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a journal of environmental and sustainability issues

The
Kentucky Institute
for the
Environment
and Sustainable
Development

Land Conservation

The Kentucky Institute for the Environment and Sustainable Development (KIESD) was created in July 1992 within the Office of the Vice president for Research, University of Louisville. The Institute provides a forum to conduct interdisciplinary research, applied scholarly analysis, public service and educational outreach on environmental and sustainable development issues at the local, state, national and international levels.

KIESD is comprised of eight thematic program centers: Environmental Education, watershed Research, Environmental Law, Sustainable Urban Neighborhoods, Pollution Prevention, Environmental and Occupational Health Sciences, Environmental Policy and Management, and Environmental Engineering.

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Cover Photo: Small waterfall on the William F. Miles property.

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Land Conservation

With the opening of the 19th century came the most significant accomplishment in the exploration of the West: The Lewis and Clark Expedition (1803-1806) from St. Louis to the mouth of the Columbia River. The land between the Missouri and the Rockies became known as the Great American Desert.

At the second half of the 19th century, the area of the U.S. stretching from the banks of the Missouri River to the eastern side of the Rocky Mountains was almost devoid of settlement. In 1854 the Kansas-Nebraska Act was signed by President Franklin Pierce opening the way for settlement from coast to coast. The great American land grab was on spurred by a government policy to settle the west. Some 10 years later, President Lincoln passed the Homestead Act of 1862 providing that "any person… over 21, who was a U.S. citizen… and had never borne arms against the government, could claim up to a quarter-section of land on payment of a $10 filing fee." The American dream of free land had become part of the American psyche and with it the belief that land was an expendable, inexpensive, and inexhaustible resource.

Now a little over 150 years later, the situation has changed. Land values have increased, settlement has been replaced by urban sprawl, and natural areas are being swallowed up by rapid development, all of which has resulted in a new perception among Americans that land is no longer expendable, that it is rapidly increasing in value, and that it is in limited supply.

Conservation of natural areas has taken on a new urgency as development patterns have exploded. In Kentucky, we are losing 130 acres every day to development, or the equivalent of a land mass equal to Jefferson County, and this in a period of five years. The authors in this issue of Sustain address the central question of what are governmental and non-governmental entities doing to protect critical natural areas? What once was land for the taking, the "wide open spaces" to be conquered and settled, is now a precious resource to be protected and conserved. This change has occurred in a period of a little over 150 years. Demographic projections for the next 150 years foretell of land being an ever more threatened resource. Land can still be purchased in Kentucky for as little as $500 per acre. Delays in taking action to conserve land could mean that governmental and nongovernmental entities would no longer have the financial ability to protect natural resources through purchase. Other states where demographics have already imposed tremendous pressures on remaining natural areas have undertaken aggressive purchasing and protection programs. This issue of Sustain illustrates some of those approaches.

Allan Dittmer, Editor

Consensus Conservation: A Common-Sense Approach to Protecting Our Environment

Mitch McConnell
United States Senator

Republicans don't care about the environment.

That's the myth, anyway. Many people view environmental policy as balancing seemingly incompatible goals—the desire to conserve undeveloped green spaces and natural resources on the one hand, and the desire to promote responsible development and economic growth on the other. A common misconception is that Republicans ignore the environment, and push for unchecked development to the detriment of everything else. After over a quarter of a century in public service, I can state emphatically that this misconception is flat-out wrong.

It's ridiculous to think that Republicans don't care about basic necessities like clean air and clean water. What many in the GOP oppose is that too often, some push for esoteric, extreme regulations that satisfy fringe interest groups, but have little effect on ordinary people. To mask the radical nature of their approach, they paint Republicans as the opposite extreme—only concerned with profit, and intent on developing unused land, with no thought at all for preserving open spaces for people to enjoy in the future.

Both of these extreme positions are short-sighted. Rather, I think that Republicans excel at promoting a third path, one between development without limit versus severe restrictions and regulations that hold back economic growth. I call this third path "consensus conservation."

Consensus conservation is a common-sense approach to conservation that works to benefit all. It focuses on preserving parkland and natural resources that ordinary people can enjoy every day instead of reaching for esoteric, intangible goals. It promotes conservation in a way that also accelerates economic development, instead of pitting the two against each other—because while preserving our environment is essential, creating jobs is important too. Finally, consensus conservation encourages the government to actually seek consensus—that is, it fosters programs that farmers, landowners, and conservationists all want to participate in, as opposed to harsh regulations imposed by bureaucrats that force citizens to comply, or worse, seizes their land for government use.

I first realized the power of this consensus conservation approach while serving as Jefferson County Judge-Executive from 1978 to 1985. The Jefferson Memorial Forest was about 2,000 acres when I started my first term. That park was originally established in 1946, as a memorial to Kentuckians who fought in World War II. Throughout my time in office, we identified land near or next to the park whenever it became available for purchase.

We slowly bought these pieces of land to expand the forest only when we found willing sellers, who received a fair price. We never used condemnation or any other tactic to force people off their land. By the time I left office to go to the Senate, the Jefferson Memorial Forest had doubled in size from 2,000 acres to more than 4,000 acres.

Jefferson Memorial Forest fills over 6,000 acres today, and provides a wonderful place for recreation for Louisville's families. It has plenty of spots to go picnicking, fishing or mountain biking.

I look back on the expansion of Jefferson Memorial Forest as my greatest conservational accomplishment as the county's judge-executive. It was also a terrific test-run for my ideas about consensus conservation. The expanded forestland filled a real need in the community for more recreational parkland for kids, families, and anyone else interested in nature. And we grew the forest only by reaching fair deals with willing sellers.

As a Senator for Kentucky, I've sought ways to protect green spaces and promote conservation, and to do so all

over the Commonwealth. In my 21 years in the Senate, I've directed over $1.2 billion to these kinds of projects throughout Kentucky, and I'm proud of every one of them. Perhaps the one accomplishment that most parallels the successful expansion of the Jefferson Memorial Forest 25 years ago is the new 21st Century Parks Project in Louisville.

Louisville has long been a first-class city when it comes to parks. Frederick Law Olmsted, the designer of New York's Central Park, designed Louisville's original park system beginning in the 1890s, including Cherokee Park, Shawnee Park and Iroquois Park. Aside from the Jefferson Memorial Forest, though, most of the city's green spaces are within the old City of Louisville boundaries. After Louisville merged its city and county governments, it also needed to expand its parks system so that no part of Metro Louisville went underserved.

The 21st Century Parks Project seeks to do just that. The plan calls for building three new parks along Floyds Fork, and linking those parks and existing parks with a 100-mile "ring of green" of bicycle and pedestrian paths. I found this vision so exciting that I secured $38 million for it in a bill passed by Congress last summer so that the expansion could begin immediately.

Along with private money raised by David Jones, the driving force behind this project, these funds will go towards buying new parkland and beginning the construction to turn the land into a beautiful and usable public space. The expansion is the most significant achievement for the Louisville park system since the creation of the original Olmsted system more than a century ago. Louisville will be the envy of the nation, as no segment of its population will be without access to parkland areas.

The 21st Century Parks Project, like the expanded Jefferson Memorial Forest, will provide real recreational space for everyone in Metro Louisville to enjoy. I also hope that city officials will look for landowners willing to sell their land and offer them a fair price, as we did when expanding Jefferson Memorial Forest, or seek donated land or offer fair exchanges. They are already off to a good start thanks to the generous donation of 114 acres by a Louisville real estate development firm, Brown, Noltemeyer & Mattingly.

Another important aspect of consensus conservation is that when done right, it can accelerate economic growth. Riverfront development projects currently underway in Owensboro, Ashland, and Henderson provide great opportunities for this possibility. Last year, I secured $40 million for Owensboro, $10.22 million for Ashland, and $10 million for Henderson in federal funds to revitalize the riverfronts for all three of these Kentucky cities.

These cities wouldn't be where they are without the river. And the riverfront area is the one common neighborhood for everyone in the city, and indeed across the Commonwealth, to share. But in all of these cities, the significance of the river and an emphasis on a thriving riverfront, with all the economic and recreational opportunities it can provide, had fallen into the background.

With the more than $60 million in funds I directed to these three cities, the leaders of Owensboro, Ashland and Henderson can begin to spur downtown economic development while also taking care to conserve and utilize the natural resources that define these regions. In Owensboro, the first priority will be to construct a wall along the river to stop erosion in Smothers Park, which has lost about 30 feet of its bank to the river over the decades. The wall will actually more than make up for this loss by extending the riverbank. Once that land is filled in, the city will gain about three and a half acres of land to add to Smothers Park. The wall will also help control flooding.

The riverfront funding will also spur economic growth in these cities by making the riverfronts more appealing places to walk, run, meet friends or attend gatherings. Owensboro plans to add overlooks on the river, walkways, and a boat ramp. Ashland may develop a marina or a railroad. Henderson officials have discussed expanding the city amphitheater or extending the riverwalk.

All of these developments will attract businesses and restaurants to the riverfront area. What are now underdeveloped areas will soon become bustling hubs of commercial and recreational activity, including parkland, for everyone in these cities to benefit from and enjoy.

A great example of consensus conservation on a larger scale is the Green River Conservation Reserve Enhancement Program (CREP). This project to clean up Kentucky's Green River really demonstrates how sound conservation policies can benefit both the environment and the surrounding communities.

An often overlooked treasure, the Green River, astonishingly, is the most biologically diverse river of the Ohio River system, and one of the most biologically diverse in the nation. It contains over 150 species of fish and over 70 mussel species, many of which cannot be found anywhere else on Earth. Biologists consider the Green River to be one

of our most ecologically significant waterways, which is why I felt it important to do something to keep it that way.

In 2001, I secured $110 million through a grant from the U.S. Department of Agriculture to begin the Green River CREP, one of the largest CREP projects in the country. The goal of the project is to reduce the amount of sediments, pesticides, bacteria, animal waste and fertilizers that flow into the river and destroy the aquatic life—in other words, to lessen the harmful impact humans can have on this unique natural resource. We do that by paying farmers who own land adjoining the Green River to take that land out of production and set it aside as a buffer to protect the river. Farmers who choose to participate plant trees and native grasses instead, halting erosion and blocking harmful elements from flowing into the river.

So far, Kentucky farmers have placed 10,000 acres into the program, and we're hoping to entice more. Once again, everyone is offered a fair price—one landowner in Adair County who was almost ready to sell his family's farm was able to keep it by enrolling in the program. The Green River CREP encompasses a 100-mile stretch of the river and eight counties in south-central Kentucky, and the benefits flow to an additional nine counties downstream as well as 33 public water systems and Mammoth Cave National Park.

Since the program's inception in 2001, I've continued to direct over $2.3 million in federal funds toward the Green River CREP to support it and pay for monitoring systems to track our progress. So far, the results are encouraging. Biologists recently discovered two Ring Pink mussels in the Green River, a species once thought extinct. That's a definite sign that water quality in the Green River is improving. Scientists believe the Green River may be the last refuge of the Ring Pink mussel, and have established a mollusk hatchery on the river to nurture and study the many different varieties of the animal found in that waterway.

The Green River CREP achievement serves as a marvelous example of consensus conservation not just throughout the state, but throughout the country. It is a great model for how government can support comprehensive, tangible conservation goals. Conservationists have cited this CREP program as one of the best examples of river conservation not just in America but worldwide.

Unlike the Green River CREP, one area where Kentucky lagged behind the rest of the nation, unfortunately, was in establishing a National Wildlife Refuge. Until 1997, Kentucky was the only state in the Union to not have a National Wildlife Refuge wholly within its boundaries. President Theodore Roosevelt, a Republican and one of the first proponents of consensus conservation, established the National Wildlife Refuge system in 1903. It was created to protect America's open lands, waters, forests and wildlife for future generations—making it one of the first federal consensus conservation programs in our history.

