htm

MAP 4.1 **TOPOGRAPHY**



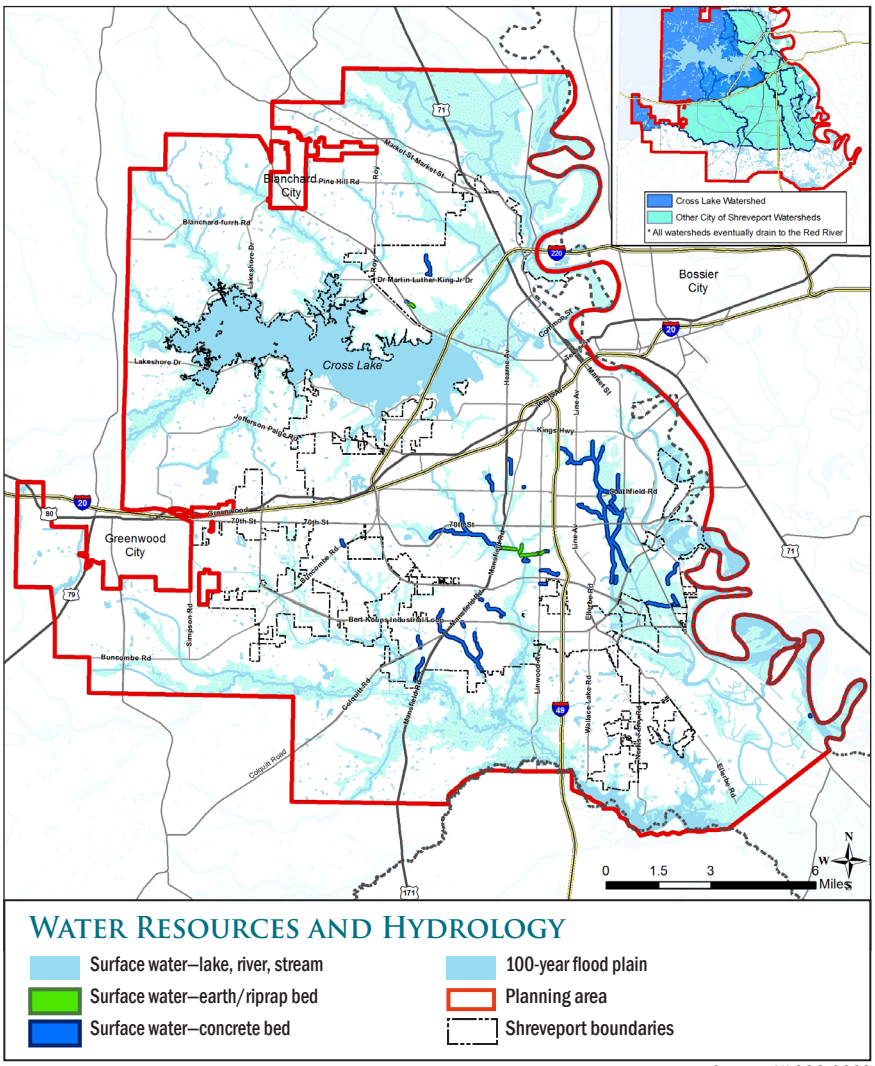
Source: NLCOG 2009

of dredging, cutoffs, training works, revetments, dikes, and other structural methods. The result is a navigation channel 9 feet deep by 200 feet wide from Shreveport downstream 236 miles to the confluence of the Old and Red rivers—ultimately connecting it to the Mississippi River. It includes five navigation locks, 26 oxbow lakes (conserved by the project for their environmental value), and several recreational areas. With the exception of lock and dam sites, which are managed by the federal government, the the Red River Waterway Commission owns the waterway project areas. The commission manages the river's navigational systems, and operates the recreational facilities along the waterway, which receive nearly 2 million visitors annually.[2]

Despite these stabilization efforts, however, the river continues to be active enough to contribute to erosion along the Shreveport bank around Clyde Fant Parkway. Water levels in the river and adjacent tributaries, such as Cross Bayou, can fluctuate a significanlty (as shown in the chart above), sometimes making recreation on the river hazardous. Levees have been built along some parts of the river bank to protect against flooding.

- **Lakes.** Both of the major lakes within the master plan area, Cross Lake and Wallace Lake, are man-made. Cross Lake is 1 mile wide and 9 miles long, covering 8,850 acres (13.9 square miles), and serves as the drinking water reservoir for the City of Shreveport and Barksdale Air Force Base in Bossier City. The City of Shreveport's Amiss Water Treatment Plant is located on the east side of the lake. Notable for its cypress trees, the lake supports wildlife such as waterfowl and alligators, and it is a major recreational asset, used for boating, fishing and duck hunting. The volume of water in the lake has declined in recent years as sedimentation has made the lake increasingly shallow—lake depth has dropped from 12 feet several decades ago to only 7 feet deep today. Evidence of nonpoint-source pollution (stormwater runoff contaminated with fertilizer, pesticides, gasoline and other chemicals) has

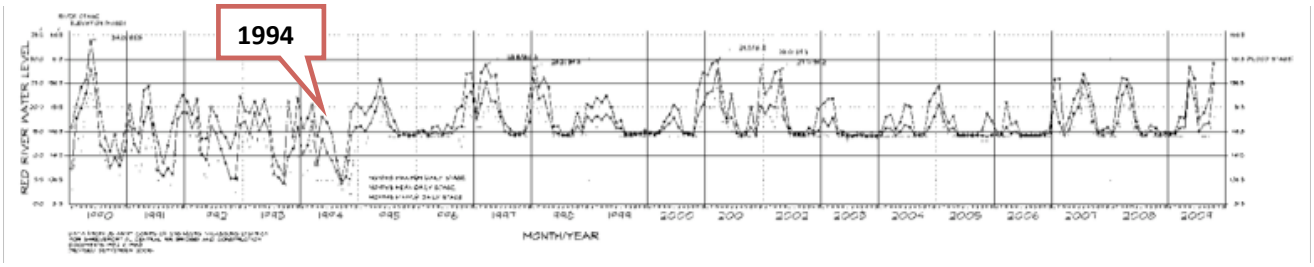
MAP 4.2 **WATER RESOURCES AND HYDROLOGY**



Source: NLCOG 2009

[2] U.S. Army Corps of Engineers: *http://www.mvk.usace.army.mil/offices/pp/projects/JBJW/index.htm.* Retrieved February, 2010.

FIGURE 4.1 **RED RIVER CHANNEL DEPTHS**



Since the 1994 completion of Army Corps activities to realign and stabilize the Red River as a shipping channel, the river's minimum depth no longer gets shallower than around 9 feet. River depth is shown here before and since the project's completion.

also appeared in the form of invasive vegetation such as hydrilla. However, hydrilla appears to be fairly well-managed due to herbicide treatments and the stocking of the lake with grass carp, which feed on it.

More recently, Cross Lake has been threatened by the invasive *Salvinia molesta*, a floating tropical plant that grows rapidly into thick mats that block out sunlight, leading to the death of water-dependent plants and animals below and reducing the holding capacity of the lake. Although Salvinia has only posed a serious threat in Cross Lake for the past few years, efforts to control it have met with only limited success. The western end of the lake has been particularly threatened and has been classified as a "nursery" area for Salvinia because of thick tree growth, which allows Salvinia to spread. The city has used herbicides to manage the problem in the past, and recently announced plans to build a floating fence across some of the western portion of the lake to contain Salvinia growth.[3]

Wallace Lake, created for flood-control purposes, is located at the southern edge of the city. Five miles long and 0.75 miles wide, it covers 2,500 acres. With wooded shores and few access points on its north shore, it is used for fishing. While much less developed than Cross Lake, it also shows signs of nonpoint-source pollution in the form of organic compounds, lead, and mercury from unidentified sources.[4]

- **Wetlands.** Although the State of Louisiana does not have a legal definition of non-coastal wetlands, the master plan uses the federal EPA definition, derived from the Clean Water Act: areas that are sufficiently saturated by water (surface water or groundwater) to support vegetation that is adapted to living in saturated soils [EPA Regulations 40 CFR 230.3(t)]. In the master plan area, examples of significant wetlands can be found along Cross Bayou and at C. Bickham Dickson Park/Red River Research and Education Park, while there are many smaller wetland areas along the shores of the lakes and natural bayous.

  Caddo Lake, located on theTexas-Louisiana border, has been declared a Wetland of International Importance, and is one of the best examples in the southern United States of a mature bald cypress forest. The area is known for its exceptional wildlife, fish and bird diversity.[5] It is also threatened by invasive plants.

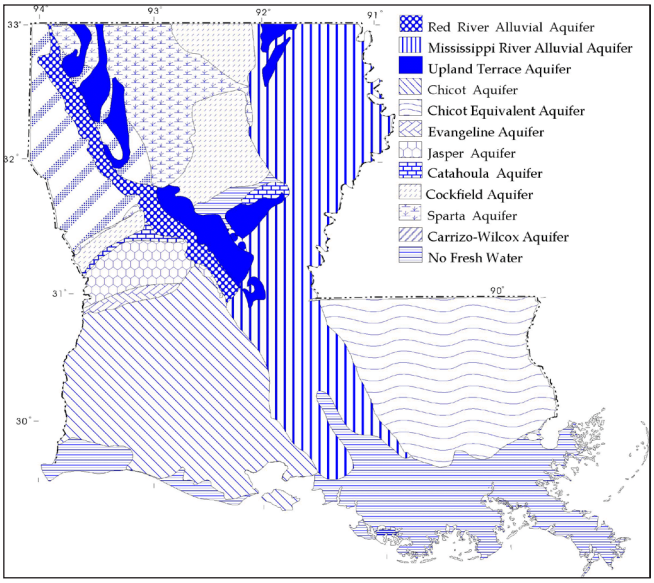
- **Floodplains.** Major floodplains in the Master Plan Area occur in several areas: upstream of Cross Lake in the western-most portion of the planning area; north of Cross Bayou in the MLK neighborhood and around the Red River and its tributaries in the northernmost portion of the planning area; in the South Highland neighborhoods south of C. Bickham Dickson Park and west of the Red River; and upstream of Wallace Lake in the southernmost portions of the planning area.

[3] Wes Wyche, Department of Environmental Services; Causey, Adam Kealoha. "Shreveport plans fence to fight salvinia." *Shreveport Times,* April 4, 2010.

[4] Louisiana Department of Environmental Quality: http://nps.ldeq.org/99manplan/99red.pdf

[5] *www.caddolakeinstitute.us*

FIGURE 4.2 **LOUISIANA AQUIFERS**



Source: LA Department of Environmental Quality 2000

- **Aquifers.** The two major aquifers in the region are the Carrizo-Wilcox Aquifer and the Red River Alluvial Aquifer. Water from the Carrizo-Wilcox is primarily used in rural wells in 25 percent of Caddo Parish. This aquifer recharges relatively slowly by rainwater. The Red River Alluvial Aquifer lies adjacent to the Red River and varies from two to ten miles in width. It does not contain potable water and is not used for drinking water by rural residents. Because it is recharged by the Red River itself, water drawn from the aquifer recharges rapidly.

Water quality and watershed management

The Louisiana Department of Environmental Quality (DEQ) is responsible for watershed management in the Red River area. A 2008 DEQ report found that although most of the watershed performed well overall for recreational purposes, it did not meet standards for fish and wildlife propagation. In 2008, the LA DEQ spent $446,603 on Red River Basin water-quality improvement projects.[6]

Initiated in 1996 through a cooperative agreement between the City of Shreveport and the Louisiana DEQ, the Cross Lake Watershed Protection Program lays out a watershed-protection strategy for the lake and bayous that flow into the lake. Watershed-protection initiatives include monitoring of home sewage systems, forestry management and stormwater runoff. Federal funding is pending for an update and further implementation of the Cross Lake Watershed Protection Program to identify and mitigate polluting activities.

Major threats to water quality within the Red River Basin include nonpoint source pollution (runoff) from forestry and agriculture, unsewered areas, land development, and road construction. Because of delayed maintenance and repair over long periods, stormwater infiltration into sewer mains in some areas causes treatment backups, threatening compliance with the Clean Water Act. In 2010, the City expects to sign a consent decree with the EPA requiring elimination of this problem.

Habitats and biodiversity

Caddo Parish is located within a terrestrial ecoregion known as the Piney Woods, which covers 54,400 square miles of East Texas, Southern Arkansas, Western Louisiana, and Southeastern Oklahoma. These temperate coniferous forests are dominated by several species of pine, as well as hardwoods that include hickory and oak, and cypress in wetland areas.[7]

- **Piney Woods Ecoregion.** The World Wildlife Fund estimates that about three percent of the remaining habitat of the Piney Woods region remains intact today, including the Kisatchie National Forest region east of Caddo Parish. The Red River Basin was historically forested with bottomland hardwoods, cypress sloughs, and shrub swamps. Beginning in the early 1800s, land was cleared for farming and development. Uban and suburban development, conversion to pine plantations, and logging have all contributed to habitat loss. Fire suppression in wooded areas has contributed to habitat degradation for fire-dependent species. All of these conditions have altered the environment in the Shreveport-Caddo planning area and in Caddo Parish.

[6] http://nonpoint.deq.louisiana.gov/wqa/links/AnnualReports/2008%20NPS%20Annual%20Report.pdf

[7] http://worldwildlife.org/wildworld/profiles/terrestrial/na/na0523_full.html

Fragmentation of ecologically-intact areas within the Piney Woods region is a major cause of threatened or endangered status, particularly for large animals native to the region like black bears—a threatened species.

- **Red River National Wildlife Refuge.** In 2000, federal legislation established the Red River National Wildlife Refuge to include up to 50,000 acres of federal lands and water along the Red River between Colfax, Louisiana, and the Arkansas state line, a distance of approximately 120 miles. Currently the U.S. Fish and Wildlife Service has acquired over 10,600 acres in Bossier, Caddo, Red River, De Soto and Natchitoches parishes, with other lands in the acquisition phase. Much of the land purchased for the refuge was fallow farmland and pastures. As part of an effort to restore

Selected Plants and Animals of the Red River Region

AMPHIBIANS
Fowler's toad
green treefrog
marbled salamander
pickerel frog
three-toed amphiuma
western lesser siren

TURTLES
alligator snapping turtle
Mississippi map turtle
red-eared slider
three-toed box turtle

OTHER REPTILES
American alligator
five-lined skink
green anole
Louisiana pine snake
Mediterranean gecko
poisonous southern copperhead
poisonous Texas coral snake
poisonous western cottonmouth
poisonous western pygmy rattlesnake
speckled kingsnake
timber rattlesnake
yellowbelly water snake

OTHER MAMMALS
American beaver
American black bear
big brown bat
bobcat
common muskrat
coyote
eastern cottontail
eastern mole
fox and gray squirrel
gray fox
least short-tailed shrew
least shrew
nearctic river otter
nine-banded armadillo
northern raccoon
nutria
red and gray fox
silver-haired bat
southern flying squirrel
striped skunk
swamp rabbit
Virginia opossum
white-tailed deer
woodchuck
woodland vole

WATERFOWL
American wigeon
blue-winged teal
canvasback
gadwall
green-winged teal
hooded merganser
lesser scaup
mallard
northern pintail
northern shoveler
redhead
ring-necked duck
wood duck

BIRDS
American kestrel
American woodcock
barn owl
common loon
eastern screech-owl
fish crow
great horned owl
mourning dove
mute swan
northern bobwhite
osprey
peregrine falcon
purple finch
ruby-throated hummingbird
snowy egret
swamp sparrow
turkey vulture
wild turkey
Wilson's snipe
yellow-bellied sapsucker

FISH
American eel
bigmouth buffalo
black bullhead
bluegill
bullhead minnow
carp
chain pickerel
channel catfish
cypress darter
freshwater drum
largemouth bass
protected paddlefish
river carpsucker
shovelnose sturgeon
taillight shiner
yellow bass

TREES
American beech
bald cypress
black willow
common persimmon
eastern cottonwood
honey locust
loblolly pine
red maple
river birch
shagbark hickory
southern red oak
sugarberry
sweetgum
sycamore
water oak
water tupelo
white ash
winged elm

Source: www.lsus.edu/lsusmus/

habitat, more than 7,000 acres has been reforested into bottomland hardwood forest. Red River NWR is a critical stopover for migratory birds and provides crucial wintering grounds for waterfowl and wading birds. Over 80,000 waterfowl utilize the refuge for feeding and resting annually and more than 200 species of neo-tropical migratory song birds seek refuge there. The Fish and Wildlife Service manages the refuge, the only refuge in northwestern Louisiana.

- **Invasive Species.** Invasive plants are typically non-native species that proliferate in hospitable environments, crowding out native species. Several invasive species have become serious problems in Cross Lake and other Shreveport waterways. Northwest Louisiana invasive species include Chinese tallow, Chinese privet, chinaberry, princess paulownia, Japanese climbing fern, and water hyacinth. *Hydrilla* and *Salvinia molesta* are invasive species that have become serious problems in Cross Lake, particularly *Salvinia*. In addition to municipal efforts to control *Salvinia* (see above), the state Department of Wildlife and Fisheries recently asked for $7.9 million in additional funding to control the plant statewide. Previous state-based control efforts include releasing *Salvinia*-eating weevils, native to Brazil. Louisiana Tech University is also testing a naturally-occurring microorganism that acts as a green herbicide.[8] Most invasive plant species are introduced through decorative gardening and landscaping. The Red River National Wildlife Refuge runs an invasive species removal program within refuge areas.

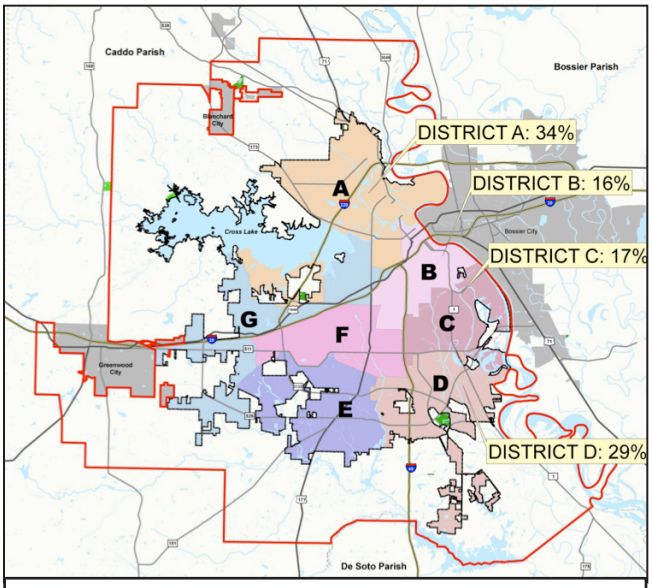
- **Endangered Species.** In the Red River Region, identified endangered animal species include the Florida panther, interior least tern, red-cockaded woodpecker, pallid sturgeon, and bald eagle. Louisiana Wildlife and Fisheries tracks a list of rare, threatened and endangered species and habitats in Caddo Parish, including 33 plants, animals and habitats that are "critically imperiled in Louisiana" (five or fewer known extant populations) and 45 that are "imperiled" (6 to 20 known extant populations).

[8] Causey, "Shreveport plans fence..."

Urban forest

The "urban forest" includes all the trees in and around urban areas—street trees and trees in other public spaces, as well as trees on private property. The large trees so characteristic of many neighborhoods in the Shreveport-Caddo area are an important element of neighborhood identity, yet many streets, roads and newer developments lack sufficient trees. In addition to aesthetic benefits, retaining and expanding the city's tree coverage—often called the "tree canopy"—is important for a variety of reasons, including enhancing property values, increasing walkability and the quality of the public realm, providing shade and reducing energy consumption, enhancing flood mitigation, and preserving wildlife habitats. There are also potential health benefits of urban tree coverage, since trees

MAP 4.3 **TREE CANOPY ANALYSIS**



Source: NLCOG, Shreveport Green 2009

Shreveport Green's tree canopy analysis, with data from American Forests, is expected to be completed in 2011.

Large and beautiful trees are characteristic of the Shreveport-Caddo landscape.

naturally clean the air of carbon dioxide—a "greenhouse gas" and contributor to climate change—and produce oxygen. A 2008 study conducted in Brooklyn, New York, demonstrated that children who live on tree-lined streets had lower rates of asthma, and postulated that this could be because trees encourage children to play outdoors more or because they improve air quality. [9]

The national nonprofit organization American Forests provided data for an analysis of the city's tree canopy for Shreveport Green in 2005-2006. Based on analysis of satellite imagery, the report identified several areas of the city that had lost significant numbers of old growth trees, because the development model common in Shreveport starts by eliminating everything on the site followed by minimal planting. Preliminary results of this report are shown below.

Air quality

The federal Clean Air Act requires the U.S. Environmental Protection Agency (EPA) to set National Ambient Air Quality Standards for six air pollutants that are commonly known health and environmental hazards. Pollutants measured include ozone, particulate matter, carbon monoxide, nitrogen oxide, sulfur dioxide, and lead.[10]

Air quality in Shreveport is generally good compared to other urbanized areas. The Environmental Protection Agency reports that in Caddo Parish in 2008, there were only 2 unhealthy air quality days for asthma or other lung diseases; 2 unhealthy air quality days for older adults and children; 2 unhealthy air quality days for active outdoor recreation; and no unhealthy days for the general population or those with heart disease.[11] Recent changes in EPA air-quality standards, however, are expected to make the area a "nonattainment area" for ozone levels, which means that it will exceed nationally-established standards for ozone.[12] Some of this air pollution is brought from the Dallas-Fort Worth Metroplex by prevailing winds. Discussion and recommendations on this issue can be found in Chapter 8.

There is a common misconception that the many pine trees in Shreveport-Caddo are sources of ozone. According to a Texas A&M publication, Dr. Eric Taylor of the Texas Cooperative Extension states that this is not the case:

> *Atmospheric ozone is formed through a complex reaction when nitrogen oxide [NOx] and volatile organic compounds [VOCs] react with oxygen in the presence of heat and light. Nitrous oxide, the primary precursor to ozone production, is produced from the burning of fossil fuels such as gasoline, natural gas and coal. Neither NOx nor VOC by itself can lead to ozone production. Both are required in significant amounts. Automobiles account for nearly 50 percent of the total NOx emissions in the United States. Automobiles also produce VOC and are recognized as one of the main contributors of ozone. Trees do produce VOCs, …but do not produce NOx. Some trees species, such as sweetgum, sycamore and oak, have relatively high emission rates of two VOC compounds, isoprene and monoterpene. Pine trees are low emitters of both of these VOC compounds. "The point to remember is that VOCs by themselves cannot lead to the production of ozone. Without NOx no ozone is produced…More than 250,000 tons of manmade VOCs were emitted from Texas point sources in 1999 alone. Some have used the tree*

[9] *Science Daily.* "Tree-Lined Streets Mean Lower Rates Of Childhood Asthma, Study Suggests." May 2, 2008. Available at: *http://www.sciencedaily.com/releases/2008/04/080430201651.htm*

[10] For more information on these pollutants, visit: *www.epa.gov/air/urbanair.*

[11] *http://www.epa.gov/aircompare/.*

[12] *http://www.epa.gov/oar/oaqps/greenbk/define.html.*

pollution debate to deflect attention and action from the true sources of the problem, which are automobile emissions and industrial point source production of NOx and VOCs," Taylor said." [13]

Air quality around Calumet Lubricants, a petroleum specialty products refinery off Midway Avenue in the Werner Park area is a neighborhood concern. The company had more than 50 reported incidents between 2005 and 2008. In a 2009 report, the Louisiana Bucket Brigade, an environmental advocacy group, claimed that at least half of these incidents were preventable. In 2009, the company reached a legal settlement with the U.S. EPA over failure to prevent fire and the release of pollutants. Concerns were heightened by reports of an explosion in the facility in February 2010. [14]

FIGURE 4.3 **CALUMET LUBRICANTS 8, SHREVEPORT—INCIDENT REPORTS BY YEAR**

	NUMBER OF INCIDENT REPORTS	NUMBER OF POLLUTANTS	AMOUNT OF POLLUTANTS	
			POUNDS	GALLONS
2005	18	12	6,595	6,132
2006	5	4	16,018	2
2007	10	11	107	12,055
2008	20	15	20,120	8,094
2009	16	16	207,060	34,020

Source: www.labucketbrigade.org

Conservation and environmental quality organizations and programs

Numerous nonprofit organizations and initiatives are working to improve conservation of important natural areas and restore environmental health locally and regionally.