The National Wildlife Refuge system encompasses 96 million acres nationwide, but only recently did Kentucky get a refuge to call its own. I proposed legislation in 1996 to establish the Commonwealth's first National Wildlife Refuge, and in 1997 the U.S. Fish and Wildlife Service approved the plan and began purchasing land. Located in Marshall County in western Kentucky along the east fork of the Clarks River, the Clarks River National Wildlife Refuge covers 7,000 acres of bottomland hardwood forest.

Since the Clarks River National Wildlife Refuge's inception, I have appropriated over $10 million in federal funds to acquire additional land for the refuge. It was important to me to protect the rights of property owners in the area, so I made sure that the government could only buy land from willing sellers or accept land through donations or fair exchanges.

I also worked closely with the Kentucky Farm Bureau to guarantee that the management of the refuge would not impact the surrounding farmers or unduly restrict their agricultural activities. There is no reason conservation interests and agricultural interests cannot exist side by side in that region. These important features are hallmarks of consensus conservation—making the refuge work with, not against, the community and families of Kentucky that it is charged to serve.

I also secured an additional $3 million to upgrade facilities at the refuge, including $500,000 to construct a headquarters building where visitors can gather, meet the staff, and view educational exhibits. Up and running now for several years, the Clarks River National Wildlife Refuge showcases a unique ecosystem, offering a great educational opportunity for Kentuckians.

The refuge is a migratory fly-way and breeding area for many types of birds, including the bald eagle, and the hardwood forests provide a home for woodpeckers, hawks, and the eastern wild turkey. The Fish and Wildlife Service researchers tag birds and track their migration from Kentucky to Canada and Central America and back. It also provides recreational activities like bird watching, hiking, canoeing, hunting and fishing.

Because consensus conservation focuses on yielding tangible benefits for people, it can apply not just to preserving already precious resources but also to cleaning up resources that are contaminated or worse, dangerous. Two great examples of this are the efforts to address environmental damage at the Paducah Gaseous Diffusion Plant in Paducah and the efforts to safely dispose of dangerous chemical weapons at the Blue Grass Army Depot near Richmond.

During the Cold War, workers in the Paducah Gaseous Diffusion Plant enriched uranium for both commercial and military uses. As a result, they also produced depleted uranium hexafluoride, or DUF6, a toxic by-product of the enrichment process, as well as other dangerous materials. There are now over 480,000 tons of DUF6 stored there.

In 1998, I authored legislation requiring the Department of Energy to finally remove the depleted uranium from Paducah. When the Department delayed the cleanup, I authored another law requiring them to begin the job by a set date and securing the funding to make sure they can do so. Now, the residents of the Paducah area can be assured that the Department of Energy will begin converting the dangerous DUF6 into safer elements by early 2008.

No matter how quickly the conversion beings, though, some areas around the plant remain dangerous. I secured nearly $1 billion in federal funds to facilitate environmental cleanup at the plant. With that money, the Department of Energy has cleaned up "Drum Mountain," which was really a five-acre mound of rusting barrels contaminated with radioactive material; disposed of hundreds of full drums of radioactive material; and is cleaning up the groundwater in the area which has been contaminated with carcinogens.

Saddest of all are the Paducah Gaseous Diffusion Plant workers who were unknowingly exposed to harmful radioactive materials. I led an effort to create a compensation program for these men and women. We also created a medical monitoring program for current and retired workers, so that doctors can catch any signs of workplace illnesses at the earliest stages.

While the materials at the Paducah Gaseous Diffusion Plant are dangerous, the materials inside the Blue Grass Army Depot are even more deadly. The people of Madison County, where the depot is located, are living right next to over 500 tons of the deadliest material ever conceived by man—VX nerve agent.

As little as 10 milligrams of VX is enough to kill a human being. That's about the mass of 10 grains of sand. It is virtually undetectable to the naked eye, and yet, if that tiny amount is inhaled, death is immediate. If it is absorbed through the skin, death takes minutes.

Since the 1940s, the Blue Grass Army Depot has stored VX as well as mustard gas and sarin nerve agent. If the Department of Defense had its way, they would have incinerated these deadly chemical agents on site—risking dangerous air emissions—or trucked them off to another facility, with catastrophe just one fender bender or flat tire away.

Working with some of my fellow senators and a group of concerned Kentuckians who formed a watchdog organization called the Chemical Weapons Working Group, I have intervened repeatedly to ensure the Army begins disposal of these dangerous weapons in the safest possible way.

I authored legislation that created the Assembled Chemical Weapons Alternatives program, or ACWA. ACWA instructed the Army to evaluate alternatives to simply incinerating the weapons or dumping them on a truck. And when the Army dragged its feet on the issue—which it did, several times—I authored legislation to ensure that the Army met its responsibilities, and secured a $20 million funding increase for the ACWA program so it could do so.

By disposing of these chemicals without resorting to incineration, Kentuckians shouldn't have to worry about dangerous air emissions of PCBs, dioxins, mercury and other metals. There should be no risk of any nerve or mustard agents being released into the air. And the Army won't tempt fate by transporting such deadly chemicals on our state's highways.

All of these conservation efforts I've discussed are just the most recent highlights of my 21-year Senate career. And all of them share features in common, which when linked together form the basis for a practical, common-sense approach to these issues that I have called consensus conservation.

Consensus conservation means that government conservation programs ought to focus on real, tangible benefits for ordinary people, such as preserving recreational green space or natural resources, or cleaning up environmentally damaged areas. It means that conservation efforts should be done in a way that promotes, rather than hinders, economic growth for the people in the surrounding community. And consensus conservation should truly seek a consensus, by creating programs that people will want to take part in rather than forcing their behavior with draconian regulations.

Hopefully these many accomplishments will put to rest the myth that only Democrats care about conservation, although even I was a little surprised last year when in an editorial, the Louisville Courier-Journal dubbed me a "godfather of green" for some of the projects I've described above. Not bad for a conservative Republican.

Theodore Roosevelt, our first conservationist president, once said, "Conservation means development as much as it does protection. I recognize the right and duty of this generation to develop and use the natural resources of our land, but I do not recognize the right to waste them, or to rob, by wasteful use, the generations that come after us." He understood what I hope more people are coming to realize—that prosperity and growth are not at odds with responsible stewardship of the environment.

I'm very proud of my environmental record and consider many of these accomplishments to be among the greatest in my career in public service. I think Kentuckians can see and appreciate a real benefit in their lives from these projects and others like them. As long as I'm in office, I'll continue to serve the people of Kentucky with sensible, effective conservation projects, and I look forward to working with others who adopt this same approach.

Mitch McConnell, currently serving his fourth term in the United States Senate, was first elected to that body in 1984. That year he was the first Republican to win a statewide race in Kentucky since 1968. With his successful reelection in 2002, Senator McConnell won the largest margin of victory for a Republican in Kentucky history. In 2005, Senator McConnell became the longest-serving Republican senator in Kentucky history. Senator McConnell also served as Jefferson County Judge-Executive from 1978 to 1985. He lives in Louisville and is married to Elaine L. Chao, the United States Secretary of Labor. His Senate colleagues have unanimously elected him Majority Whip, making him the second-ranking Republican in the Senate.

Conservation and Land Use Policy in "The Natural State"

Mike Huckabee
Governor of Arkansas

Shortly after becoming governor, I did something that, as a Republican, surprised some people – I climbed aboard my bass boat and floated the Arkansas River from one end of the state to the other in support of a constitutional amendment to create a 1/8-cent sales tax to fund conservation efforts in the state. On average, this 1/8-cent tax generates $46 million a year with the funds being earmarked for the Arkansas Game and Fish Commission, the Department of Parks and Tourism, the Department of Arkansas Heritage and the Keep Arkansas Beautiful Commission.

Why would a Republican governor who ran on a smaller government platform, and went on to cut taxes, be willing to support such a tax increase? I had a few reasons. First, unlike government imposing a tax on the people, this was an opportunity for the people of Arkansas to choose for themselves whether or not to make a small contribution to conserve and preserve Arkansas' history and natural beauty. Arkansans understand the value of living in "The Natural State." Arkansans enjoy a standard of living that is hard to imagine in a lot of other states. Besides enjoying distinct but mild seasons, we have easy access to the Ozark and Ouachita Mountains, whitewater rafting and leisurely canoeing on more than 9,000 miles of rivers and streams, hiking on more than 1,500 miles of trails, camping and hunting in 2.9 million acres of national forest, exploring in caves and limestone caverns and exceptional fishing, boating, skiing and scuba diving in and on our 60,000 acres of lakes. Arkansas' beauty is our most important resource, and the people of Arkansas understand this.

Second, I supported the 1/8-cent conservation sales tax because I understood it to be an important economic issue for the state. Arkansas annually sees more than 20 million visitors who make more than $4 billion in travel-related expenditures, generating $238 million in state taxes and creating 59,287 jobs. Arkansas parks alone attract more than 10 million visitors. I was confident 1/8 of a cent was an investment Arkansans would be willing to make.

Finally, I understood conservation to be an issue of stewardship. I believe we are each called to be stewards of what God entrusts to us, whether it's health, homes or habitats. As governor, exercising stewardship over so many areas – the economy, the business climate, the environment – can be complicated as competing interests vie for prominence. It takes extra work to find common ground, and it is not always possible. When we do, often times the result is mutually beneficial.

As we embark on the inevitable trek toward increased development, it's up to those of us in government to put in the extra effort to work with the private and non-profit sectors to find creative ways of preserving and protecting natural areas without infringing on the rights of property owners or inhibiting economic productivity. In Arkansas, we are finding ways to do just that.

The Arkansas Natural Heritage Commission, one of seven agencies within the Department of Arkansas Heritage, was created in 1973 and is charged with identifying natural communities and determining which native plant and animal species most need habitat protection; purchasing tracts representative of those habitats to create a statewide system of natural areas; and managing those natural areas to ensure their beneficial use and preservation for the enjoyment of future generations. With a budget ranging between $3 and $4 million, the commission relies on federal and other grant programs as well as partnerships with other organizations such as the Arkansas Game and Fish Commission, Arkansas State Parks, the Fish and Wildlife Service, The Nature Conservancy, the University of Arkansas System and others.

One example of successful partnership is the Baker Prairie Natural Area located in the midst of the growing urban development of Harrison, Ark. Once a tallgrass prairie covering 5,000 acres of northwest Arkansas, Baker Prairie now covers 71 acres and is co-owned by The Nature Conservancy and the Arkansas Natural Heritage Commission. Located within the city limits and close to public schools, the prairie's abundance of wildflowers, turtles, birds and bugs, make it a popular attraction. Far from being seen as a roadblock to progress, residents of Harrison recognize the prairie's value to the community and have volunteered their labor and resources to guard this natural area for years.

We have also found success in working with industries to protect these sensitive sites. Recently, the Arkansas Natural Heritage Commission, The Nature Conservancy and Potlatch Forest Holdings Incorporated, a forest products company owning 473,000 acres in Arkansas and employing 900 Arkansans, entered into an agreement for a perpetual conservation easement on approximately 330 acres, making that land a part of the state's Warren Prairie Natural Area. The easement allows the forest to be managed for timber production, but in an ecologically sustainable way – a way that improves the health of the forest and also benefits wildlife. The transformation of this commercial timberland will take time. This long-term ecological management style is already proving successful on other tracts at the Warren Prairie Natural Area, where the commission and The Nature Conservancy have worked to convert the forest to a more natural pine savanna. The Warren Prairie Natural Area is home to a federally threatened plant and is showing promise as a habitat for the endangered Red-cockaded Woodpecker, which has already been spotted in the area.

We have also had great success working with private landowners in other parts of the state. The Arkansas Natural Heritage Commission is working with landowners to protect caves that serve as sensitive habitats for endangered bats, such as the Ozark big-eared bat, the gray bat and the Indiana bat, as well as threatened Ozark cavefish. Arkansas and Oklahoma are currently sharing an $831,040 grant from the U.S. Fish and Wildlife Service to help with this preservation. At issue is the protection of water entering the caves' aquifers as well as the prevention of excessive disruption of hibernating bats, which can cause them to abandon the sites or to lose offspring to death. By working with landowners, the Arkansas Natural Heritage Commission has been able to protect these recharge zones by obtaining easements and other conservation measures.