Environmental quality

- **Shreveport Green** is a non-profit organization dedicated to improving the city's environment and enhancing its economy through public education and community beautification, litter abatement, and recycling projects. The organization's activities include:
  - > Tree planting and donation
  - > Maintenance of a tree nursery with about 800 trees on more than an acre
  - > Training in property maintenance for homeowners
  - > Litter surveys and cleanup
  - > Public education on a variety of environmental topics

  In the past, Shreveport Green also provided street sweeping and recycling services through third-party contractors, but it recently cut these activities due to budget constraints. Shreveport Green receives funding from private and city sources, currently employs three full-time staffers, and coordinates around 18,000 volunteers per year, including Americorps program participants.
- **The Louisiana Bucket Brigade** is a nonprofit environmental health and justice organization that works with communities near the state's oil refineries and chemical plants. The Bucket Brigade provides grassroots-action assistance, advocacy and information about communities' environmental health, and performs ongoing air-quality monitoring around the Calumet petroleum refinery in Shreveport.[15]
- **Residents for Air Neutralization** is a neighborhood-based group active in advocating for clean air around the Calumet site.

Conservation and habitat programs

- **The Red River Waterway Commission** promotes conservation, recreation, and economic development in the Red River region.
- **Shreveport Green and the LSU AgCenter Cooperative Extension Service** provide environmental education programs.
- **The Louisiana Department of Wildlife and Fisheries** maintains a Natural Areas Registry that serves as an inventory of natural areas and hosts the Louisiana

[13] http://agnewsarchive.tamu.edu/dailynews/stories/FRSC/Aug1403a.htm
[14] The US EPA provides additional information and current conditions regarding environmental quality in the Shreveport area at http://tinyurl.com/yj5gujr.
[15] *www.labucketbrigade.org*

Natural Heritage Program, which maintains a list of rare, threatened and endangered species in Louisiana.

- **The Louisiana Native Plant Society** is a nonprofit organization that works to preserve native plants and promote education about them.
- **The Ozark Society** is a regional organization that advocates for conservation and preservation of wildlife and natural habitats, and provides education and outdoor recreation opportunities. The Bayou Chapter is the local arm of the Ozark Society in the Shreveport-Caddo region.[16]
- **The Natural Resources Conservation Service of the U.S. Department of Agriculture** is a national conservation organization that works with landowners to assist with conservation and habitat restoration on private land. The Shreveport Service Center for the USDA coordinates NRCS activities for the region.[17/18]
- **Caddo Lake Institute (CLI)** is a non-profit scientific and educational corporation with the mission of protecting the ecological, cultural and economic integrity of Caddo Lake, its associated wetlands, and surrounding plant and wildlife habitats. CLI has spearheaded collaborative efforts promoting preservation in the Caddo Lake area and advocating having the lake list as a Wetland of International Importance.[19]
- Local nature parks include **C. Bickham Dickson Park**—a SPAR facility, that includes the Red River Education and Research Park, managed in partnership with LSUS—and **Walter B. Jacobs Memorial Nature Park**—a Caddo Parish Parks facility—which has a nature study center.
- **Caddo Black Bayou Preserve,** owned by the Nature Conservancy, is a spring-fed natural area that includes braided streams, cypress-tupelo swamps, bottomland hardwood forests and a unique sandhill forest that harbors a variety of rare plant species. It is not open to the public except for special tours. The Nature Conservancy has been active in conservation efforts in the area in collaboration with CLI.[20]
- **Friends of the Red River National Wildlife Refuge** advocates for the Red River National Wildlife Refuge by promoting and participating in the conservation, enhancement, and appreciation of native wildlife communities through education, fund raising, and development of partnerships and programs.

Other active conservation and nature study organizations include the following:

- Red River National Wildlife Refuge
- Ark-La-Tex Chapter of the Rocky Mountain Elk Foundation
- Bass Life Associates
- Bird Study Group, Shreveport Society for Nature Study, Inc.
- Ducks Unlimited
- Kisatchie Group Sierra Club
- Red River Wetlands Coalition
- Cypress Nature Study Center
- Museum of Life Sciences, LSUS

GREEN INFRASTRUCTURE

Today, the traditional elements of park and recreation planning are described as supporting elements of a broader "green infrastructure." While roads, sewer and water lines, utilities, community facilities and buildings constitute the "gray infrastructure" of a city, green infrastructure is comprises a city's network of parks, tree-lined streets, bike trails and pedestrian paths, river and stream corridors, waterfronts and urban wilds. Both gray and green infrastructure must be planned, created, maintained and restored as systems, not as isolated facilities.

Green infrastructure systems are living, breathing networks of land, water, plants and animals that give cities character, make them more healthy, and improve quality of life—all of which are critical not only to the well-being of residents and ecosystems, but also to city economies and their ability to retain and attract residents and investment. Excellent

[16] *http://www.ozarksociety.net/About_History_OS.htm*
[17] *http://www.nrcs.usda.gov/about/*
[18] *http://offices.sc.egov.usda.gov/locator/app?service=page/ServiceCenterSummary&stateCode=22&cnty=017*
[19] *www.caddolakeinstitute.us*
[20] *http://www.nature.org/wherewework/northamerica/states/louisiana/preserves/art6848.html*

parks, recreational resources for adults as well as children, and access to water and nature are key ingredients to the quality of life desired by everyone in the 21st century. The availability of land in the Master Plan Area offers the opportunity to create a signature green infrastructure network in the Shreveport-Caddo area.

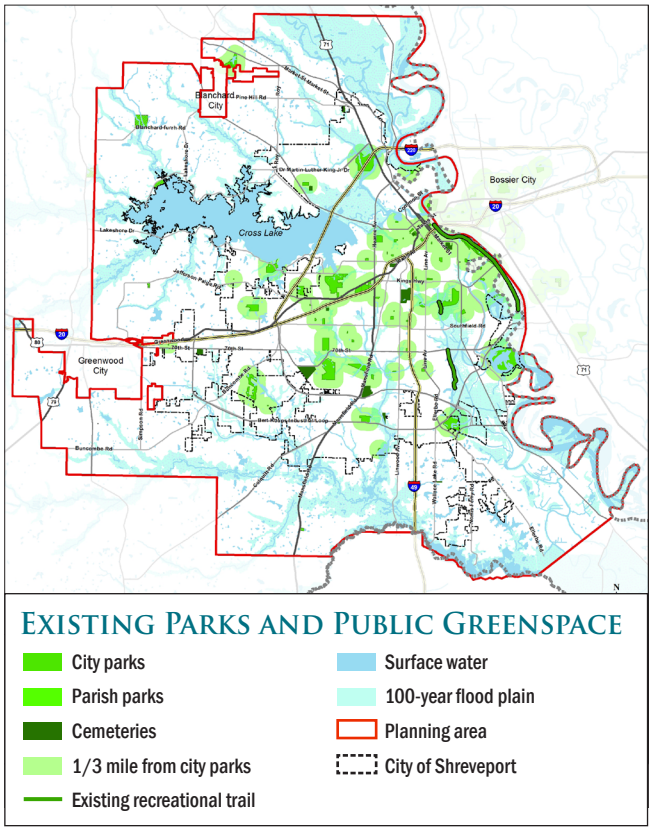
Parks and recreation level of service

Level of Service

The Caddo Parish/City of Shreveport Parks Master Plan for 2006-2020 includes an analysis of level of service for Shreveport and Caddo Parish compared with National Recreation and Park Association (NRPA) standards of service for parks and recreational facilities. Including school facilities, the plan concludes that Caddo Parish is above the national service standards for gyms, playgrounds, sports fields, and golf courses, but below the national standard for trails and recreational fishing areas. The planning process also revealed that residents had a strong desire for more walking and biking trails throughout the city. SPAR representatives have further indicated that the city has more public swimming pools than are currently needed.

In cities, there should be a park within walking distance (one-third to one-half mile) of every resident.

MAP 4.4 **EXISTING PARKS AND PUBLIC GREEN SPACE**



Source: NLCOG 2009

NRPA standards were developed after World War II, in a period of rapid suburban development, with the purpose of ensuring that the people living in new subdivisions would have adequate park and recreation facilities. The standards' focus on providing sufficient acreage and different types of recreation reflects that preoccupation. In recent years, urban park advocates have recognized that these standards are not as appropriate for urban situations, where raw acreage is less important than easy access to parks. Research has repeatedly shown that the most important variable in how much and how often people use a green space is distance—especially walking time—from home.[21] They will travel from time to time to use large, unique open spaces of regional importance, but for everyday use, parks need to

[21] Ann Forsyth, "People and Urban Green Areas: Perception and Use," University of Minnesota Design Center for America. *Urban Landscape Design Brief*, 4 (June 2003) pp. 2, 5.

be close by. From the point of view of the park user, it does not matter who manages public open space, as long as it is accessible. The different character of neighborhoods within the Master Plan Area must be taken into account when planning for existing or future parks.

Overall strategies identified in the Parks Master Plan emphasize building partnerships among public entities—including schools—as well as with nonprofit and private partners, and stressing maintenance and renovations of existing facilities.

Priority capital projects identified in the Parks Master Plan for existing park renovations and upgrades in 2007–2016 (across Caddo Parish) include:

- General park renovations and upgrades, including ADA accessibility improvements
- Expanded camping facilities
- Expanded hiking trails
- Boat ramps and fishing piers

SPAR has also developed a detailed plan for the rehabilitation and improvement of all the park resources along Clyde Fant Parkway.

Recreational Trails

A recreational trail is a multi-use, all-weather trail, primarily for walking, running, cycling, skating and other non-motorized uses, with minimal instances of cross flow by motor vehicles. It is separated from vehicular traffic, sometimes in its own right-of-way, or sometimes within a right-of-way of existing infrastructure such as levees, drainage paths, or obsolete rail lines, and may connect with other kinds of "trails" such as sidewalks and bicycle lanes for short segments to provide trail continuity. Recreational trails should be considered complementary to a non-vehicular transportation system because they can have

FIGURE 4.4 **CURRENT LEVEL OF SERVICE (LOS)—FACILITIES**

FACILITY	CURRENT # C+S			CURRENT SCHOOLS			NATIONAL STANDARDS	C+S STANDARDS	TOTAL VS. STANDARD	TOTAL C+S+S	TOTAL C/S
	CADDO	SHREVE-PORT	BOTH	CADDO	SHREVE-PORT	BOTH					
Gym	–	11	11	6	23	29	1/10,000	1/10,000	40/25	+15	-14
Play-grounds	13	45	58	5	40	45	1/5,000	1/5,000	103/59	+53	+8
Trails (miles)	7*	16.7	41.2	–	–	–	1 mile per 2,500 **	1 mile per 2,500	41.2/83	-41.8	-41.8
Sports fields	3+/8	42	45	18	69	87*	1/5,000	1/5,000	142/50	+92	+5
Fishing pier (area)	3	2	5	–	–	1	1/10,000	1/10,000	25	-20	-20
Golf courses **		144 holes				1	18 public holes per 50,000	18 public holes per 50,000	67 holes	+77 holes	+79

C + S = Caddo + Shreveport

CP = Caddo Parish

CS = City of Shreveport

C + S + S = Caddo + Shreveport + Schools

** Counted three fields for each middle school and high school*

*** Recommended local standard*

**** Golf holes for CAddo plus Bossier Parishes–public spaces*

Source: Caddo Parish/City of Shreveport Parks and Recreation Master Plan, 2006–2020, p.28.

Including Caddo Parish and City of Shreveport parks and recreational facilities as well as Caddo Parish schools, the level of service for Caddo Parish is above the national standard for gyms, playgrounds, sports fields, and golf courses, but below the national standard for trails and recreational fishing piers.

non-recreational uses. They may provide a key link in a city-wide bicycle transportation plan, for example. SPAR has several miles of recreational trails already in place, with plans to extend these and connect them with one another. (See Map 4.5)

FIGURE 4.5 **PRIORITY CITY OF SHREVEPORT PARKS AND RECREATION CAPITAL NEEDS**

	2007–2011	2012–2017	2017–2021	2007–2021 TOTAL
Community Centers	$650,000	$1,650,000	$400,000	$2.7M
Outdoor Recreation	$ 2,700,000	$ 1,550,000	$ 500,000	$4.75M
Athletic Facilities	$ 4,250,000	$ 1,000,000	$ 3,750,000	$9M
Regional Parks	$ 500,000	$ 1,500,000	$ 1,400,000	$3.4M
Golf Course Renovations	$ 5,000,000	-	-	$5M
Tennis Renovations	$ 1,500,000	$ 500,000	-	$2M
Linear Parks and Trails	$2,000,000	$1,500,000	$500,000	$4M
Other New Facilities	$ 4,500,000	$ 5,500,000	$ 3,500,000	$13.5M
TOTAL	$21,100,000	$13,200,000	$ 10,050,000	$44.35M

Source: Caddo Parish, City of Shreveport Parks and Recreation Master Plan, 2006–2020.