While Arkansas has seen many successes, certainly the most exciting one has been the rediscovery of the Ivory-billed Woodpecker more than 60 years after its last confirmed sighting. That story has been told far and wide. Since the initial discovery in 2004, there have been other sightings of this magnificent bird on lands managed with funds from the 1/8 cent conservation tax – further evidence that this small investment is reaping great returns.

Another equally important discovery was made in 2001. Theo Witsell, a botanist with the Arkansas Natural Heritage Commission, was conducting a routine survey of plant species on ANHC-protected land not far from a popular retirement and resort community near Hot Springs, Ark. when he found what turned out to be a new plant species. He named the plant, "Pelton's rose-gentian," after John Pelton, the photographer and amateur naturalist who first showed the plant to Witsell. This newly discovered annual produces purple flowers in mid-summer and is a type of Sabatia. Since the initial discovery in 2001, Witsell has found another population of the Pelton rose-gentian in Arkansas. As of now, the only places on the planet known to house this beautiful plant are the Ouachita Mountains of Arkansas. Thankfully, both sites are already protected, one by the Arkansas Natural Heritage Commission and the other by The Nature Conservancy.

Arkansans have always known that our state is special. Passage of the conservation tax amendment proved that Arkansans are willing to make an investment to protect and preserve the very thing that makes "The Natural State" so special. Now, after nearly 10 years of investment, people from around the world are traveling to Arkansas to witness and enjoy the returns on that investment.

Mide Huckabee became Akansas' governor in 1996 and is currently the second-longest serving governor in the country. In a state where his party is the minority, Gov. Huckabee has proven he can work across party lines to get things done.

Last year, *Governing* magazine named Huckabee one of its Public Officials of the Year, and *Time* magazine named him one of the five best governors in America. In December 2005, Huckabee also received the AARP's Impact Award.

Most recently, Gov. Huckabee has gained national notoriety for his personal journey to health, losing 110 pounds in a little over a year and recently completing three marathons. His Healthy Arkansas initiative aimed at encouraging people to make healthy lifestyle choices, has become a model for the nation. Huckabee's fourth book, *Quit Digging Your Grave With A Knife And Fork*, has received favorable reviews across the country.

During his tenure, Gov. Huckabee created the ARKids First program, providing access to health care to tens of thousands of uninsured childen, ensured that 100 percent of the state's tobacco settlement funds are used for health purposes, implemented education reforms that have resulted in steady increases in student test scores, promoted technology to the point where Arkansas was recognized as having the best online services in the country, completed the largest road construction project in the state's history, rehabilitating the state's system of crumbling interstate highways, and pushed through the Arkansas Legislature the first major, broad-based tax cut in state history.

Huckabee became chairman of the National Governors Association in 2005 and is promoting his Healthy America Initiative across the country. Huckabee is also the Chairman of the Education Commission of the States where he is shining a light on the importance of the arts in education.

Gov. Huckabee loves to play bass guitar in his Rock-n-Roll band, Capitol Offense, which has opened for artists such as Willie Nelson and the Charlie Daniels Band, and has played the House of Blues in New Orleans, the Red Rocks Amphitheater in Denver, Colorado and for two presidential inauguration balls.

The governor and his wife, Janet, have three grown children - John Mark, David and Sarah, and a black Labrador named Jet.

21st Century Parks: A Legacy for the Future

By David A. Jones
Co-founder Humana, Inc.

There are few in Louisville unfamiliar with the local legacy of Frederick Law Olmsted. Their understanding of his crucial role in the development of American landscape architecture may be hazy, but the parks he designed — including Cherokee, Shawnee and Iroquois – have become inextricably interwoven with the day-to-day experiences of life in Louisville. The 21st Century Parks project, and the more extensive City of Parks initiative of which it forms a part, extends this grand tradition and is arguably the single most visionary parks plan anywhere in the U.S. since Olmsted was active in the late nineteenth century.

The story of 21st Century Parks has many beginnings, but one clear end: the creation of a twenty-seven-mile corridor of contiguous trail flowing from Shelbyville to Bardstown Roads along the area known as Floyds Fork, in eastern Jefferson County. Interspersed along this route will be an estimated three to six parks designed for either active recreational use – soccer fields and baseball diamonds, for example – or passive recreational activities – among them jogging, hiking, bicycling, and canoeing. This twenty-seven-mile stretch is but a portion of the larger goal of the City of Parks Initiative, which aims to form a one-hundred mile loop around all of Jefferson County, connecting Floyds Fork to Jefferson Memorial Forest, and from there to the Levee Trail and Riverview and Waterfront Park systems of urban Louisville. This vision of a green belt encircling Jefferson County did not emerge from the minds of its creators fully formed, but rather is the culmination of years of effort by many leaders and organizations, and the more recent partnership that emerged when common philosophies, goal and values intersected.

One beginning to this story can be found in the 1993 launch of Future Fund, Inc., a volunteer-led, non-profit land trust created to halt what then- Jefferson County Commissioner Steve Henry saw as the imminent destruction of the ecologically and culturally valuable open spaces in the county. Floyds Fork was identified as a crucial element, and the organization received funding from C. E. & S., our family's charitable foundation, and the Bingham family, among others, to begin land acquisition and conservation, focusing on preserving the open space, scenic vistas, and ecologically unique and valuable characteristics of the area. The representatives of Future Fund spent much of the decade building relationships with the residents in and around the corridor, and over time began to amass significant acreage.

Meanwhile, beginnings were occurring elsewhere in Louisville. In 1999, William Juckett, chief executive officer of the Louisville Olmsted Parks Conservancy, in concert with Bridget Sullivan, then director of Metro Parks, began making phone calls. They asked civic-minded leaders in the community to think about the role of the Olmsted parks in their lives and in the lives of their fellow citizens. I was the recipient of one such phone call setting up a meeting between Mr. Juckett, Ms. Sullivan, our son Dan, who had personal experience with park development, and me. Mr. Juckett asked us a key question: How can we do something that will have a one-hundred-year impact on Louisville and the surrounding area?

Dan took this question to heart and began formulating a plan he believed would build a century-plus legacy. In 2000, he teamed with Dan Church, who at the time was working for Bravura, a Louisville architectural and design firm founded in 1991 by architect Jim Walters. I had worked closely and successfully with this firm on a number of projects over the years. The "two Dans" decided to build upon the ideas of Cornerstone 2020, the wide-ranging land use plan unveiled that same year which aims to sustain and further develop the quality of life in Louisville. The plan recognized that doing so depends upon "continued success in the economic marketplace and an ongoing commitment to the conservation of environmental resources which define our heritage and enhance the livability of our community."

Dan Jones, Dan Church and Ms. Sullivan targeted the Floyds Fork area as the region in which an open space conservation project was feasible and would also result in a tangible enrichment of the area's quality of life. With funding from the C.E. & S. Foundation, they conducted between 2000 and 2002 an extensive evaluation of land availability in the Floyds Fork area and generated a detailed plan outlining the possibilities and opportunities of a parks project there. The culmination of this effort was the "Floyds Fork Parks and Open Space Inventory and Analysis Report: A Refinement of the Cornerstone 2020 Parks and Open Space Master Plan," completed in December of 2003.

At that moment two elements crossed paths. Future Fund had been quietly and gradually accruing land in the area, and by 2003 had amassed approximately 1,200 acres. Funding had been hard to come by, despite much volunteer time and effort. Late that year Steve Henry demonstrated to me that not only was a major parks project in Floyds Fork viable, but that Future Fund had made significant land acquisition progress during the previous decade. Dan Jones and Jeff Frank, vice president of Future Fund, visited the area together, and Dan's excitement mounted.

Upon their return, Dan Jones and I asked Future Fund to prepare a funding request detailing what the organization believed was necessary to continue its land acquisition process along the scope of the Refinement Plan. Future Fund did just that, generating a $15 million acquisition strategy. Tentative talk of "feasibility" was over.

The time had come to make the project public. In 2004, Dan formally approached Mary Lou Northern, secretary of Louisville Metro's Neighborhoods, Parks, and Cultural Affairs Cabinet and an avid parks user herself. Her enthusiasm was echoed by that of Mayor Jerry Abramson. Under the leadership of Director Mike Heitz and Senior Planner Lisa Hite, Metro Parks had been conducting an analysis of the existing park system and seeking to enlarge such areas as Riverview Park and Jefferson Memorial Forest. It became clear that the project had tremendous potential to become integrated and extend far beyond the twenty-seven-mile stretch of the Floyds Fork corridor. As Dan Jones commented, Louisville was on its way to becoming a "city of parks." The simple eloquence of the phrase captured the imagination of all involved, and the City of Parks Initiative began.

The Floyds Fork component itself was rapidly increasing, with the number of organizations, sponsors, and enthusiasts growing at a rapid rate. It soon became plain that an umbrella organization and identifiable leader was necessary to facilitate communication and coordination between the many people and organizations involved. Dan Jones, as chairman, created the non-profit 21st Century Parks to accomplish this purpose, and named me treasurer. The organization's broad-based board of directors includes representatives from Metro Parks, Future Fund, the Louisville Olmsted Parks Conservancy, the C.E. & S. Foundation, the Mayor's office, and Main Street Realty.

Dan Jones then pursued and completed a Master's Degree at the Yale University School of Forestry and Environmental Studies, in part to gain skills in urban park development and land conservation. A fund drive began in February 2005, and over $20 million has been raised. Although this is a significant sum of money, the scope of the project is so enormous it will require much more to reach completion.

In the summer of 2005 Mayor Jerry Abramson and I called upon Kentucky Senator Mitch McConnell for assistance – asking whether $10 million could be found to support 21st Century Parks and its visionary plan. Shortly thereafter Senator McConnell responded with staggering news: $38 million in federal funds had been earmarked for 21st Century Parks, and the Senator indicated he was thrilled to be involved in what both he and I saw as the most important Louisville civic project of our lifetimes. Since that moment, land acquisition has continued apace. Future Fund and 21st Century Parks currently have holdings approaching 3,400 acres, in addition to the over 1,300 acres under Metro Parks' ownership.

The next phase of the project involves design and implementation of the integrated park system. Fifteen firms were judged capable of this task and were invited to compete. Eight entered the competition. Four finalists were chosen, and after a thoughtful and rigorous process, the board came to an enthusiastic and unanimous conclusion. At the time of this publication the name of the firm chosen could not be released due to final negotiations. An initial goal is to complete land acquisition and the central element, the trail, by 2009, with additional hope for the partial completion of one or more of the three to six planned parks. Even as the initiative moves rapidly forward, Metro Parks continues to purchase and develop land along additional sections of the 100-mile "City of Parks" green belt.

When 21st Century Parks completes its mission, it will have fulfilled a variety of needs in the community, not least of which is land conservation. Floyds Fork is one of the last nearly pristine areas in the county, and is home to species of

flora and fauna found only in this small pocket of the world: gladecress, and the Indiana bat, to name but two. Floyds Fork has several untouched watersheds, not to mention a natural beauty and mystique, incredible vistas, and a serene, bucolic quality. Where there is settlement at all, the area has been and continues to be primarily composed of small working farms.

The population of Louisville has grown to six times what it was in the days of Olmsted, and the current direction of growth is most markedly eastward toward the Floyds Fork area. Within the Development Review Overlay (DRO), a government zoning area that includes much of Floyds Fork, four new subdivisions have been approved since the announcement of the City of Parks initiative. The DRO specifies that there can be no more than one housing unit per five acres of land, but developers have successfully requested zoning revisions allowing greater density. Census tract estimates of population and housing units for areas that include the DRO zone project growth of more than 100 percent by the year 2020. In the face of these developments, important natural areas will become increasingly compromised, and a growing segment of the population will lack access to green and open space.

In 1889, then Mayor Charles D. Jacob made what seemed to his contemporaries a foolish, unsound investment: he purchased a parcel of land then rather derisively called "Burnt Knob." Of what possible benefit could this land be? "Jacob's Folly" they called it, bemusedly shaking their heads. When Frederick Law Olmsted tried his hand at designing a park there, people thought, "Who will use it?"

Today this purchase of folly is an iconic feature of Louisville: Iroquois Park. While in the 1890s a trip to this green space meant a day in the country, Iroquois Park is today only one of many urban parks, surrounded by residences and firmly ensconced in the city of Louisville. While perhaps nowadays it seems less ridiculous to build a park far from urban centers, the philosophy behind 21st Century Parks is in no small way revolutionary, especially to the many individuals who consider development and environmental conservation perpetually and violently at odds with one another. Echoing the tremendous foresight of Mayor Jacobs, the 21st Century Parks project in Floyds Fork is preemptive and anticipatory conservation.

Yet perhaps the project could be more accurately called a philosophy of development consistent with preservation. According to Dan Church, collaborator in the Refinement Plan and current consultant to 21st Century Parks, and Dan Jones, its chairman and chief executive officer, "Development and parks can work together, and should be done together." The contentious relationship between development and conservation need not be seen as insurmountable. The Refinement Plan makes specific reference to the oncoming wave of development, stating, "Much of the open land remaining in Floyds Fork will be subject to development. This report recommends a park and open space system in the Floyds Fork area that anticipates, and possibly leads the development of lands for new residential uses." The concept map at the conclusion of the plan argues that "in this strategy, the appropriate balance between uses can be visualized. The compatibility and interrelationship between development and open space is demonstrated. Recognition of the trend for residential growth in the area, and the need to provide parkland for the residents, creates the need to plan for both private and public land uses in a comprehensive and harmonious manner."

There will undoubtedly be challenges even when the relationship between development and land conservation reaches agreement on boundaries. As landscape architects like to say, viewsheds – the equivalent of sight lines in layman's terms — extend far beyond lines of ownership, and especially in locations with the topography of Floyds Fork. Rolling hills create long viewsheds, exposing potential users to sights that compromise the natural vistas, even though they are far off in the distance. Preserving unmarked natural scenery cannot be done without the cooperation of developers, who are encouraged to account for the increased value of their developments due to their proximity to expansive reserves of open space.

Beyond conserving natural spaces and allowing public access to the education and knowledge that will help ensure their continued survival, 21st Century Parks seeks to preserve and enhance a defining cultural signature of life in Louisville: the use of parks. Many residents in Louisville grew up in parks, structuring their neighborhoods and identities around them. As they aged, these open spaces have become points of reference, part of the lexicon of life here. Through daily interactions, a high level of consciousness and perceived value has emerged regarding the green spaces of Louisville.

The ultimate goal and contribution of the 21st Century Parks project, and the City of Parks initiative as a whole, is to conserve the quality of life and the livability of Louisville for current residents – and for generations to come. Aesthetically pleasing cities attract new people, who renew the city's vigor and vitality both economically and socially.

Olmsted, fundamentally a social philosopher, felt that not only would more people come to cities with parks, they would be happier residents for them.

21st Century Parks hopes to welcome the people of Louisville, both current and future, into a more unified community forged through civic partnerships. The planned parks and trails are of universal availability; those of all walks of life can enjoy them. Bruce Maza, Executive Director of the C.E. & S. Foundation and 21st Century Parks board member, believes parks are about habits. The green ring being created will foster a "set of habits that disregards what have been barriers, bringing you across boundaries." These boundaries can be cultural, geographical, or generational. Parks have the potential to connect suburb and city, neighborhood and neighborhood, parents and children, all through the habits they allow and endorse.

Not only does the project seek to unite people on an individual level, it has evolved as an important example of what is possible when private, public, and volunteer-based organizations unite their energies to accomplish common goals; it is a classic case of "the sum is greater than the parts." As Jeff Frank sees it, "This emerged fairly organically, and is a rare opportunity to forge strategic partnerships. We're excited about it because now we all have the means to do what we struggled to do before." Though there may be disagreements over details, all involved are committed to the over-arching vision.

These parks can forge partnerships beyond the leadership level. "The idea is that when you get people out there, there will emerge a grassroots movement dedicated to taking care of the parks. The more shareholders there are in the parks, the more people there will be who have a vested interest in seeing them survive and prosper," says Kevin Beck of Main Street Realty, manager for the Floyds Fork portion of the project. Community involvement begins immediately, and is not limited to financial contributions. Public meeting sessions are planned where the Oversight Committee and design firm can hear and take into account the desires of area residents and the general public. Future Fund is unwavering in its commitment to purchasing land at a fair market value, from willing sellers, and to creating flexible contracts that allow sellers to define the particulars of the ownership transfer. The sellers also will have a voice in shaping the design of the future parks.

Bruce Maza describes 21st Century Parks as "holding up in the community a set of values, making the local culture aware of itself as inheritors [of the Olmsted legacy] and calling upon individuals to contribute for the future." 21st Century Parks seeks to capitalize on this growing awareness and to structure it into the constantly-evolving ethos of Metro Louisville. The future, as envisioned by Cornerstone 2020 and by all those involved in the City of Parks initiative, fosters the continued livability of Louisville and its environs by conserving important natural areas, promoting thoughtful development and building a more unified community whose unique ambience will be preserved and enhanced by our children and grandchildren. And that is a legacy of *more* than a century.

David A. Jones co-founded Humana, Inc. in 1961 and served as chief executive officer for 37 years and board chair for 44 years prior to retiring in 2005.

Mr. Jones is currently nonexecutive chairman of the board of Hospira, NYSE (HSP), a director of Glenview Trust Co. and a retired director of Abbott Laboratories and several other companies.

Mr. Jones was a member of The Business Roundtable and co-founder and past chair of the Healthcare Leadership Council, a group of about 50 CEOs of the nation's largest health care organizations.

Mr. Jones, a native of Louisville, Kentucky, and his wife Betty have five children and ten grandchildren. He earned a bachelor's degree from the University of Louisville in 1954, where he won the outstanding senior award. He also became a Certified Public Accountant that year. After three years of Navy service he entered Yale University, earning a law degree (JD) in 1960, while also serving on the economics faculty from 1958 to 1960. He received the Yale Medal in 1992, and in 2003 received The Order of Merit, Romania's highest civilian award. He holds honorary doctorates from The Chicago Medical School, the University of Louisville, Transylvania University and the Claremont Graduate School.

At the request of Mr. Drucker, Mr. Jones served as the founding chairman of the Peter F. Drucker Graduate Management Center's Board of Visitors, Claremont Graduate School, California.

For the Sake of Water:
Land Conservation and Watershed Protection

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I. Land Conservation

Land conservation serves many critical purposes in society. It provides open spaces, parks, and recreational spaces necessary for mental and physical health, as well as social interactions in an increasingly urbanized and human-built world. It protects agricultural lands and rural communities from encroachment by development. It promotes biodiversity by preserving plant species and habitat critical to wildlife species. It maintains ecological processes and functions, such as energy and nutrient flows, temperature and climate effects, renewal of soils, ecologically important disturbance regimes like wildfires and floods, and processing of the chemical, biological, and physical content of air, soils and waters. Undeveloped land is an essential component of the character and functions of places that people value. And undeveloped land is essential to the natural operations of ecosystems on which all life and all human society depend.

Few purposes of land conservation are as important, though, as protection of watershed health and integrity. All life depends on water for survival. Healthy, functioning watersheds are especially important both to nature and to humans. A "watershed," in its most general meaning, is a geographic area that drains to a common point.[1] As used in this article, "watershed" refers to any hydrologic unit of land and to land defined by its relationship to water flow, drainage, and surface waters. Thus, a watershed could be anything ranging from a large region draining to a common river system, like the Mississippi River system down to a small catchment of only 0.10 square miles, draining to a particular point on a small creek or stream.[2] Watersheds have "nested" hierarchies, meaning that a smaller unit drains to a larger unit, which drains to a still larger unit, and so forth.[3]

Watersheds serve critical ecosystem services. These services include filtration of pollutants, flood control, habitat for aquatic species, support of biodiversity, maintenance of biological and chemical content of surface waters (freshwater bodies, estuaries, and coastal waters) and groundwater, soil enrichment and deposition, shaping of landscapes, and provision of water necessary to maintain and support life.[4] Healthy watersheds are necessary to a healthy natural environment.[5]

Healthy watersheds are also critical to supporting human life and economic activity like fishing, recreational water sports, commercial shipping, and provision of public water supplies.[6] Research in the past few years on the economic value of ecosystem functions is revolutionizing the way that we understand the costs of land development and environmentally harmful activities.[7] Evidence from scientists and economists suggests the economic value of ecosystem services may vastly exceed the economic value of development or commercial use of natural resources.[8] We know that the degraded quality of surface and coastal waters adversely affects commercial and recreational fishing.[9] We also know that urban runoff is a major cause of beach closures nationwide, resulting in high costs to local economies.[10] We know that it is substantially more expensive to treat contaminated sources of drinking water supplies for public water systems than it is to purchase and set aside undeveloped land in runoff and recharge zones to prevent contamination to source waters.[11] Increasingly, the common wisdom of economic development policy and urban planning is that well-protected environmental amenities, including natural, vibrant aquatic resources, are key features to attracting the most desired businesses and economic growth, in large part due to the demand of business leaders and employees to live and work in ecologically sustainable communities.[12]

Few states can appreciate the benefits of clean water and healthy watersheds as much as Kentucky. Kentucky has more miles of running water than any other state, other than Alaska.[13] These water systems support a high array of ecological and biological diversity.[14]

In my hometown of Louisville, water is an important part of the community, as it is in many communities

throughout Kentucky. Louisville's identity – historically, psychologically, and geographically – is defined by its location on the majestic Ohio River. Waterfront Park, located where downtown Louisville meets the Ohio River, is "a vibrant green gathering space, with public access to the river . . . ," and a model for combining environmental, community, and economic development goals around a river focal point.[15] Ongoing and emerging activities to revitalize Louisville's downtown are taking advantage of the downtown's proximity to, and views of, the Ohio River, while drawing development away from more environmentally sensitive lands upstream and downstream. However, the Ohio River is only a part of the overall picture. Throughout the Louisville Metro region, there are many citizen groups and efforts focused on the protection and restoration of waterways that people love and value, such as Beargrass Creek, Floyd's Fork Creek, Goose Creek and Little Goose Creek, Harrods Creek, Wolf Pen Branch Creek, Mill Creek, and Fern Creek. When I moved to Louisville in 2005, I observed as a newcomer what many long-time residents already know: the area has three especially important and distinctive resources that it must capitalize upon, and cannot afford to waste or allow to decline. Those three distinctive resources are parks, neighborhoods, and watersheds. Failure to preserve and protect these resources would set in motion a chain of impacts that would include economic decline and an unraveling of the area's social fabric. Likewise, the area's progress and strength depend on maintaining and enhancing these critical resources that make Louisville distinct from other metropolitan areas. Just as Louisville distinguishes itself as "The City of Parks" and a place where well-preserved neighborhoods support community identity and pride, it should also distinguish itself as "The City of Sustainable Watersheds."

Land conservation is a vital component of any plan to protect and sustain watersheds.[16] Land use and land development can have severe adverse impacts on watersheds, unless planned and managed in environmentally sustainable ways. The Center for Watershed Protection recommends land conservation efforts that protect critical habitat for plants and wildlife, the aquatic corridor where land and water meet, the hydrologic reserve (undeveloped areas, such as forests and agricultural lands, that sustain the hydrologic responsiveness of the watershed), and the features of land that could contribute pollutants to natural waters.[17] However, land conservation does not mean merely setting aside lands for non-development. Land conservation increasingly focuses on low-impact development standards, changes to the ways that already developed land is used, restoration of degraded ecosystems, and even limits on how undeveloped land is used (e.g., environmentally and aquatically sustainable agricultural and recreational practices).