Parks and recreation organizations and programs

Public Agencies

Multiple City, Parish, and State agencies provide area residents with access to parks and open space. While Shreveport Public Assembly and Recreation (SPAR) and the Caddo Parish Parks and Recreation Department together operate the majority of public parks and recreational facilities, agencies including the Department of Transportation, the Department of Operational Services, the Levee Board, and the School District are also responsible for maintaining open space and recreational facilities that are often publicly-accessible as well. For instance, several School District recreational facilities are available for public use after regular school hours.

- **Shreveport Public Assembly and Recreation (SPAR)** is responsible for the maintenance, appearance and operation of City properties, including government offices, fire stations, assembly facilities, recreation centers, parks, athletic facilities, cemeteries, flower beds, rights-of-way, and all municipal grounds. Some SPAR recreation centers are sites for community gardens. SPAR maintains over 5,000 acres of land, 132 buildings, 63 park areas, 10 city pools, and Clyde Fant Parkway. SPAR's public programs include athletics, recreation, environmental services, therapeutic recreation, and management of the Stoner S'port Marina. SPAR's events department also helps in planning and executing special events, including the Independence Bowl, Festival Plaza events, RiverView Hall/Theater, public festivals and parades. SPAR is responsible for planning the City's capital projects for public buildings and recreation, and its operations are guided by an Advisory Council whose members are appointed by the City Council.

  Annual participation in SPAR programs and events:
  - > 267,000 youth and adults use its recreation centers
  - > 65,000 adults and children participate in special programs offered at recreation centers citywide
  - > 6,000 people participate in track, basketball, baseball and softball leagues
  - > more than 300,000 citizens and tourists visit Independence Stadium and Fairgrounds Field
  - > 1.2 million visitors and citizens are served by SPAR through its role in festivals, special events, parades, trade shows and conventions.[22]
- **The Caddo Parish Parks and Recreation Department** is responsible for the operation and maintenance of 16 park and historical sites and two undeveloped areas, and it provides landscaping and grass maintenance for other Parish facilities on a year-round basis. Additional parks managed or developed in partnership with various townships in the parish are in various stages of planning and development. The department also oversees a regional tree growing-out station in the Walter B. Jacobs Memorial Nature Park in partnership with Shreveport Green and the National Tree Trust. Interpretive and environmental programs provided by the staff of Walter B. Jacobs Memorial Nature Park, both

[22] *http://www.ci.shreveport.la.us/dept/spar/index.htm*

on- and off-site, serve thousands of people in the region annually. The department's recreation specialist works with towns and community groups throughout the parish to provide access to recreational opportunities. Major events supported by the department include March for Parks, Earth Camp, Get Hooked on Fishing Day, Senior Day, and Christmas on Caddo.

- **City of Shreveport Department of Operational Services (DOS)** maintains drainageways within the city, which could serve as potential greenway connections. It is also responsible for stormwater management, streets, detention areas, and erosion control.
- **Louisiana Department of Transportation and Development (LA-DOTD)** owns and maintains green areas, mostly as turf, within highway rights-of-way. In Shreveport, significant amounts of open space can be found along highways and at interchanges. In some states, these green areas are managed with native species and function as part of the green infrastructure system.
- **Caddo Parish School District** is an important contributor to the inventory of open space and recreational facilities, including sports fields, playgrounds, recreational facilities, and community gardens. The School Board is currently undergoing a strategic plan for 2020 that will include a complete inventory of all facilities.
- **Caddo Parish Levee Board** controls several drainageways, including Bayou Pierre and others.

Nonprofit Agencies and Organizations

In addition to these public entities, several private, nonprofit groups work to supplement available parks and recreational facilities and services. *A Better Shreveport* is the most active citywide community-based initiative working to improve parks and open space access (it also works on several other fronts to improve quality of life in the Shreveport area). Current projects include development of walking and biking trails, including promotion of greenway development along drainageways, and improved alternative transportation infrastructure.

Local food systems

Community gardens and urban agriculture

"Community gardening" is any type of gardening or horticulture that takes place in a shared, communal garden space, which may be either publicly or privately owned or operated. "Urban agriculture" encompasses a wide range of activities, including community gardens and urban farms, involving the raising, cultivation, processing, marketing, and distribution of food in urban areas, including individual and collaborative, public and private initiatives. "Food deserts" are districts where access to healthy food choices is limited, even if convenience stores or fast food outlets may be present.

The following community-based organizations work to establish, maintain, and promote community gardens.

- **LSU AgCenter** provides research-based education, assistance, and vision in a wide range of food-system issues that are fundamental to a sustainable local food system. The LSU AgCenter provides Market Gardening Seminars for both experienced and beginning growers. AgCenter staff and volunteers provide ongoing education and consultation to nine community-based gardens in underserved neighborhoods, including one in collaboration with SPAR at the Valencia Recreation Center, with plans to create an additional four gardens at other SPAR facilities by 2014. The AgCenter has dedicated staff and program resources to promoting urban agriculture in and around the Shreveport area, and collaborates with other local organizations such as Slow Foods USA, local chefs, the City of Shreveport, SPAR, and others in addressing the issue of food deserts and developing an "Eat Local" movement.
- **Red River Coalition of Community Gardeners (RRCCG)** provides education, assistance and inspiration to create strong sustainable communities through community gardens. RRCCG carries the vision that neighborhoods can become strong, cohesive communities by growing healthy food together.
- **Sankofa Vision** is a nonprofit community-building, cultural, arts and educational organization that sponsors and manages Sankofa Gardens—a 2-acre, organic community garden and learning campus in the

Linwood-Caddo Heights neighborhood of Shreveport. Sankofa Vision—a partnership with the Louisiana Tech School of Architecture—provides public green space and hands-on gardening and healthy food preparation demonstrations and education. Future plans include a learning center building to house educational and workforce-training programs for all ages.

- **Northwest Louisiana Master Gardeners** volunteer in community gardens and serve in leadership positions to provide gardening expertise to local gardening initiatives.

Farmers' Market

The Shreveport Farmers' Market operates from early June through November at Festival Plaza in downtown Shreveport. During the market season, the market is held weekly (with a several-week hiatus for the Red River Revel festival). With an average of about 65 vendors each week at the peak of the growing season, the market receives an estimated 37,908 visits annually, according to an economic impact study completed in 2009. Forty-four percent of shoppers polled indicated that they visited the market weekly. Visitors spend an average of just over $25 per visit at the market itself, plus an average of over $60 at other local establishments, providing a total economic impact of more than $2.6 million per year. Annual receipts for the market totaled more than $1.5M in 2009. Vendors pay $10-15 per day for booth space, which is provided by the market. Overhead costs are paid for by the Red River Revel.[23]

[23] *The Economic Impact of the 2009 Shreveport Farmers' Market, Shreveport, Louisiana.* Report prepared by the Center for Business and Economic Research, September 2009.

The Farmers' Market has been so successful that expansion to additional locations or days should be considered.

In addition to staging and operating the market itself, Shreveport Farmers' Market staff members also work with local and regional farmers—including urban farmers and community gardeners—to promote diversification of crops for more sustainable and organic varieties and reduce the amount of resale produce in the market. The organization also serves as a platform for growers to share knowledge with one another. Off-season, the market helps vendors and consumers stay connected so that vendors who maintain year-round sales can continue to reach their customer base. The increased popularity of the market in recent years has increased demand for vending space. Additionally, market organizers are working to encourage more urban gardeners to participate in the market as vendors alongside larger-scale growers.

In addition to the Farmers' Market, at least one farm within Caddo Parish (Jonathan Jackson's Farm) runs a Community Supported Agriculture program. Community-supported agriculture (CSA) is a model of local food production whereby consumers buy "shares" of a farm's production (typically by making an advance cash payment) and then receive produce and other products, typically weekly, throughout the growing season. CSAs allow farmers to receive capital up-front to invest in their farms, and shareholders receive fresh, local produce that is often not available through traditional grocery stores.

URBAN AND REGIONAL SUSTAINABILITY

The Haynesville shale and water issues

Shreveport has become a center of the natural gas resource economy because of the Haynesville Shale play. The impact of the hydraulic fracturing drilling process and horizontal drilling on water quality and supply are a concern to many members of the public. Water is needed for two purposes to gain access to the natural gas reservoirs: drilling of the well itself and "fracking," the technique used to release the gas from underground rocks. In the Haynesville Shale, drilling the well itself requires 800,000 to 1,000,000 gallons of water, typically twice as much as is required to drill a drinking water well, and the fracking process requires 5,000,000 to 7,000,000 gallons of water, which includes a small admixture of chemicals used to extract natural gas. These processes have raised concerns about possible contamination of groundwater

by the chemicals or by natural gas itself, as well as risk of depleting water resources and impacts on local wastewater-treatment facilities.

Hydraulic fracturing technology was developed in the mid-twentieth century as a way of tapping into poor-quality gas-reservoir rocks and making them economic to produce. It was perfected in the 1970s in the massive "tight sands" that occur regionally around Shreveport. The technique involves pumping large amounts of water, with minor amounts of additives, at high pressure to break open reservoir rock and form a pathway for hydrocarbons. Sand and artificial, sand-sized materials, or *proppants*, are injected with the carrier fluid to keep the fractures propped open. Horizontal drilling technology, which was developed to expose larger portions of a conventional reservoir from a single wellbore, was perfected in the 1990s. The two technologies, fracking and horizontal drilling, were brought together in order to make the gas-bearing Barnett Shale around Fort Worth, Texas, profitable. The success of this field was responsible for development of massive gas shales across the U.S. and internationally. In 2008, a relatively new drilling technology was combined with a proven technique in order to extract natural gas economically from a rock type that had never been considered a reservoir for hydrocarbons. To date, the Haynesville Shale of northwest Louisiana and eastern Texas has proven to be an extremely prolific gas source and is considered the largest potential gas field in North America. As the Haynesville Shale boom exploded around Shreveport, disorder prevailed—just like all previous oil and gas booms. Many of the companies that spent billions of dollars on leases and drilling were not from the region and were initially unfamiliar with state groundwater regulations. State regulatory agencies were also overwhelmed by the boom.

The Water Resources Committee of Northwest Louisiana (WRCNL) was formed in 2003 jointly by the Caddo Parish Administrator, the Director of the LSUS Red River Watershed Management Institute (RRWMI), and a concerned citizen. Prior to initiation of the Haynesville Shale discovery, the committee had expanded to include the Sabine River Authority and Bossier, Desoto and Webster parishes. This committee was formed because of developing concerns about the long-term availability and quality of surface and groundwater sources in the region. Also prior to Haynesville development, Caddo Parish and RRWMI developed a groundwater monitoring-well system in order to evaluate the long-term supply potential and water quality of the highly stressed Carrizo-Wilcox Aquifer, the only viable groundwater resource for the rural areas of several northwest Louisiana parishes.

As Haynesville Shale development proceeded, rural residents and water district managers expressed alarm that wells drawing on the Carrizo-Wilcox Aquifer were either going dry or that they were having to lower pumps because of excessive water use by the gas operators. The initial outcry was so powerful that outraged well owners, activists, and the media mobbed the WRCNL meeting. The committee encouraged the gas operators to identify alternative sources of water, such as streams, rivers, lakes and the non-potable Red River Alluvial Aquifer. The Louisiana Office of Conservation issued memos to operators encouraging them to follow groundwater regulations, reduce the use of groundwater and use the alluvial aquifer or more abundant surface water like the Red River.