In this article, I will describe the impacts of land use on watershed sustainability and briefly discuss four types of land conservation techniques that can protect watersheds when all four types are used. These techniques are: 1) land use planning and regulation; 2) public land management; 3) private land conservation; and 4) changes in land-use behaviors and values. All four techniques are playing important roles in ongoing efforts to combat the threats and harms to the Anacostia River watershed in Washington, DC, and Maryland.

II. Land Use Impacts on Water Quality and Watersheds[18]

Land use patterns and practices have adverse impacts on water quality and watershed integrity in several different ways. One feature of land use having particularly significant aquatic impacts is impervious cover. Impervious cover is land cover that water cannot penetrate.[19] Impervious cover may be rocky or hard-packed natural surfaces, and even pervious urban soils may have low permeability because the soils are compacted, highly disturbed, and of poor quality.[20] However, most impervious cover in an urban watershed is human-made, such as: buildings and similar structures with roofs; paved or hard-cover recreational facilities like decks and patios, plazas, swimming pools, tennis and basketball courts, skate parks, and playgrounds; and transport systems like roads and streets, highways, freeways, driveways, parking lots, and sidewalks.[21] Waterways that are lined with concrete, clay, or impervious rock, such as many urban drainage channels, are also mostly impervious.[22]

Impervious cover prevents the natural filtration of precipitation and water flows that would occur if the water were to fall on or flow over permeable soils.[23] It also decreases natural evaporation and transpiration processes.[24] Impervious cover increases the quantity and velocity of water that runs off of developed lands during rainfalls and snowmelts, as well as the variety and quantity of pollutants being carried from developed lands into bodies of water. The quantity and velocity of stormwater runoff cause flooding, drainage problems, streambed sedimentation, the destruction of vegetation and habitat, reduction in large woody debris (an important structural component of many streams), increase in stream temperatures, and downstream channel or streambed erosion.[25] Runoff's transportation of sediment and pollutants into rivers, creeks, streams, lakes, and oceans and into the stormwater drainage systems that empty into these bodies of water has emerged as one of the most significant causes of water quality degradation in the

United States, now ranking well ahead of point source discharges from industry and sewer treatment facilities.[26]

Moreover, impervious cover affects the entire integrity and health of the watershed. Urban land development not only increases peak flows from a given storm event but also decreases the ecologically-important baseflow between storms and widens floodplains.[27] An area with more than ten percent impervious cover can suffer adverse impacts to stream health, and at 25 percent or more of a subwatershed devoted to impervious cover, the streams in the subwatershed are deemed "nonsupporting" for their likely irreversible harms to aquatic life.[28] Likewise, excess water running off of impervious cover into surface waters is not recharging groundwater and thus contributing to decreased groundwater levels.[29] A study by American Rivers, the Natural Resources Defense Council, and Smart Growth America showed that impervious cover from land development contributes to groundwater infiltration losses of between 6.2 billion and 132.8 billion gallons of water per day per major metropolitan area where land development is outpacing population growth.[30]

Nonetheless, the impact of any particular impervious cover on runoff depends on the location, the structure of impervious cover, the availability of adjacent pervious areas to absorb and filter runoff, and the extent to which the cover is connected to the storm drain network.[31] The amount of impervious cover having adverse runoff impacts tends to vary with different types of land use, with the least impacts resulting from low-density residential development and the greatest impacts resulting from commercial and industrial development.[32]

A second type of land use impact on water quality is the generation of pollutants that contaminate surface waters and groundwater. There is no question that land development and land use activities cause decreased water quality.[33] Land use decisions encompass not only choices among categories of uses (e.g., residential, commercial, industrial, agricultural) and types of design (e.g., height, density, setbacks, structure design and placement, materials, landscaping, parking), but also ongoing operational activities related to the use of the land, including the use of pollutants. In previous publications I have summarized the kind of impacts that land use has on water quality[34]:

> Degraded water quality from urban development is related in part to the amount of impervious cover that increases runoff into stormwater systems and into bodies of water, as discussed previously. However, water quality impacts from land development also result from the nature and concentration of pollutants used on urban, suburban, and exurban lands. Fertilizers, pesticides and herbicides, and pet waste come from lawns, golf courses, parks, and other humanly landscaped areas especially prevalent in sprawling communities. Freeways, streets, parking lots, car wash locations, automotive repair and storage facilities, and driveways are sources of automobile oil, coolants, other fluids, and contaminated car-washing runoff. Other pollution sources include commercial and household cleaning fluids; sediment and soil from construction, grading, landscaping, or other land alteration; decomposing litter; industrial and commercial chemicals and wastes; gas stations and their underground storage tanks; and landfills. These pollutants may run off ultimately into surface and coastal waters, facilitated by impervious cover. But they may also contaminate groundwater, degrade species' habitat, or overtax the natural filtration functions of soils, wetlands, and estuaries.
>
> Pollution from urban development harms more and more biological communities as this development sprawls across our landscapes. Organic wastes, such as pet wastes, deplete receiving waters' dissolved oxygen, which can contribute to fish kills. Nutrients in fertilizers that enter urban runoff enhance algae growth in surface and coastal waters, affecting not only the types of plants and animals living in the waters but also dissolved oxygen levels and the survival of aquatic species. Pesticides, chemicals used in or with vehicles, and some household products contain toxics that can biomagnify in concentration in the food chain (including in fish consumed by humans) and kill aquatic life. Soil erosion from construction and land development activity causes "sedimentation of streams, lands, and estuaries, which can smother bottom feeding or benthic organisms."[35]

We are continuing to discover ways that our land use activities harm water quality. For example, a recent study from Austin, Texas, demonstrates that parking lot sealcoat is a significant source of polycyclic aromatic hydrocarbons, which are carcinogenic contaminants appearing in high concentrations in urban waters where there has been rapid development.[36] Particles of parking lot sealcoat become scraped from freshly coated parking lots by the abrasion of tires and enter urban runoff.[37] In general, local land use regulatory requirements for parking result in overbuilt parking lots and structures, which in turn has adverse environmental impacts.[38]

Land use development also alters lands that are critical to watershed functioning, such as wetlands, hillsides and slopes, and riparian lands. In fact, "lands that serve important water system functions in their natural state, such as riverfront lands, coastal lands, wetlands, aquifer recharge areas, and hillside and mountain slopes, are targeted for development due to their landscape amenities that consumers of development want."[39] Development in floodplains is a major problem, contributing to flooding and related loss of life and property.[40] The loss of aquatic habitat to urban development also affects overall watershed health and functioning.[41]

The filling and development of wetlands, in particular, have substantially altered watershed hydrology. Wetlands serve critical flood control and pollution filtration functions, both absorbing floodwaters like a sponge and settling out and breaking down pollutants.[42] Wetlands have been lost to land development at alarming rates: over half of the wetlands in the coterminous United States have been lost since 1700, and the loss continues to exceed 50,000 acres per year, but is down from nearly 300,000 acres per year in the 1980s.[43] Experts believe that the flooding of New Orleans from Hurricane Katrina – including the accompanying loss of life and property – would have been considerably less if it were not for the combination of wetland-eliminating land development and control of water flows carrying wetland-creating sediment to Louisiana's coastal wetlands.[44]

The re-engineering of watershed hydrology also has resulted in degraded water quality and watershed functioning. Land use practices and land development patterns have directly or indirectly contributed to the demand for watershed re-engineering. The types of re-engineering activities that have altered the natural functioning of watersheds include channelizing and lining streambeds, building dams on rivers, creating artificial lakes, altering the natural course of waterways (including often making meandering streams straight), building ports and docks, discharging treated waters into water bodies, stabilizing streambeds with structures and riprap, extracting sand and gravel, removing woody debris, and clearing riparian vegetation.[45] The reasons for these projects have varied from energy generation to flood control to support of navigation to creation of new lands for development, but they have promoted economic development and human land use goals at the expense of watershed health and integrity. We are now learning that many of these re-engineering projects have had undesired consequences.[46] As a result, many communities are now engaged in restoration projects for water bodies, attempting to undo the harm of human alterations.[47]

Growth-generated consumption of water, with resulting reductions in instream flows of surface waters and overdrafts of groundwater, contribute to poor water quality.[48] From 1950 to 1990, the United States population grew 92 percent, while water use grew by 106 percent, with even higher increases in domestic use.[49] Land development has been characterized by especially "water-intensive land use practices, including large grassy lawns even in dry and hot climates, swimming pools, golf courses, water recreational parks, fountains, non-native landscaping, vehicle washing activities, and even lush lawns for commercial and industrial centers."[50]

Finally, sprawl exacerbates many types of land use impacts on watersheds. In comparison to more compact growth, sprawl increases the amount of impervious cover per person, requires more roads, highways, parking lots, and other vehicle-related development, and consumes more environmentally sensitive lands like wetlands, riparian lands, and hillside slopes.[51]

Land use degradation of water quality and watershed health causes tremendous ecological, ethical, social, and economic harms. Consider the following:

- "Between 1990 and 1998, floods killed more than 850 people in the United States and caused $89 billion in property damage. Much of this flooding occurred in places where weak zoning laws allowed development in floodplains."[52]
- Using land in fragmented, self-serving ways that have adverse environmental impacts harms the interconnected ecological community of nature, the social community of neighbors, and the ethical community of humans who are connected to nature.[53]
- "Stormwater runoff costs the commercial fish industry $17-31 million per year in environmental damage to adjoining communities."[54]
- In 1996, there were over 2,500 beach closings and advisories, and over 2,000 fish consumption advisories, almost all of which were due to water contamination?[55]
- "An estimated 70-90% of natural riparian vegetation, vital to maintaining the integrity of riverine-riparian ecosystems and biodiversity, has already been lost or is degraded due to human activities nationwide."[56]
- "The cumulative impacts of . . . many human impacts has been . . . ecosystem simplification: huge reductions in the life-supporting complexity and diversity of watershed ecosystems. As the complex-

ity and diversity are reduced, the system's ability to self-repair is eroded, leaving the system with reduced ability to perform ecological functions and with biodiversity depleted."[57]

III. Protecting Watersheds Through Land Conservation: Four Methods

Given the impact of land use and development on watersheds, the protection of watersheds requires land conservation efforts, broadly defined. These efforts include:

- Protection of environmentally sensitive lands from development, especially those lands that provide critical watershed services. The lands most needing conservation are: wetlands; lands immediately adjacent to rivers, creeks and streams, lakes, and coastlines; lands recharging underground aquifers; and hillside slopes. Obviously, the beds and banks of water bodies also should be protected from development.
- Land use planning and growth management that discourages urban sprawl and encourages better use of already developed areas.
- Development design and re-design that minimizes or reduces the amount of impervious cover and maximizes the use of watershed-servicing design features, like swales, retention/detention/infiltration basins, restored or created wetlands, native vegetation, and filters.
- Prevention or reduction of pollution-creating uses of land, including the use of fertilizers, pesticides and herbicides, parking lot sealcoat, automotive oils and chemicals, and other pollutants that run off into waters.
- Use of construction techniques that minimize soil disturbance and prevent soil and sediment from running off of construction sites.
- Conservation of undeveloped open spaces throughout any given watershed.
- Restoration of degraded water bodies, riparian areas, and aquatic habitat.
- Water-efficient design, operation, and maintenance of new development, and retrofitting of existing development with water conserving features.

Throughout the United States, both the public sector and the private sector are undertaking these efforts in many different ways. Land conservation and watershed protection are built on a diverse mix of actions and choices – what might be called a polycentric approach.[58] No single model or single approach is sufficient. Likewise, no single entity has authority over, control of, or responsibility for land conservation.

The reality of a polycentric approach to land conservation and watershed protection has both weaknesses and strengths. Land conservation efforts may overlap duplicatively at points and leave gaps at other points. An uncoordinated system can be fragmented. It depends on many different participants, some of whom will not have the interest, will, ability, or resources to conserve land.

However, the polycentric model of land conservation has several strengths that exceed the model's weaknesses. It promotes experimentation, innovation, and adaptation in land conservation, because many different people and entities are trying many different approaches. It accommodates a balance between private control of land and government control of land. This balance has foundations in the political and legal history of the U.S., as well as the realities of social expectations about private property rights and government land use policy. In addition, a mix of conservation efforts has the potential to build widespread participation in, and commitment to, land conservation. It is a bottom-up, instead of top-down, model. It recognizes the many different ways by which people develop psychological, social, and ethical commitments to special places. Finally, this system diversifies the risk of policy failure, whereas reliance on a single model or a single entity to conserve land poses risks of policy failure if something goes awry.

Four broad categories of land conservation efforts merit particular attention in understanding how land conservation protects watersheds. They are: 1) land use planning and regulation; 2) public land management; 3) private land conservation; and 4) changes in land-use behaviors and values. We can see examples of all four types of efforts in a comprehensive initiative to restore the health of the degraded Anacostia River watershed in the District of Columbia and Maryland. The Anacostia watershed restoration project illustrates how diverse land conservation activities advance watershed protection.[59]

Land development and pollution-generating land use activities have degraded

the Anacostia River watershed. The watershed drains 176 square miles of land through heavily urbanized and suburban areas in Washington, D.C. and Prince George's and Montgomery Counties in Maryland. Over 600,000 people, from a wide range of socio-economic backgrounds, live in the watershed. Undeveloped lands in the watershed face intense development pressures. The Anacostia River, estuary, and tributaries have poor water quality, resulting from urban runoff, development activity, and sewer system overflows. In 1994, American Rivers, a national environmental group, named the Anacostia River as the second most endangered river in the United States. Fish consumption advisories for the Anacostia River indicate health hazards from PCB and chlordane contamination of fish. Its watershed has extensive impervious cover (overall about one-third of the land in the watershed), contributing both pollution and stormwater flow that alter stream ecology and hydrology. One report describes the situation as follows:

It all ends up here: sand and salt and motor oil and antifreeze and fertilizer and animal waste and countless other substances. The residue washed by rains and melting snow from city streets, lawns, parking lots, and construction sites finds its way to the Anacostia through perhaps a dozen streams in the suburban counties north of Washington.

The Anacostia, long in the shadow of its majestic neighbor the Potomac – which it joins just south of the Jefferson Memorial in the middle of the District of Columbia – suffers the plight of many urban rivers. Massive development along its banks has ruined its recreational value, and inadequate public access has bred ignorance of its trouble, say government officials and environmentalists.[60]

Although the majority of developed lands are residential, intensive commercial and industrial land uses exist along the river and some of it tributaries. Moreover, the watershed has lost over 90 percent of its tidal wetlands, almost 75 percent of its freshwater wetlands, over 70 percent of its original forests, and much of its natural riparian vegetation. Forested land, which serves critical watershed functions, composes less than 25 percent of the watershed, of which less than 15 percent is large enough to support the necessary biological diversity for this type of watershed.

The need for substantial changes in how land is used in the Anacostia River watershed reminds us that land conservation is about far more than just open space protection or preventing development in scenic areas. Land conservation includes not only prohibitions on development of sensitive lands, but also modifications to existing land uses and human behaviors, requirements that development and ongoing land use activities adhere to environmentally sustainable best management practices, and restoration of degraded lands, waters, habitat, and other ecosystem features.

Land Use Planning and Regulation

Land conservation necessarily involves local land use regulation. Government agencies, primarily local governments like cities and counties, regulate the use of privately owned land through three core elements of the land use regulatory system: 1) comprehensive plans; 2) zoning codes and similar land use regulations; and 3) discretionary decisions about the grant or denial of development and land use permits, including the imposition of development and operational conditions in the permits.[61]

Comprehensive land use plans define the general goals and policies directing the locations, types, and timing of a locality's future growth. Although zoning codes and permit decisions must be legally consistent with a comprehensive plan in many states, plans may be quite general, amorphously defined, or subject to frequent change. In these respects, plans operate more like guidelines that influence specific regulatory decisions but do not strictly bind decision makers. Nonetheless, the adoption of pervasive conservation policies in local land use plans serves two important purposes. First, it provides prospective, proactive direction to decision makers about how to require ecologically sustainable land use patterns and practices for specific lands and specific uses. Second, it creates a mechanism for developing a comprehensive set of objectives and action items for restoring, conserving, and protecting watersheds within a local jurisdiction.

Zoning, subdivision regulations, and similar ordinances and statutes regulate land use by defining the permissible, impermissible, and conditionally permissible uses and structures (including height, bulk, parking, signage, architectural design, landscaping, and other features) for specific parcels of land or geographic areas of the locality. Local land use ordinances also typically mandate that landowners and developers obtain certain permits for various kinds of land use activities, and define the criteria for local decision makers to grant conditional use permits, subdivision approvals, site design approvals, variances, building permits, and the like. Conservation measures in land use regulations include: a) restriction of permissible land uses for environmentally sensitive lands to minimal activities, such as agriculture, open space and recreation, environmental conservation, or very low-density residential use; b) prohibition of development in certain especially sensitive areas, such as within a

certain distance from surface waters (riparian, shoreland, and coastal buffers) or on steep hillsides and slopes; c) the "overlay" of additional land use restrictions beyond the underlying applicable restrictions in areas that have particular impact on watersheds, such as aquifer recharge zones or areas of substantial runoff into surface waters (e.g., riparian areas, upland headwaters); d) the prohibition of certain pollution-generating land uses or the imposition of watershed-protecting performance standards for land uses and construction activities; and e) inclusion of a greater number of land uses requiring conditional use permits, which would allow for project-specific and site-specific conditions to protect the watershed.

Despite the importance of plans and zoning regulations, most major land use decisions in the United States involve some type of discretionary permitting. Decision makers grant (often with conditions) or deny permits in accordance with comprehensive plans, zoning codes, land use regulatory statutes, and certain federal and state constitutional parameters. However, the legal parameters are quite wide and the decision makers' discretion is quite broad. The actual government decisions about what kinds of land uses will be allowed and under what conditions they will be allowed result from a type of public negotiation among local officials and planners, developers and landowners, and local residents and environmentalists. Negotiated land use approvals dominate our land use regulatory system, because they tailor regulatory decisions to the particular site, surrounding location, and project in question. Given the context-specific nature of land use decisions, any attempt to constrain local officials' discretion with tightly defined "rules" in zoning codes and similar codified regulations would likely result in both under-regulation and over-regulation. The critical concern should be over the facts and factors that decision makers consider when evaluating permit applications, particularly whether decision makers are considering – and making decisions based on – a proposed project's impacts on watershed health and integrity.

Efforts to improve and protect the Anacostia River watershed illustrate the roles of each of these types of land use controls. Montgomery County, Maryland, has engaged in a series of planning efforts to incorporate watershed protection and land conservation into land use policies. In 1981, it adopted the Eastern Montgomery County Master Plan that placed a special emphasis on watershed protection. The plan provided for headwater protections, down-zoning of lands to prevent development along waters where brown trout spawn, limits on impervious cover, and acquisition of stream valley lands. Subsequent multi-jurisdictional agreements among Maryland, the District of Columbia, Montgomery County, and Prince George's County, also provided plans for watershed restoration and protection. In the mid-1990s, the Montgomery County Council and Planning Board adopted a comprehensive plan to protect the Paint Branch watershed, a subwatershed of the Anacostia River watershed It also amended its park acquisition plans to identify new riparian and sensitive headwater lands for government acquisition for parks and open space.

The plans were implemented through several zoning provisions, enacted in the County Code. One such provision, adopted in 1995, designated the upper Paint Branch watershed as a Special Protection Area. The County Code limits impervious surface area within the special protection area to 10 percent. Therefore, developers of new projects must: a) limit the impervious cover of the project to 10 percent or less of the site, including through redesign of project proposals that exceed the limit; b) use off-site mitigation, such as the purchase and dedication of off-site land as a "pervious reserve" to offset the project's on-site impervious cover that exceeds 10 percent; or c) obtain a waiver from the Montgomery County Planning Board. The Code's provisions applicable to the Upper Paint Branch Special Protection Area also designate areas around streams, wetlands, seeps, springs, and floodplains as conservation area buffers in which development is prohibited, unless a landowner obtains a waiver from the Planning Board for an unavoidable buffer encroachment. Furthermore, all public and private projects in the Special Protection Area must submit a water quality plan, containing evidence that the project will comply with the impervious cover and buffer restrictions, and has adopted adequate measures to manage and control storm water runoff, sediment loads, and erosion.

Another watershed-protection zoning provision created an Environmental Overlay Zone in 1997. The Zone applies to lands within the headwaters of the upper Paint Branch watershed. It restricts the amount of impervious cover on these lands and provides strict regulations of certain land uses that could have adverse impacts on the watershed, including automobile filling stations, automobile fluid maintenance stations, pipelines (whether above ground or underground), airstrips in common open space, helistops, landscape contractor, retail nursery or garden center, wholesale nursery or greenhouse, golf course and country clubs, golf driving range, and riding stables.

Finally, development permits throughout the Anacostia River watershed now commonly contain conditions that require minimization and mitigation of stormwater runoff,

sediment loading, and erosion through the use of various best management practices. All development proposals are evaluated for compliance with the master plan, the Planning Board's Environmental Guidelines, and the Montgomery County Forest Conservation Law. Limits on impervious cover, clustering of structures, dedication of buffers and open space, and development of a site- or project-specific water quality plan are some of the conditions that may result from the permitting process. Through land use planning, regulation, and permit decisions, land use practices on privately owned lands are increasingly adapting to meet conservation and watershed protection goals.

Public Land Management

Another essential component of land conservation for watershed protection is the government's management of public lands for watershed health and integrity. In the United States, federal, state, and local governments own about one-third of all land.[62] In 2000, eight federal agencies announced a new policy for "a watershed approach to federal land and resource management," applicable to the more than 800 millions acres of federal lands managed by these agencies as national parks, national wildlife refuges, federal rangelands, national forests, and the like.[63] To protect water quality and aquatic ecosystems on federal public lands, the federal agencies committed to guiding principles and programmatic objectives for federal land management activities that focus on planning on a watershed scale, watershed restoration and adaptive management techniques, and science-based management of public lands for the quality of waters, aquatic habitat, and watershed conditions.[64]

Likewise, the nation has seen an increase in local government acquisition and management of lands providing important watershed services.[65] Moreover, federal, state, and local design and operation of public infrastructure – such as roads and sidewalks, public transportation facilities, water distribution systems, stormwater systems, sewage systems, parks, schools, libraries, government buildings and community centers, dams, flood control projects, harbors and waterfronts, public housing, stadiums and other arenas, and other such facilities that are created and maintained at least in part by government agencies – have impacts on watersheds. Increasingly, public infrastructure projects are being designed and operated to minimize impacts on the natural environment or to restore natural ecosystem features and functions. For example, government watershed restoration projects serve the related goals of land conservation and watershed protection.

Public lands play an important role in land and watershed conservation in the Anacostia River watershed. State and local governments own about 85 percent of land within stream valley corridors, and the federal government owns about 17 percent of the entire land throughout the watershed. Changes in public land management, funded by millions of public dollars, have done much to reduce the degradation of the Anacostia River watershed. First, government agencies have identified and ceased activities that harm the Anacostia River and its tributaries, although often with pressure from environmental groups. For example, environmentalists pushed to stop oil leeching from a Metro bus depot to the Hickey Run, a tributary of the Anacostia River, and to stop the dumping of animal waste from the national Zoo on Hickey Run's banks as it flows through the National Arboretum. Likewise, the District of Columbia modified its sewage and waste-water handling procedures to minimize discharges into the Anacostia River. Aging sewer facilities were rehabilitated, and swirl concentrators were installed to treat combined sewer overflows.