As a member of the Water Resources Committee, the Watershed Management Institute worked with operators in an attempt to help them move from the Carrizo-Wilcox Aquifer to more abundant surface-water sources, most obviously the Red River. The Institute and the Red River Waterway Commission set up an ad hoc committee to work with the U.S. Army Corps of Engineers (USACE) to establish a protocol so that gas operators could ddraw river water. Permits were issued starting in spring 2009, and numerous water-withdrawal site permits are now in effect. The Corps required that the water withdrawal from the river not have a negative impact on navigation or on lock operation and that it not damage levees. A voluntary group of public and private parties—including the U.S. Fish and Wildlife Service, Louisiana Fish and Wildlife Service, Louisiana Department of Environmental Quality, and environmental consultants—has now emerged as the Water Energy Working Group. This group has been able to address numerous and typically contentious

issues, such slow permit review process, threatened and endangered species, surface-water ownership, and the seasonal concern of low-flow conditions on Red River tributaries. Work with the Department of Natural Resources and operators on implementation of the state's new surface-water law is underway.

In addition, the committee and the working group have developed a priority ranking of preferred sources of water for use by gas operators: 1) reuse of treated industrial or municipal wastewater (a successful program that does not draw directly on natural water sources); 2) surface water from the Red River; 3) non-potable water from the Red River Alluvial Aquifer; and 4) limited use of the Carrizo-Wilcox Aquifer for well drilling only.

Louisiana's approach to establishing best practices for drilling in the Haynesville Shale was to issue an order from the Office of Conservation. Developed in 2009, Order No. U-HS represented a response to Haynesville drilling in urban areas like Shreveport and to efforts by neighboring parishes to pass an ordinance similar to Fort Worth's Barnett Shale ordinance. The provisions of the order only apply to wells drilled to or completed in the Haynesville zone and that lie within 750 feet of a residence, religious institution, public building, or public park in an urban area. Other provisions include minimal setbacks to these same properties of 500 feet or 200 feet (with owner approval). Provisions regulating drilling, completion, and production operations cover fencing; maintenance of drill site; limits on dust, vibration and odors; site lighting; muffling exhaust; venting and flaring of gas; discharge; work hours; noise; water; and road use.

Although concerns about hydraulic fracturing in the Haynesville Shale play initially focused on how the technology would affect regional water supplies. More recently it has become a subject of national controversy as questions have arisen about possible threats to human health in urban areas of the Barnett Shale play and the Marcellus Shale play in the northeast U.S., where shale gas drilling and completion activities are new and seen as a threat to aquifers, the environment, and landscape aesthetics. As previously mentioned, hydraulic fracturing has been a common practice for decades, but only now is the practice being brought into question. Little hard data exist to verify negative environmental impacts, and most claims are anecdotal. As a result of growing concerns from around the country, the Environmental Protection Agency has begun a five-year study to evaluate the potential of hydraulic fracturing to cause groundwater contamination. Although much of the focus has centered on the technique of hydraulic fracturing itself, other industry impacts—such as surface spills, water sourcing, increased roadway truck traffic, and pipeline construction—have helped drive public concern.

Fracking in the Haynesville Shale play appears to present minimal risk to groundwater because the Haynesville gas reservoirs lie at great depths (11,000–13,000 feet)—well below the aquifers, which extend no deeper than a few hundred feet—and because the geologic column above the gas consists of relatively young, unfractured rocks and sediments. This contrasts to reservoirs in portions of other plays, like the Marcellus in New York and Pennsylvania, that lie closer to aquifers and are older and more brittle, meaning riddled with natural fractures that could potentially provide pathways for contaminants to reach the aquifers. The hydraulic fracturing companies arge that they have replaced potential contaminant-producing fracking components, such as diesel, and are replacing others with agents that will not adversely affect the environment.

Solid waste

The City of Shreveport provides garbage pick-up and in 2011 will provide curbside recycling service (currently provided by a third-party contractor). The city owns a landfill in Keithville, and the 2009 opening of a Pratt Industries recycling facility at the port allowed for the resumption of a recycling program. There is currently no City composting program, though the City did run one in the past. (See Chapter 9 for more information on solid waste programs.)

Energy efficiency

City Energy Efficiency and Conservation Strategy

In 2009, the City received $1.9M in Energy Efficiency Block Grant funding from the U.S. Department of

Energy. The Mayor and City Council convened a citizen-based steering committee—the Energy Efficiency and Conservation (EEC) Strategy group—to examine ways to use this funding to reduce the City's energy usage, stimulate economic development, and provide an example to both private and public sectors to catalyze further energy efficiency initiatives. The committee recommended funding priorities that increase energy efficiency, reduce energy consumption, cross jurisdictional levels of governance, build community relations, stimulate the economy, and maximize benefits beyond the funding period. Specific recommendations include:

- Use of technical consultants to establish a greenhouse gas (GHG) baseline and facilitate the comprehensive Energy Efficiency and Conservation Plan process.
- Independent audits and energy-efficient retrofits of government buildings, with the resulting savings funding additional improvements and technical consultant services.

Energy Efficiency and Conservation Activities for the Shreveport Community, City of Shreveport, Caddo Parish and Caddo Parish School Board

This summary reviews energy-efficiency and conservation activities, as of October 2009, provided in the Comprehensive Energy Efficiency and Conservation Plan:

BUILDING ENERGY EFFICIENCY

1 Energy efficiency upgrades to City buildings—lighting and HVAC upgrades in 33 buildings in 2004.

CLEAN AND RENEWABLE ENERGY SOURCES

1 Landfill methane recapture: The City has installed a methane-recapture project at the landfill. The methane was used at the local General Motors assembly plant.
2 Household hazardous waste collection.
3 Sewage sludge recycling: 100% of the sewage sludge from waste treatment is processed into "class EQ" materials for use on local farms. No sludge is going to the landfill.
4 Recycling of sewerage effluent: A pipeline is being installed from a waste treatment plant to the Industrial Port of the Red River.
5 Ozone abatement: The City has implemented an ozone-abatement program.

TRANSPORTATION/LAND USE

1 Bio-diesel fuel blend to reduce fossil fuel use: City, Caddo Parish, and School District fleets now use 10% or 20% bio-diesel fuel blends
2 Hybrid electric vehicles—SporTran uses two hybrid electric buses in its transit fleet, and the City is adding three hybrid electric cars.
3 Compressed natural gas (CNG)—The City/SporTran will phase in CNG for the bus transit fleet.
4 Intelligent transportation systems (ITS)—The City is installing an intelligent traffic signalization system.
5 Vehicle pollution control—Caddo Parish and Caddo Parish School Board received grant funding to install pollution-control equipment on their diesel fleets.
6 Shreveport Green has a tree-planting program to expand the tree canopy as a way of increasing energy savings and helping mitigate greenhouse gases.

- Financial programs, incentives, and loans for low-income residential retrofits.
- Education, outreach, and job-training programs around energy efficiency and conservation.
- Adoption and enforcement of energy codes currently required for state approvals.
- Initiation of an EEC Business Incubator Program in collaboration with existing incubator and educational programs, which would also serve as a one-stop shop for loans and other energy-efficiency and conservation business development resources.

The citizen's committee was also charged with completing a framework document for a Comprehensive Energy Efficiency and Conservation Plan and the City is pursuing funding options.

Earth Aid. In 2009, the City of Shreveport began participation in the Earth Aid program, a water- and energy-efficiency incentive program that gives residents discounts at participating local businesses and free trees if they lower their energy and water usage. Shreveport is the second city after Washington, D.C., to join the program.[24]

Green building

Local ordinances do not as yet provide significant incentives for green building practices. Community Renewal International's project to rehabilitate a downtown building (currently in the fund-raising phase) is expected to result in the city's first LEED-certified nonresidential building. LEED (Leadership in Energy and Environmental Design) is a certification system developed by the US Green Building Council which has become a standard or benchmark for environmentally sustainable building. While LEED is the current industry standard, the certification process can add costs to construction. Local ordinances and government practices can call for LEED-style best practices and monitoring of outcomes, without requiring official certification.

[24] *http://www.workthisway.org/view-news.cfm?id=61; http://www.earthaid.net/*

B. Community Issues and Concerns

Public opinion survey

A public opinion survey conducted at the beginning of the process for this master plan revealed that Shreveport-area residents consider environmental quality and access to open space to be important priorities. In particular, more than 90 percent of respondents stated that adequate water supply and good water quality were "very important" or "somewhat important," and more than 26 percent counted water supply and water quality among the top four issues for the Shreveport area to improve. Maintaining parks, recreation and open space was also a high priority: more than 90 percent thought that this was "very important" or "somewhat important," and 48 percent stated that the "availability of nature recreation nearby" was "extremely important" or "very important" to their decision to stay in or come to live in the Shreveport area. More than 50 percent stated they "strongly agree" or "agree" that "more parks are needed in the Shreveport area and also that "more sidewalks, walking paths, trails, and bicycle paths and routes" are needed.

Visioning forum

When participants in the Forum were asked to write personal vision statements, many included aspects of a "green" future for Shreveport-Caddo:

- "User-friendly bike and walking paths; more parks and green areas"
- "The future involves the use of solar energy and windmills"
- "…solar and alternatively fueled, a managed clean place, beautiful waterways…"
- "I see neighborhoods enveloped by trees"
- "A very green vision, lots of people of different ages outside walking, shopping, eating, biking, playing with animals, sporting in parks"
- "I envision a peaceful community with beautiful greenery—growing trees and neighborhoods"
- "Greener—both literally and environmentally"
- "Residents are neighbors out in their yards and streets have wide bike lanes; houses have solar power"
- "Small parks and wilderness areas inside city limits"

Vision Forum participants also had the opportunity to participate in small-group discussions around key master plan topics, including several groups that focused on "Land and Water." Input from these groups included improving access to waterways; protecting natural resources; creating more walking and biking trails; and requiring green space in new development.

"Speak out!" vision meetings

The Community Advisory Group organized a series of short visioning sessions in each of Greater Shreveport's nine neighborhood high schools to give residents additional opportunities to contribute to the master plan Vision. Participants expressed a desire for more family activities and recreation, improved parks, and protection of watersheds and natural habitats.

District and neighborhood meetings

During neighborhood district and downtown community meetings, Shreveport-area residents underscored their desire to see improved maintenance and increased funding for existing parks and open spaces before the creation of new ones. Residents also stressed a desire for more biking and walking trails and better use of vacant land as green spaces and amenities, and stated the importance of city "greening" and beautification, including preserving and restoring the city's tree canopy. Finally, residents frequently mentioned their desire for expanding community gardens and urban agriculture to all neighborhoods throughout the planning area. Specific ideas from the neighborhood district meetings included:

- Re-use adjudicated property as open space.
- Create landscaping requirements for new development.
- Increase access to more recreational facilities and activities.
- Build on neighborhood character of great trees and rural character.
- Landscape major roadways.
- Create more neighborhood "pocket" parks.
- Connect parks with walking and bike paths.
- Maintain existing trees and green spaces.
- Tear down homes and businesses that are beyond repair and create green spaces.
- Protect agriculture and farmland, and control development in rural areas.
- Expand park facilities.
- Protect and promote urban/rural forestry.
- Do not kill weeds with chemicals.
- Expand access to urban horticulture and agriculture.
- Improve walkability and "bikeability;" create greenways, "blueways" along waterways, and more trails.
- Create usable green space from drainage infrastructure areas.
- Create more neighborhood parks.
- Protect and expand public access to the waterfront—both the Red River and Cross Bayou.
- Create walking and biking trails downtown and to connect with other neighborhoods.

Green systems in the Vision and Principles

- **Green Systems in the Vision:** "Shreveport is the 'greenest' and healthiest city in the South, committed to resource and energy sustainability and enhancing access to healthy lifestyles. Our landscape is enriched by a natural network of greenways and bayous offering recreation in nature."
- **Green Systems in the Principles:**
  - > Connect our natural features in a usable network of greenways and blueways.
  - > Protect the quality of the water, air, and landscape.
  - > Promote cleaner energy and resource sustainability.
  - > Maintain and improve existing infrastructure before expansion to new areas.
  - > Encourage healthy lifestyles through access to nutritious food and a wide range of healthy activities that meet the diverse needs of our population.

C. Strategies and Actions to Achieve the Goals

Goal 1

Important natural areas are preserved and protected as usable habitat networks with ecological integrity.

Policies:

- *Support protection of environmentally sensitive habitat areas, including efforts to create conservation areas.*
- *Support protection of wetlands for their stormwater management, flood control, and habitat value.*
- *Coordinate capital projects to protect wetlands and other sensitive areas.*

STRATEGIES

A. Prepare a Shreveport-Caddo Nature Priorities report in collaboration with environmental organizations and local educational institutions showing the type, environmental sensitivity, character, and scenic value of natural areas and habitats in the Master Plan Area.

The creation of the Red River National Wildlife Refuge is a testimony to the biological richness of Northwest Louisiana. Shreveport-Caddo residents have long enjoyed this area's natural beauty through boating, fishing, hunting, bird watching and other activities. Perhaps because nature seems so abundant and so close to the city, and development has been proceeding relatively slowly, most residents do not think about protecting habitats or sensitive areas. However, communities that do not think about preserving exceptional lands often end up regretting it when they are gone. The Master Plan Area retains many areas that have not yet been developed, and it is during periods of modest development that the opportunities to preserve habitat networks are easiest. The Trust for Public Land Greenprint Program would be a good partner for creating the Nature Priorities Report.[25]

Actions

1. **Identify priority areas for conservation or habitat restoration in vacant or underutilized land, including parks, where appropriate.** Among the types of areas that should be included in the identification process are areas important for biodiversity (rare and endangered species), intact habitat (for example, deep forest areas required by certain birds), and wildlife corridors. Waterways and their surrounding corridors are usually exceptionally rich habitat areas because of the variety of species that need to access water and that travel through the corridors. Examples of potential areas of interest include the west shore of Cross Lake, the Bayou Pierre corridor, the Cross Bayou wetlands and Twelve Mile Bayou corridor.

2. **Use the information on identified habitat networks and environmentally sensitive lands in the update of the SPAR and Parish Parks and Recreation Department Master Plan.** The parks and recreation master plan update process should include discussion of natural areas and put more emphasis on the protection of natural areas in the park system.

B. Seek protection or conservation actions on priority open spaces.

Actions

1. **Emphasize the area's natural attributes in tourism and economic development recruitment.** Even in the "Sportsman's Paradise," the outstanding ecological value and beauty of Shreveport-Caddo's natural environment should receive more emphasis. In addition to its interest

[25] See *http://www.tpl.org/tier3_cd.cfm?content_item_id+20150&folder_id+3130.*

for tourists, easy access to nature and the outdoors is a known competitive advantage in recruiting young knowledge workers to new locations.

2. **Explore conservation options such as easements/servitudes in collaboration with private owners and conservation organizations.** Natural areas in private hands can be protected through voluntary conservation servitudes (easements). The property owner agrees to permanently give up development rights on the land, often in return for a payment through a government program, or simply to benefit from a reduction in taxes on the land, and retains title to the property. Conservation servitudes are known in Louisiana through the Louisiana Coastal Wetland Reserve Program, which works with farmers to restore lands to wetlands, making a payment for the agricultural development rights in return for establishment of a conservation servitude on the land. Servitudes on private property do not require that public access be granted to the land.

   Private conservation programs and/or a program similar to state program above could be created for non-coastal areas and applied in Shreveport once important habitat or scenic resources have been identified. Conservation organizations can work with landowners to promote the new program, highlighting the benefit of reduced taxes. Although land is often a major component of rural landowners' wealth that they hope to pass on to their children, many landowners also often would prefer that some of the land stay undeveloped. Conservation servitudes offer an alternative.

3. **Permanently protect public park land, such as the Red River park land, with an open-space zoning designation or a conservation servitude.** Certain park lands are exceptionally valuable to the city and the region and should be protected from inappropriate development or use. Provision can be made for limited development that is directly related to the recreational purpose of and access to the land, such as a nature center, limited parking, or a boat ramp.

4. **Expand and promote environmental education programs that increase public access to natural areas and awareness of their ecological benefits.** Preservation and protection of important natural areas depends on both proactive initiatives among public leaders and policy-makers as well as public support for such activities. Increasing public awareness and access to important natural areas builds support for conservation of these important ecological resources and increases public enjoyment of these natural resources. Local advocacy groups can work with schools, SPAR, Caddo Parish Parks and Recreation, LSUS, hunting groups and others to promote knowledge and access to local natural areas.

C. Promote the use of native plants and low-impact, low-maintenance landscaping practices in public landscaping and horticulture projects and combat the advance of invasive non-native species.

Actions

1. **Use native plants and passive or low-maintenance landscape designs wherever possible in City and Parish landscaping activities.** Maintenance of parks and other publicly-owned landscaped areas (e.g., public buildings, road medians, etc.) can include native plants and passive or low-maintenance landscape designs wherever possible. For instance, road medians can be planted with native species that do not naturally become overgrown and thus require less human maintenance. Likewise, parks and landscaped areas of public facilities can use pesticide-free landscaping techniques to reduce impact on the region's environment. Such practices have also been

shown to reduce maintenance costs over time. State transportation programs are leading the way in natural landscaping of transportation corridors. (See *www.environment.transportation.org*)

2. **Collaborate with existing conservation organizations to raise public awareness about native and invasive plant species.** Public education about native species and low-impact landscaping techniques can encourage more ecologically-sensitive landscaping practices among private landowners. Most of these practices also save property owners time and money, but are often not well-known. Information on low-impact and native species landscaping is widely available on the web. Garden groups, the Barnwell Center Garden programs, LSU Extension, and the Farmers' Market are among the groups and events that could be approached for a campaign to limit invasives.

Goal 2

Water in bayous and other wetlands, lakes, and the Red River meets or exceeds national clean water standards.

Policies:

- *Support stormwater management best practices to reduce nonpoint source pollution in Cross Lake, the Red River and other water bodies and wetlands.*
- *Monitor drilling uses of water resources to avoid contamination or excessive use.*

STRATEGIES

A. Strengthen measures to protect water bodies from nonpoint-source pollution.

Actions

1. **Promote watershed education and raise public awareness about low-impact gardening and landscaping practices to reduce chemical runoff from fertilizer, herbicides and pesticides.** Nonprofit organizations such as LSU AgCenter and Shreveport Green can serve as partners for creating and distributing educational materials on watershed protection.

2. **Monitor septic systems, natural gas extraction activities, and other commercial and industrial sources of water contamination.**

B. Use and encourage natural drainage and passive stormwater-management practices.

Actions

1. **Promote on-site stormwater management through a stormwater management master plan, land use, landscape and other regulations.** Land use regulations can be strengthened to decrease or eliminate runoff from development sites and require properties to accommodate stormwater on site, such as through the use of water storage basins or permeable surfaces instead of asphalt. Reducing runoff to stormwater drains decreases the burden on public infrastructure, reduces pollutants that are carried from roads, lawns, and other land uses into water bodies, reduces erosion from high velocity water events, helps restore the underground water table, and helps to reduce the heat island effect. Chapter 9 discusses how a stormwater utility district could be established with discounts from a stormwater fee for on-site stormwater management.

2. **Integrate natural stormwater-management features in rights-of-way of new and updated roadways and streetscapes—for example, use of stormwater planters that absorb stormwater runoff from streets.** Natural drainage for stormwater mitigates pollution, reduces the need for large engineered systems, and provides a landscape amenity. A number of cities are implementing natural drain-

Vegetated planters along streets absorb rainwater.

age in both new and existing streets, where feasible. For example in Portland, OR, the SW 12th Avenue Green Street streetscape-enhancement project, utilizes a series of landscaped stormwater planters designed to capture and infiltrate runoff from approximately 8,000 square feet of street. With the new stormwater facilities now in place, nearly all of SW 12th Avenue's annual street runoff, estimated at 180,000 gallons, is managed by its landscape system.[26] More information on potential natural drainage pilot projects for Shreveport are contained in Chapter 9.

C. Promote the use of best management practices in oil and gas operations.

Promote and require, to the degree local regulations have jurisdiction, best practices by natural gas operators and property owners, and advocate for state action to require and enforce best practices. Ensure that government land used for oil and gas operations adheres to best practices. Local jurisdictions like the City and Parish can enact regulations about how wells are drilled and operated and to mitigate impacts. (See Chapter 12.)

Actions

1. **Ensure the integrity of private property rights for surface owners and surface users.** Operators and landowners must negotiate upfront a surface-use agreement with landowners and surface users (i.e., permitees and lessees) detailing the placement of pipelines, compressor stations, roads, well sites, and related facilities, and detailing the use of drilling products and chemicals as well as baseline testing of available water resources for quality and quantity.

2. **Strengthen and enforce existing laws.**
   Water, Soil and Surface Protection
   - > Water quality in drilling areas must be protected by the use of closed-loop drilling systems (i.e. pitless drilling).
   - > Oil and gas operators must use available technologies such as directional drilling, horizontal drilling, multiple wells per drilling pad, and smaller well pads to reduce surface impacts. Concentrating wells reduces heavy truck traffic in neighborhoods and fragmentation of farmland and wildlife habitat.
   - > Substitutions for toxic oil and gas field materials (e.g., proppants, solvents, friction reducers, acid neutralizers, paints, etc.) must be used when non-polluting options are available.

[26] *http://www.portlandonline.com/bes/index.cfm?c=29323&a=123776*

> Eliminate on-site disposal of waste to reduce incidents of water, soil and vegetation contamination.
> Cementing, casing and monitoring of active wells and injection wells are critical to protecting our water quality. Operators must be required to meet the highest cement and pipe standards, take financial responsibility for their integrity in perpetuity, comply with surface casing and mechanical integrity requirements, including the performance and filing of cement bond logs and location of perforations.
> Proper management and disposal of produced and flow-back water must require that any wastewater re-injected into the ground be re-injected into a formation and through an injection well approved by the Office of Conservation.
> Oil and gas operators should only use surface water or Red River Alluvial Aquifer water as sources for hydraulic fracturing operations.

Air Quality Protection and Noise Standards

> Electric motors should be used to drive gas compressors and other stationary oil and gas-field infrastructure.
> Condensate tanks should be equipped with vapor-recovery units and monitored for the control of VOC emissions.
> No-bleed pneumatic valves and fittings should be used on pipeline networks.
> In concern for regional air quality, all immobile oilfield equipment that emits nitrogen oxides (NOx), volatile organic compounds (VOCs) or other Hazardous Air Pollutants (HAPs), owned and/or operated by an individual operator, should be regulated as a single source and for its cumulative effect.
> Waste gas and flaring must be defined and managed as an "air emission" and meet a state emissions standard.
> Excessive sound is a serious hazard to public health and welfare, safety, and quality of life; oil and gas operators must therefore meet local noise-ordinance standards.
> Noise standards should apply to all exploration, development, work-over, transportation and refinement equipment, particularly in proximity to residences, businesses, schools, hospitals, nursing homes and churches. Low-frequency noise complaints must be documented and mitigated.
> No person or entity should cause, allow, or permit the operation of any source of sound that creates a sound level that exceeds the ambient sound level by more than a specific dB level established by the local noise ordinance.
> The local authority having jurisdiction may require continuous monitoring to ensure compliance with the noise limits when the Significant Noise-Generating (SNG) source is in within 1,000 feet of a residential property or noise-sensitive area.
> Noise-mitigation equipment, structures, products, and materials or other alternate methods as approved by the authority having jurisdiction may be used to ensure compliance.

Human Safety and Quality-of-Life Protections

> To ensure safety and quality-of-life for residents, oil and gas wells must be set back at least 500 feet from a house or other domestic structure.
> Drilling and production should be located away from residences, businesses, schools, hospitals, nursing homes, and churches. Specific local regulations should be in place to ensure safety and emergency preparedness.
> Increase local, state and federal regulations to ensure the safety of human health and the environment as a result of oil and gas development.
> All drilling, completion and production operations shall be conducted in such a manner as to minimize, so far as practicable,

dust, vibration and noxious odors, and shall be conducted in accordance with generally accepted practices incident to such operations in urban areas. All equipment used in such operations shall be operated in such a manner as to minimize dust, vibration and noxious odors so far as practicable. Proven technological improvements in industry standards of drilling, completion and production in urban areas shall be adopted as they become available if capable of significantly reducing factors of dust, vibration and odor.

Wildlife, Wetland and Habitat Protection

> Remote monitoring and control devices must be installed to limit access by persons other than essential gas field personnel in and near wildlife habitat, wetlands, and other environmentally sensitive areas.

> Drilling activity must carefully comply with lease and permit stipulations and limit or exclude public access on oil and gas field roads.