Second, government agencies have engaged in many restoration projects, often with several different agencies partnering on specific projects. These projects include assessing watershed conditions and needs, removing trash from waterways, constructing storm ponds, shoring up eroded stream banks, building a 32-acre marsh from a barren mud flat, planting trees and other vegetation in riparian areas, replacing artificial channels with natural streambed features, creation of facilities that remove trash and oil, rerouting of storm water flows, and restoration of degraded wetlands. These restoration projects are producing results. For example, a 10-year, $2.2 million effort to restore Sligo Creek has led to the return of 10 native fish species and improvements in water quality indicators.

Third, government agencies have acquired environmentally sensitive lands that support and sustain watershed functions as parks and open space preserves. For example, since January 1996, state and local governments in Maryland's portion of the Anacostia River watershed have acquired over 372 acres of new parkland for $14.5 million. Parks and open space preserves offer higher levels of protection to streams, creeks, and rivers than do developed lands, even when appropriately conditioned with best management practices, but acquisition of parklands is expensive. Therefore, governments within the Anacostia River watershed have selected primarily the lands they believe to be most critical to watershed protection. For example, Montgomery County identified the Good Hope and Gum Springs areas of the Upper Paint Branch watershed as targets for parkland acqui-

sition, because they are home to spawning and nursery tributaries for the wild brown trout.

Private Land Conservation

A particularly important increase in land conservation in recent years has occurred in the area of private land conservation, mostly through the use of conservation easements and land trusts. Conservation on private property is critical for several reasons.[66] Most of the government owned lands are in the western United States, thus making private land conservation especially necessary in the eastern United States. Watersheds and other integrated ecosystems are composed of a patchwork of public and private lands; conservation initiatives on public lands will not be effective in protecting watersheds, habitat, and other ecological features without conservation efforts by private landowners. The scope and extent of lands that are at risk of environmental degradation are too great for government purchase, given limited budgets. Moreover, even if government agencies could purchase large amounts of private lands for conservation purposes, the widespread government ownership of land would conflict with private property norms in the U.S. culture and would diminish opportunities for people to develop good-stewardship values and behaviors as property owners.

Three major types of private conservation play the most important roles: 1) a private landowner's grant of a conservation easement to a nonprofit land trust (or similar environmental organization) or to a government agency, while the private landowner retains ownership of the land subject to the conservation easement; 2) a private landowner's grant of title to land to a nonprofit land trust or similar environmental organization; and 3) a landowner's development or use of the land with low-impact or environmentally sustainable methods.

The term "land trust"[67] typically refers to a non-profit, tax-exempt organization dedicated to conserving land, usually by purchasing or receiving gifts of property interests in land, primarily either fees (i.e., a legal term in property law meaning title ownership of land) or conservation easements. However, the reader should be aware that some state government entities that hold conservation lands or easements are also called land trusts. There are over 1500 local and regional non-profit land trusts in the United States. At the national level, the Nature Conservancy is perhaps the best known environmental conservation land trust. From 1998 to 2003, local and regional land trusts increased the amount of total acres they conserve from 4.7 million to 9.4 million. Over half of all land trusts report that they protect wetlands and river corridors, while over forty percent of all land trusts report that they protect watersheds.

Conservation easements[68] have become the preferred method of private land conservation in the U.S., making up over 5 million of the 9.4 million in private conservation lands held by local and regional land trusts in the form of nearly 18,000 easements. From 1990 to 2000, the amount of land subject to conservation easements increased by 475 percent, whereas lands owned in fee by land trusts increased by 186 percent.

A conservation easement is a non-possessory property interest in land, granted (by sale or by gift) from the landowner to an environmental non-profit organization, usually a land trust, or to a government agency. The easement restricts the development or use of the land subject to the easement, according to the express terms of the easement. The property owner retains ownership of the land and can use it in any way not prohibited by the terms of the easement. The easement "runs with" the land, meaning that it binds subsequent grantees of the property owner (usually provided that the easement has been recorded in the deed records so that subsequent grantees are on notice of it). The conservation easement is classified as a negative easement in gross – negative because it restricts or prohibits uses of the burdened land, and in gross because the benefit of the easement, which is the right to enforce its restrictions against any owner or interest-holder in the burdened land, is held by a non-neighbor. Historically, the common law did not recognize negative easements in gross, but statutes in 49 states now expressly authorize conservation easements. A number of states have modeled their conservation easement statutes after the Uniform Conservation Easement Act, a model statute.

From a legal perspective, conservation easements present issues concerning interpretation of the easement's terms in light of new facts and circumstances, some landowners' violations of the terms of the easement (e.g., developing the land in ways that are prohibited by the easement and contrary to its purposes), equitable doctrines and statutory provisions that allow for the termination or modification of conservation easement under certain circumstances, common-law restrictions on perpetual interests in land or negative easements in gross, and both practical and legal constraints on enforcement of the easement by its grantee or third-party beneficiaries of the easement (e.g., the public). From a policy perspective, critics of conservation easements raise concerns about inflexibility in the terms of many easements, the wisdom of binding the choices of future genera-

tions, the overvaluation of conservation through tax subsidies (advocates of private markets) or the ethically questionable commodification of conservation (critics of private markets), failure to include non-land interests such as water supplies or habitat in conservation-based property rights, and whether such a diffuse and fragmented set of conservation interests in land can be effective in protecting ecosystems especially in comparison to an alternative of systematic, centralized planning and coordination of conservation decisions.

Nonetheless, conservation easements are popular and valuable tools for constraining development and land use practices that harm the natural environment and the local community. One reason for their popularity is their preferential tax treatment. Donors of qualified conservation easements to qualified entities may receive deductions for income taxes, estate taxes, and property taxes that would otherwise be owed on privately owned lands. Another reason for their popularity is the psychological and cultural appeal of private landowners voluntarily agreeing to restrict their land use rights in the interests of environmental conservation, without government ownership or control of the land. Indeed, land trusts can use conservation easements on large amounts of acres to create preserves and buffers that would not be achievable through reliance solely on government owned lands.

The use of conservation easements illustrates a primary theme of this article: effective land conservation restricts activities that harm watersheds and channels uses of land into aquatically sustainable land use practices. The terms of the conservation easements – what is allowed and what is prohibited – can be tailored to the specific characteristics of the land in question and its surrounding watershed, as well as to the specific conservation goals of the parties. This is particularly true for conservation easements that serve watershed protection goals, as two environmental policy experts describe:

A number of land trusts and other conservation organizations play an increasingly important role in drinking water source protection. . . . [However,] [l]and trusts routinely use conservation easements to address water quality issues oriented less toward drinking water and more toward water quality or stream health in general. Provisions vary widely, but they are generally targeted at limiting non-point source pollution by restricting landowner activities. The conservation easements target impervious surfaces and urban runoff. But conservation easements may also target non-point source pollution for land use on undeveloped or partially developed lands. Here, conservation easements including an assortment of provisions, for example: establishing stream buffers and limiting certain agricultural or forest practices [e.g., restricting uses of pesticides and fertilizers, methods of timbering, or methods of farming that cause soil erosion], placing limitations on septic system location or manure handling, specifying how storm water is to be managed, and preventing alteration of stream banks, watercourses, or water bodies through drainage, damming, and the building of levees.[69]

In the Anacostia River watershed, conservation easements protect watershed-serving features of land that remains in private ownership. As of 2003, there were 17,581 acres of open space or farmland subject to conservation easements in Montgomery County (including areas that are not within the Anacostia River watershed). The easements on some of these lands protect farmland for agricultural use, which prevents the development of the land with impervious cover but may not prevent non-point source pollution and runoff from pesticides and herbicides, fertilizers, and soil erosion. However, two categories of conservation easements – the Rural Legacy Program and Legacy Open Space – protect environmentally sensitive areas and cover almost 6,000 acres. More importantly, two additional conservation easement programs that may not be included in the above-reported figures provide watershed protection. The first involves forest conservation easements that protect existing or newly planted forests from any disturbance of the canopy or understory except to control non-native species of plants or trees (i.e., invasive species). Forests provide many key watershed services. The second involves developers and landowners dedicating streamside land or similar watershed-sensitive lands in fee simple or by conservation easements, often in connection with the development of adjoining or related land. The latter example illustrates how the tools of land use regulation, public land management, and private land conservation are used together to create an array of conservation interests in land that prevent further degradation of the watershed.

Changes in Land-Use Behaviors and Values

Finally, legal tools, by themselves, will not achieve enough land conservation or watershed protection without widespread changes in human behaviors and values about how we use land. One of the nation's leading experts on the relationship between property law and environmental ethics, Professor Eric Freyfogle of the University of Illinois College of Law, urges the widespread adoption of a land ethic that promotes the health of the land system, a system in which nature's parts and processes, as well as human

communities, are interconnected.[70] Freyfogle has no illusions, though, about the challenges of developing environmental stewardship norms and ecologically sustainable behaviors in the vast majority of us who have become all too accustomed to consumptive, self-gratifying, and environmentally insensitive land use practices. He describes the painstaking work of Jim McMahon with the Nature Conservancy in Illinois to promote community-based conservation in the degraded Mackinaw River watershed.[71] McMahon worked with small, but eventually increasing, groups of farmers to help them to understand and appreciate the Mackinaw River and its watershed, as well as to grasp the adverse impacts of their land use practices on the watershed's health. Local values and behaviors changed as people became engaged, individually and as a community, in protecting a place that they came to see as special and having inherent value.

Likewise, the Mono Lake Committee in California prevented the destruction of the distinctive and environmentally important Mono Lake from Los Angeles' use of the Lake's feeder waters, by educating and engaging the public.[72] As the public – including inner city school children and their families in Los Angeles – developed psychological and social connections to Mono Lake, came to understand the ecology of the Lake and its pending destruction, and participated in political deliberations over the Lake and water conservation, both public values and water consumption behaviors changed. With growing political pressures on the Los Angeles Department of Water and Power to reduce its diversions and use of Mono Lake feeder waters, Los Angeles eventually agreed to an unprecedented reduction of its water rights in Mono Lake, accompanied by extensive reclamation and conservation efforts.

Public outreach has often been identified as the most critical task for public and private entities cooperating to protect the Anacostia River watershed. The various planning, regulatory, land management, restoration, and private conservation efforts to-date will not be enough to sustain the watershed without public awareness of the watershed, commitment to its vitality, and cooperation in preventing its degradation. Some efforts have had a narrow focus, such as an Environmental Education Compliance of Auto Repair Shops Program, which provided education and follow-up to reduce the amount of oil and grease in the Hickey Run from automotive repair shops.

A somewhat broader, yet focused, project was the Small Habitat Improvement Program (SHIP), which was a pilot project started in 1990 to involve local residents in small-scale watershed restoration efforts. A project of numerous local government agencies, federal and state agencies, environmental groups, community groups, and schools, SHIP involved school children and local residents in a low-income, environmentally degraded subwatershed, Watts Branch, in cleaning up streams and neighborhood streets, planting approximately 1,500 native trees, establishing nearly two linear miles of riparian buffer, stenciling over 1,000 storm drains with the words "Don't Dump – Anacostia River Drainage," and educating both school children and area residents about the watershed and the importance of trees to watershed health. The focus of SHIP's projects was volunteer participation in the restoration efforts, engaging watershed residents in solving their own environmental problems and in developing experiential connections to the watershed.

However, SHIP was only one of many efforts to increase people's understanding of, and commitment to protecting, the Anacostia River and its watershed. The Anacostia Watershed Society, a local non-profit, reports that over 30,000 volunteers, many of them urban children and youth, have participated in the following activities:

- Photo essays by young people that encourage stewardship of, and connection to, the Anacostia River watershed;
- A Watershed Explorers Program, which is a comprehensive program of outdoor and indoor education that involves students in restoration activities and learning about the Anacostia River;
- A River Habitat Program, which is an elementary school science program that builds personal interactions between students and the river ecosystem, while teaching them about the science of the ecosystem;
- Teacher training programs;
- Public education programs;
- Regularly published newsletters;
- Fish propagation;
- Planting 11,300 trees;
- Raising and planting native wetland plants;

- Storm drain stenciling;
- River cleanups, including removal of trash and debris and removal of non-native plants;
- Streambank stabilization projects;
- River tours enjoyed by over 8,200 people; and
- Lessons in canoeing and kayaking.