> Whenever practical, bury utilities, particularly in and critical habitat for sensitive species. Minimize the disturbance footprint by burying utilities along roads rather than cross-country.

> Any aerial power lines should be spaced to prevent or minimize wildlife deaths.

> Existing power poles should be modified to prevent perching.

Goal 3

A greenway plan and program using floodplains, drainage basins, and unbuilt land connects neighborhoods with parks, schools, community destinations and downtown.

Policies:

- *Expand and build upon existing green space network plans.*
- *Promote and facilitate partnerships with public and private land owners to provide public access to greenways and waterfront areas.*
- *Require safe pedestrian links to greenway networks in new development.*

STRATEGIES

A. Create an area-wide greenway plan integrated with a network of on-street bicycle and pedestrian routes.

The abundance of vacant land in the City of Shreveport is a problem from one perspective, but it also offers an opportunity to create a signature greenspace network, including an integrated greenway system. (See Chapter 8 for more information on bike lanes and bike/pedestrian paths.)

Actions

1. **Develop a greenway plan that promotes the long-term vision of area-wide greenway circuits, while also providing criteria for incremental connections.**
   A greenway plan that lays out a compelling vision for greenway connections throughout the Master Plan Area and into neighboring parishes can become a powerful symbol. For example, the 200-mile Bay Circuit Trail, conceived in 1929 as an "outer emerald necklace" of parks linking 50 cities and towns around Boston, is today almost complete. At the same time, a greenway

plan must include criteria for making choices about incremental linkages and guidance on where and how to do it. Where separated rights-of-way are not possible, the greenway network should be well-linked with on-street bicycle and pedestrian routes.

2. **Amend land use regulations to require new development to enhance and facilitate greenway linkages.**
   Developers should be required to consult with the MPC, SPAR, and the Parish Parks Department to ensure that new development is laid out to facilitate links to existing and future greenways.

3. **Establish conservation setbacks from wetlands and bayous that may provide an opportunity for greenways and water-quality protection.**
   Setbacks that prevent construction and certain kinds of land disturbance within a prescribed number of feet from wetlands and bayous reduce nonpoint-source pollution. Because most of these water resources lie in floodplains, it is in any case inadvisable to allow construction there. Depending on conditions, these setbacks may then be used for low-impact greenways.

4. **Raise public awareness about the value of green space and greenways near private property to encourage greenway expansion in all neighborhoods.**
   Parks and greenways have repeatedly been shown to raise the real estate value of adjacent properties.

B. Create new park land connected to the greenway network, where appropriate and feasible.

Action

1. **Identify opportunities to create parks in areas where the parks would provide multiple benefits.**
   Stormwater parks, such as the one recommended in Chapter 11 in the medical district, can end flooding while providing a neighborhood amenity, a potential attraction for new neighborhood investment, and a new destination within the greenway network. New lakes, water-retention areas, and parkland around Bayou Pierre and Wallace Lake can also alleviate flooding concerns and provide public amenities while connecting with Brush Bayou Recreational Trail.[27]

Goal 4

Usable green space is within walking distance of every resident inside the loop.

Policies:

- *Give priority to underserved areas in developing new parks within the city core.*
- *Support partnerships with public and private property owners, such as the Caddo Parish School Board and the Caddo Levee District, to increase public access to open space.*

STRATEGIES

A. Provide new green space in underserved areas whenever feasible.

Action

1. **Identify underserved priority areas, prioritize them for the creation of new green space, and re-evaluate the choices periodically.**
   As part of the Parks and Recreation Master Plan updating process, priority areas for parks should be re-evaluated in relation to changes in demographic characteristics as well as population numbers, revitalization programs, walkability, and similar criteria.

[27] *http://www.shreveporttimes.com/article/20100213/OPINION03/2130316/1007/OPINION*

B. Continue to expand access to green space wherever feasible.

Actions

1. **Create, maintain and update regularly an open-source inventory of all open spaces, parks, natural areas and make it available on the city and parish websites.**
   SPAR and the Parish Parks Department can jointly sponsor the creation and maintenance of this inventory as the Parks and Recreation Plan is updated and includes more material on natural areas as well as programmed open spaces.

2. **Establish planning practices and ordinances that require or encourage creation of new green space as a component of new development projects.**
   As part of a program to ensure that new development pays for the costs of growth, provision of new parks should be part of an impact-fee system to create a fund for new parks. As noted earlier, developers must be required to consult with the MPC and SPAR about proposed greenway linkages. Similarly, they should discuss how development layouts will enhance access to existing and potential new parks. (See Chapter 12 for a discussion of impact fees.)

3. **Work with the school system, library system, and other potential partners to expand park and recreation resources without the need for municipal or parish land acquisition.**
   In many communities, the park and recreation department and the school system have mutual-use agreements that broaden the recreation facilities open to the community as a whole without requiring purchase of new park land. For example, the Houston SPARK School Park Program is a non-profit organization operating out of the mayor's office. SPARK was created in 1983 to develop public school grounds into neighborhood parks. An inter-local agreement, one of the first in Houston, among the City, the Houston Parks Board and the school district formally established the SPARK program. SPARK combines the resources of the Department of Housing and Community Development, seven local school districts, Harris County, the private sector, neighborhood groups, PTA/PTO groups and concerned citizens.[28]

Goal 5

A sufficient number of community parks serve residents outside the loop.

Policy:

- *Give priority to underserved areas in developing new community parks outside the city core.*

STRATEGIES

A. Provide new community parks in underserved areas outside the loop wherever possible.

Action

1. **Identify underserved priority areas and re-evaluate these choices periodically.**
   While a park within walking distance of every resident is not feasible outside the loop, community parks that can serve a wider area should be located where there can be walking access for some residents, if not all of them.

Goal 6

Public access to significant water resources for recreation near and on the water is available.

Policies:

- *Provide for meaningful public access and nature experiences along Cross Bayou, the Red River, Cross Lake, and other water resources.*
- *Continue and enhance partnerships with public agencies, such as the Red River Waterway Commission, to provide public access to water.*

[28] *http://www.sparkpark.org/*

STRATEGIES

A. Develop the public amenity value of existing natural bayous and other waterways.

Actions

1. **Ensure public access to the water for recreation and nature experiences in any Cross Bayou development plan.**
   Chapter 10 discusses strategies for developing new housing in the Cross Bayou area over time. Any development plans for the area should ensure permanent public access to the entire length of the Cross Bayou waterfront. Funding from the Riverfront Park Extension General Obligation Bond may be available to fund public access and recreation planning within a Cross Bayou vision plan in advance of a request for proposals for a private development partner.

2. **Enhance public access to the Red River waterfront along Clyde Fant Parkway.**
   SPAR has prepared an improvement plan for the parks on Clyde Fant Parkway. Enhanced public access to the river should be a priority implementation action when this plan is executed.

Goal 7

Parks, recreational areas, and other green infrastructure is of high quality and is well-maintained.

Policies:

- *Provide adequate resources for maintenance and operations in parks, recreational facilities, and other green public spaces.*
- *Promote sustainable maintenance practices.*

STRATEGIES

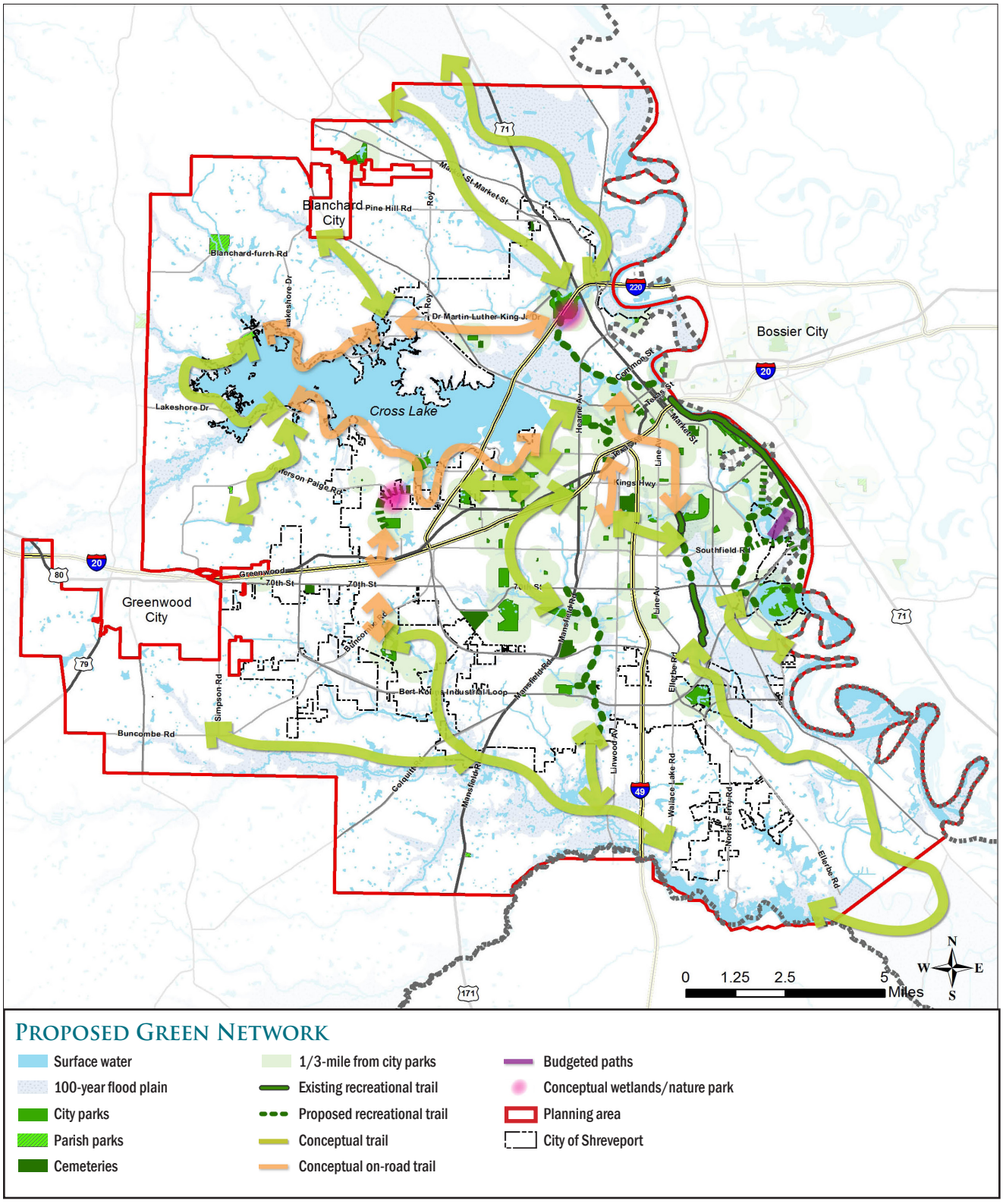
A. Provide additional funding and resources for maintenance of parks and recreational facilities.

Action

1. **Seek a dedicated source of funding for parks and recreation maintenance and operations and develop a set of criteria for charging fees where appropriate.**
   The most successful park systems have a dedicated funding source. In addition, they charge fees for some activities (with the potential for scholarships for those who need them). Fees should not be charged for

Shreveport-Caddo's waterways are among its most important sources of natural beauty.

MAP 4.5 **PROPOSED GREEN NETWORK**



PROPOSED GREEN NETWORK

- Surface water
- 100-year flood plain
- City parks
- Parish parks
- Cemeteries
- 1/3-mile from city parks
- Existing recreational trail
- Proposed recreational trail
- Conceptual trail
- Conceptual on-road trail
- Budgeted paths
- Conceptual wetlands/nature park
- Planning area
- City of Shreveport

Source: NLCOG, Goody Clancy 2009

activities, such as youth programs, that have a strong social purpose that is valuable to the community as a whole. However, the more the benefits of an activity are individual, rather than community-wide, the more appropriate it is to charge a fee. This also would allow SPAR to offer more recreational classes and activities and upgrade facilities.

B. Enhance partnerships for ongoing maintenance of park systems.

Actions

1. **Explore consolidation of the City and Parish park systems or joint activities to remove redundancies and increase capacity.** SPAR and the Parish Park and Recreation Department already have a strong cooperative relationship, as the recent Parks Master Plan powerfully demonstrates. Exploration of the potential for cost-efficiencies and enhanced service to all the residents of Caddo Parish would be worthwhile.

2. **Seek additional private partners, such as a Parks Foundation or additional Friends' groups.** The most successful park systems have nonprofit partners that raise money and support the parks by other means. Friends' groups—typically neighborhood residents who support their neighborhood park—are also very effective in helping to keep parks safe and clean. An investment by the parks departments in a volunteer coordinator to create and support Friends' groups is worthwhile.

C. Adopt low-maintenance landscaping and building practices to reduce overhead costs for parks and recreational facilities.

Action

1. **Incorporate sustainable maintenance practices in park and recreation maintenance.** Because parks are long-term assets, sustainable management practices will enhance benefits to future generations. Sustainable management in the park system can also provide an educational example to private property owners of how to manage their landscapes. On a life-cycle basis, green systems can bring significant savings, and it may be possible to obtain grants and other assistance to plan and begin implementing the program. Best practices include:
   - > Choose turf varieties that require lesser amounts of fertilization, irrigation, and mowing and artificial turf for intensively used athletic fields.
   - > Employ integrated pest management and natural alternatives for management of golf courses and other areas.
   - > Design new recreation buildings to take advantage of natural lighting and ventilation during some parts of the year, in order to reduce the need for air conditioning and lighting.
   - > Seek to use recycled and recyclable materials for walls, paving and recreational equipment.
   - > Explore alternative energy sources, such as solar power, to reduce electricity costs over time in recreational structures.

Goal 8

The City of Shreveport has more than 30% tree canopy coverage by 2030.

Policies:

- *Promote tree preservation and tree planting on public and private property.*
- *Give priority to tree planting along major corridors and other public spaces.*
- *Support an Urban Forestry division with appropriate staff within the Office of Public Works.*

STRATEGIES

A. Develop a tree canopy protection and restoration plan.

A tree canopy plan should identify priority areas for tree canopy restoration and protection and provide a strategic timeline for undertaking tree canopy restoration in all parts of the city. For example, main streets and boulevards could be given first priority, followed by schools and recreational areas. Canopy maintenance and restoration should occur in all parts of the Master Plan Area, but areas that have experienced the greatest canopy loss over time should receive first priority. Shreveport Green has already begun a tree canopy project, so it would be the logical entity to work with municipal agencies in developing the protection and restoration plan.

B. Protect the existing tree canopy by providing maintenance services and education.

Actions

1. **Make the hiring of a certified urban forester/ arborist an early priority.**
   The City and the Parish could share an urban forester position. In addition to ensuring that trees on publicly owned property are well taken care of, the urban forester would be called on to work with developers on tree-protection and tree-replacement issues.

2. **Work with public utility providers to establish conservative pruning policies.**
   Residents comment that public utility contractors take a drastic approach to tree pruning. A city forester or arborist would be best positioned to work with the utility to reach agreement on pruning policies. In the absence of a city forester, the SPAR landscape architect could be designated to negotiate a mutually acceptable system.

3. **Enhance partnerships to provide tree care and maintenance.**
   Partnerships with Shreveport Green, SPAR, and neighborhood groups can help ensure that trees are maintained and that residents are educated about tree care.

4. **Enforce landscape standards for new and existing development.**
   Project applications to the MPC should be required to include site plan documents that show existing trees and trees to be planted as part of the proposed project. Trees above 6 inches dbh (diameter breast height) should be indicated individually. Approved applications for building permits should show the trees required in the project. Spot checks for permit enforcement should include landscape standards.

C. Expand the city's capacity to grow and plant trees for public and private property.

Actions

1. **Provide public land to expand Shreveport Green's tree nursery program and develop additional "grow stations" for growing large trees.**
   With so much available land and a wonderful environment for growing trees, Shreveport could be a national model for urban forestry. Although Shreveport Green maintains a small tree nursery program, a large municipal nursery could supply trees to the city and to other jurisdictions.

2. **Expand and support Shreveport Green's tree-planting program to provide and plant trees for public property and residents.**
   An enlarged public tree nursery could supply 1,000 native trees per year for planting within the Master Plan Area.

3. **Begin a program to plant and maintain a minimum of 500 trees per year on public property.**
   The trees should be planted in locations where trees are absent but would be very welcome, such as public parking lots, bus stops, and along sidewalks.

4. **Explore creating a volunteer group to plant and care for trees.**
   Tree planting is often a popular activity, but consistent care and watering for new trees, especially those exposed to urban stress, is less common. An "Adopt-a-Tree" program can provide the crucial care in the first two years after planting that strongly predicts a tree's chances of surviving. In some communities, residents can request a tree as long as they commit to caring for it.

D. Expand tree and landscaping requirements for new development and roadway projects.

Actions

1. **Revise land use and zoning codes to include more tree and landscaping requirements.**
   Enhanced landscape standards that promote tree protection and replacement are needed.

2. **Include street tree planting in all corridor road and gateway improvement projects.**
   Many of the most-traveled roads in Shreveport are barren of trees, even though there is room for them. A program aimed at making every major road, where feasible, into a tree-lined street would have multiple benefits, including lowered temperatures, less stormwater runoff, cleaner air, and enhanced beauty. (See Chapter 8 for a discussion of "complete streets" program.)

Goal 9

Locally produced foodstuffs are available for local consumption in a variety of outlets.

Policies:

- *Support and promote community garden initiatives and urban agriculture business opportunities through incentives and regulatory frameworks.*
- *Support expansion of fresh food outlets, such as farmers' markets, throughout the city.*

STRATEGIES

A. Protect and expand agricultural activities throughout the Master Plan Area, with regulations to ensure appropriate uses according to location.

Actions

1. **Conserve existing active agricultural land.**
   (See discussion of conservation easements and purchase of development rights programs, under Goal 1 above.)

Commercial urban farms, like this one in Cleveland, OH, are being established in many cities that have vacant land.

2. **Support the LSU AgCenter and other food-security advocates in efforts to establish a model urban agriculture system in Shreveport through a variety of measures:**
   - > Adopt clear zoning guidelines for urban agriculture on private property, including cultivation of chickens, bees, and other small livestock, where appropriate.
   - > Provide vacant and underutilized land for publicly-accessible gardens so that all interested residents have the opportunity to garden and grow food as well as the resources to get started.
   - > Actively promote and showcase a range of innovative urban agriculture examples throughout the city and region, including gardening, poultry, beekeeping, rainwater catchment, etc.
   - > Facilitate partnerships with schools, parks and other public facilities to provide gardens within easy access of children, and integrate gardening into the school curriculum.
   - > Support and promote higher education programming on agriculture at local colleges and universities.
   - > Integrate urban agriculture with economic development and workforce-development activities and through partnerships with restaurants.
   - > Through existing community centers and community-based organizations, create and increase access to demonstration and educational farms and gardens and create and promote educational programs around gardening/farming for all ages. An example is Hollygrove Market and Farm in New Orleans: a nonprofit farm, produce market, educational center, large demonstration kitchen, and a community room for large events. (*www.hollygrovemarket.com*)

B. Re-establish a citywide composting program and provide compost to residents for collection free of charge.

Lawn and garden clippings and restaurant food waste can be recycled through a composting program rather than going into the waste stream. See Chapter 9 for discussion of recycling and solid waste issues.

Goal 10

All residents have reasonable access to healthy, affordable food in close geographic proximity and are well-informed about nutrition.

Policies:

- ***Support the development and expansion of urban agriculture, fresh food retail outlets, and other sources of fresh foods in areas that are underserved by fresh food outlets.***
- ***Support and expand nutritional education programs and partnerships with schools to provide gardening and nutrition education.***

A community garden in Allendale

Farmers' market produce

STRATEGIES

A. Promote healthy cooking and eating through partnerships with existing educational organizations.

Action

1. Form partnerships between the LSU AgCenter (and other community gardening initiatives) and the Caddo Parish School District to provide community gardens and nutritional education on school grounds and as a part of the school curriculum.

B. Expand access to farmers' markets and other fresh food outlets.

Actions

1. Adopt land use and zoning regulations to explicitly allow farmers' markets and other fresh food vending in appropriate locations.

2. Facilitate Farmers' Market expansion to additional locations throughout the city.

C. Support community gardening through the use of adjudicated and other available properties.

Actions

1. **Provide water and other necessary utilities to community gardens on adjudicated and similar properties.**
   Community gardens need access to water in order to function.

2. **Include planning for community gardens in neighborhood revitalization developments.**
   The LSU AgCenter should be included as a partner in planning for neighborhood revitalization so that community gardens and orchards can be organized as part of the green network in these neighborhoods and so that utilities can be provided as part of the development process.

Goal 11

Greenhouse gas emissions are reduced by 20% in 2030.

Policies:

- *Support a City and Parish greenhouse gas audit and local climate action plan.*
- *Support an energy-audit program for commercial and residential properties.*

STRATEGIES

A. Prepare a citywide energy and climate action plan.

Actions

1. **Join other cities in working toward sustainable energy policies.**
   By becoming part of a national city movement, Shreveport can benefit from the experience of other communities.:
   > Sign the US Conference of Mayors Climate Protection Agreement.
   > Join ICLEI-Local Governments for Sustainability an international organization that provides local governments with tools and resources to develop sustainably. Membership fees are based on several variables but are typically no more than a few thousand dollars. Membership provides city officials with access to free or inexpensive technical support in developing policies and programs for sustainable development, including technical tools for performing a citywide greenhouse gas audit and technical assistance in developing and implementing a climate action plan. (*www.iclei.org*)

2. **Continue to implement the new City Energy Efficiency and Conservation Strategy through a variety of means.**
   High-priority aspects of implementation include preparation of a greenhouse gas audit of the city government and then expanding to prepare a local climate action plan that would include identification of hazard mitigation and measurable targets for citywide solid-waste reduction, municipal energy efficiency, weatherization of homes and commercial buildings, and similar issues.

3. **Explore ways to increase energy efficiency requirements in zoning and building codes.**
   In Chapter 12, this plan recommends a complete rewrite of the zoning ordinance to create a Unified Development Code. The development standards in this code should promote energy-efficiency.

4. **Expand home-weatherization programs offered by Community Development.**
   Funding is available from federal, private, and philanthropic sources.

5. **Provide public education for area residents on alternative and renewable energy adoption—including information on Louisiana's solar tax credit program—through partnerships with existing organizations.**

6. **Promote adaptive reuse of existing buildings and deconstruction of buildings slated for demolition wherever possible.**
   In many communities, building-materials reuse centers receive materials salvaged from demolition and distribute or resell them to local nonprofit or for-profit projects.

Goal 12

Municipal operations and buildings are models of resource and energy efficiency.

Policies:

- *City and Parish green-procurement and -building policies.*
- *Municipal leadership in alternative and renewable-energy use.*

STRATEGIES

A. Improve energy efficiency of all municipal buildings and facilities.

Actions

1. **Explore adaptive reuse of existing buildings when developing new municipal facilities, and use LEED-style best practices for retrofits of existing buildings and new buildings.**
   LEED (Leadership in Energy and Environmental Design) is the current standard for energy efficient, "green" building. Incorporation of these best practices, or subsequent new standards, into building retrofits or new designs will result in life-cycle savings.

2. **As the fleet is renewed, continue to convert all City and Parish vehicles to compressed natural gas vehicles.**
   As a center of the natural gas industry, the City, Parish, and other agencies should continue to convert vehicles to compressed natural gas as they are replaced.

D. Getting Started

Early actions that are not costly will provide a foundation for more ambitious activities.

ACTION	RESPONSIBLE PARTY
Permanently protect public park land, such as the riverfront parks, with open space zoning or a conservation servitude.	SPAR; MPC; City Council
Amend land use regulations to facilitate connections with proposed greenways and to provide for open space.	MPC; City Council
Prepare a conceptual public access plan for the Cross Bayou area as part of a Cross Bayou vision plan.	SPAR; MPC; DDA
Establish a community garden at SPAR's A. B. Palmer Recreation Center.	LSU AgCenter; SPAR
Finish the tree canopy analysis.	Shreveport Green
Make a commitment to plant a minimum of 500 trees a year and seek resources to start the program.	City; Shreveport Green
Sign the US Conference of Mayors Climate Protection Agreement and join ICLEI-Local Governments for Sustainability.	Mayor
Continue to convert government vehicles to compressed natural gas as the fleet is renewed.	City; Parish; School District