These many activities are not merely educational; they engage the local residents in experiencing, understanding, and developing relationships with the watershed in which they live, work, study, and play. Anthropological research among the local residents of the Anacostia River watershed shows that some residents have negative attitudes towards the river because of past negative experiences with the river and the surrounding social and physical environments of their neighborhoods. Residents with positive attitudes towards the river have had positive experiences with it. The above-described public outreach efforts are giving residents more positive experiences with, and a greater stake in, the river. As people come to appreciate and value the watershed, their ethical choices and behaviors will change towards better stewardship of the watershed and its lands. The desired result is that conservation will be a daily way of life for everyone. Legal tools will work more effectively if they are a part of a broader public commitment to being good members of a watershed community.

IV. Conclusion

Land conservation is a simple term for a multi-faceted and multi-directed set of decisions about how individuals and communities will use land. The goals of land conservation cannot be limited to non-use or non-development of special lands. Land conservation also includes ways of using and developing land that promote and achieve ecological sustainability, including making changes to existing land use practices. This goal of ecologically sustainable land use practices is especially essential to protecting watersheds from degradation by unsustainable land use practices. Likewise, the responsibility for conserving land to protect watersheds must span the range of public and private sectors, and the methods of conservation must encompass both decisions for the future and actions for today. A polycentric model of watershed-regarding land conservation makes good use of the diverse legal tools and methods for achieving effective watershed protections and increasing society-wide commitments to sustainable land use. How we use land and water says much about who we are. In many different ways, we need to act responsibly "for the sake of water."

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One NC Naturally
Innovative, Coordinated Conservation for North Carolina's Present and Future

Richard Rodgers, Director
Office of Conservation and Community Affairs
North Carolina Department of Environmental and Natural Resources

Each day, North Carolina loses an average of 383 acres of farmland and forest to development. Between 1990 and 2002, more than 1 million acres of the state's forests succumbed to the unrelenting march of human development. The land consumed by development increased twice as fast as the 42 percent population growth rate. With the population of North Carolina expected to increase by 50 percent over the next 25 years, the challenge of planning sustainable growth is formidable and the outlook for natural systems grim.

However, the state's Department of Environment and Natural Resources is implementing strategies to promote conservation in the context of rapid development through a comprehensive, visionary initiative called One North Carolina *Naturally*. Rather than attempt to protect natural resources by heavy reliance on top-down regulation, One North Carolina *Naturally* emphasizes voluntary conservation programs that start with planning at the local level. It represents an ongoing effort to focus, coordinate, and fund land and water conservation throughout the state's 100 counties in cooperation with local government agencies, private organizations, landowners, and the public. Protecting our state's open space areas in this coordinated manner facilitates the more effective use of limited funding sources.

One NC *Naturally* organizes its efforts among three broad, multifaceted conservation programs that encompass natural areas, working lands, and coastal habitats.

Forever Natural – Conserving Our Natural Areas for Future Generations

North Carolina spans one of the most diverse collections of ecosystems in the nation, from the boreal forests atop the eastern United States' highest peak, to coastal peat bogs hosting the world's only indigenous home for the Venus fly trap. Permanent protection of such critical biomes contributes to the integrity of processes that support water and air quality, plant and wildlife populations, and other natural resources.

One significant step in the effort to conserve natural areas is the Million Acre Initiative (MAI). In 2000, when the state legislature enacted the MAI, about 2.8 million acres of natural areas were already protected. That represented nearly 9 percent of the state's land area. The MAI established a goal of preserving an additional one million acres by 2009. So far, 400,000 acres have been contributed toward that goal through the federal, state and local governments, and private, nonprofit groups. The North Carolina Natural Heritage Program has identified the highest priority conservation sites, using aquatic and terrestrial biodiversity as guiding criteria.

The primary obstacle to meeting the MAI goal is the availability of public and private funding for new protection

projects. In an effort to overcome that barrier, during its 2005 session the N.C. General Assembly appropriated money toward conservation through three state trust funds.

- Clean Water Management Trust Fund awarded 159 water quality improvement grants totaling $112 million.
- Natural Heritage Trust Fund awarded 28 grants totaling $23 million, to protect 19,648 acres.
- Parks and Recreation Trust Fund provided $14 million for land acquisition, adding 9,423 acres to state parks and natural areas.

Working Lands – Stewardship of Working Farms and Forests

Another focus of One NC *Naturally* is the conservation of working farms and forests. Because agriculture and forestry contribute more than $62 billion each year to the state's economy, sustainable stewardship of agricultural lands is essential in order to maintain their vitality in the world marketplace. Of equal importance, however, is the greater burden working lands assume in managing environmental quality statewide as development steadily chips away at the bulk of biological systems that would otherwise mitigate the detrimental impacts of human activity. This complex dynamic is further complicated by the fact that population growth, and the appetite for land it typically stirs, often tip the economic incentives for land use toward its sale for development rather than its continued use in farming or forestry.

When landowners support land and water conservation through sound management practices, their working landscapes purify water, cleanse the air, and enhance wildlife habitats, consequently producing benefits passed on to all the state's citizens. One NC *Naturally* seeks to integrate the delivery of financial resources and technical assistance to private landowners and public land managers for the sustainable use of their lands. By means of an internet presence, One NC *Naturally* offers a "conservation toolkit" with information and contacts for dozens of state and federal conservation and preservation programs, as well as private land trusts and nonprofit organizations.

A written Working Lands Conservation Plan, currently undergoing revision, assists several instrumental conservation organizations in their decision-making. Among these are the N.C. Association of Soil & Water Conservation Districts (the non-profit representative of the state's 96 conservation districts), the N.C. Division of Soil & Water Conservation, the Division of Forest Resources, and the state legislature. The Conservation Plan serves as an aligning tool for statewide conservation implementation and funding.

Working on the Water – Protecting and Restoring Coastal Habitats

Much of One NC *Naturally*'s efforts in coastal zones revolves around the Coastal Habitat Protection Plan, a landmark conservation package designed to protect and restore critical fisheries habitat. The 2005 adoption of CHPP by three oversight groups—Marine Fisheries, Coastal Resources, and Environmental Management commissions—was a significant leadership coup. CHPP's implementation plans and specific action items facilitate coordination among the commissions and DENR, as well as laying the groundwork for developing new solutions to coastal issues through innovation and partnerships. Enhancing oyster habitat restoration and reducing pollution caused by stormwater runoff are among the principal goals of the plan, which include:

- Improving the effectiveness of existing rules and programs protecting coastal fish habitats
- Identifying, designating and protecting strategic habitat areas
- Enhancing and protecting habitats from physical impacts
- Enhancing and protecting water quality

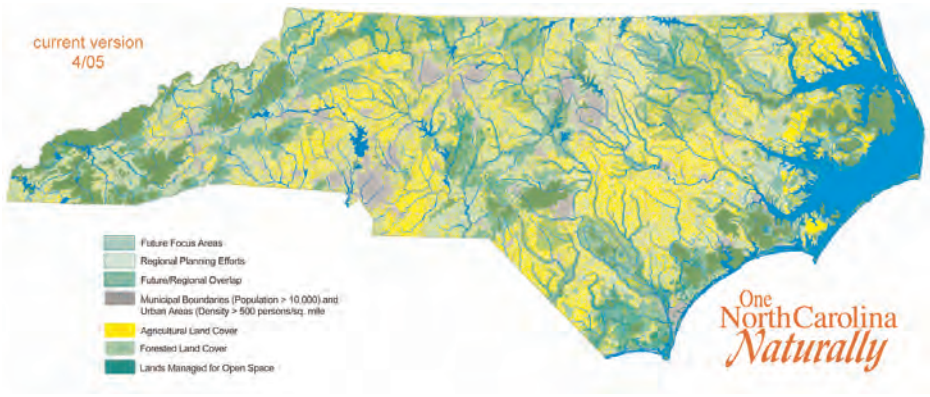
Outreach and Education effort

One NC *Naturally* has launched an outreach and education program to reach a wide spectrum of audiences, includ-

ing landowners, government officials, conservation groups, developers, and businesses. The objective of outreach is to generate interest in and appreciation for the urgent need for conservation. Communication is accomplished by an email list serve, a newsletter, and through the office's web site, www.oneNCnaturally.org. There, visitors can access a conservation toolkit, an interactive map viewer, and updates on regional open space planning.

Regional Open Space Planning

One NC *Naturally* involves a regional planning process that provides a forum for decision-making about conservation in local communities. By first working with local and regional groups to address their specific needs, the state can move in a general direction that does not conflict with the goals of any particular region. In 2004 and 2005, the leading regional organizations set about a conservation planning process that resulted in identification of focus areas, plans, and potential projects. Local and regional open space planning efforts contribute invaluable information to the statewide conservation plan.



Coordinated focused planning map

As a part of the One NC *Naturally* planning process, a consolidated state map was developed that features:

- Areas where population pressure impacts open space and natural resources
- Public and private lands managed as open space
- Future focus areas and high priority conservation sites for aquatic and terrestrial biodiversity
- Regional plans developed across the state

The web-based Conservation Lands Map Viewer supports decision-making surrounding conservation and development. Planners and citizens can easily locate key information vital to successful planning efforts. By way of GIS data layers, the maps graphically depict how individual green spaces and working landscapes fit and function together into a network of essential green infrastructure. Understanding the interrelationships among those areas helps consolidate protection efforts and maximize their cost effectiveness.

Coordinated conservation planning integrates plans from multiple sources, which in turn facilitates prioritization of conservation needs. North Carolina's conservation priorities include watershed maintenance, preservation of productive farmland, management of natural areas, and wildlife habitat enhancement for future generations.

As tens of thousands of acres each year are permanently withdrawn from the state's inventory of fully functioning ecological systems for the sake of development, North Carolina citizens are becoming increasingly aware of the importance of setting aside some portion of our critical and unique lands. This system of natural networks not only sustains our natural heritage, but also provides essential ecosystem services—fresh air, clean water, wholesome food, and abundant fiber products—required by humans.

Environmental quality directly relates to the quality of life experienced by every citizen of the Tar Heel state. As long as land development threatens to spiral in tandem with North Carolina's population growth, the demands placed on surviving natural systems will escalate their value as capital assets for acquisition of a quality of life desirable to all North Carolinians. Placing a high value on the services those ecosystems represent is essential if the state expects to provide an environment within which its citizens can realize their highest aspirations. One North Carolina Naturally constitutes a tangible step toward keeping those dreams within reach.

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Florida's Landmark Programs for Conservation and Recreation Land Acquisition

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The State of Florida has had a long and successful history of purchasing land to conserve its unique natural and cultural resources. Buoyed by phenomenal support from the general public, Florida's Legislature, with the support of a succession of both Democratic and Republican governors, has enacted a series of well-funded programs over the past half century that have resulted in the purchase and protection of over six million acres of conservation lands. When combined with substantial federal conservation lands in Florida (including large military bases) and holdings by local governments, Florida has almost ten million acres that are managed for natural resource protection and for resource-based recreation. This is approximately 30 percent of our total land area. Since 1990, we have had an annual land acquisition budget of $300 million, far exceeding that of any other state or even that of the Federal government for use in all fifty states.

The popular and political support for environmental protection in Florida stems from three primary factors. First, because of its high rate of population growth – over 18 million residents with a net population increase of 960 each day or 350,000 each year –natives and immigrants alike have witnessed the destruction of natural areas that they once took for granted. Second, Florida's natural environment provides the foundation for its annual $57-billion dollar tourism industry; destruction of our natural environment would seriously harm our state's economy. Finally, environmental protection is beginning to be seen as important economically in its own right both as a means of containing urban sprawl, with its concomitant costs to local governments for providing infrastructure away from population centers, and as an amenity for new development. Because our rapid development is the cause of destruction of our natural areas, funding environmental land acquisition for the past several decades has been predominantly through collection of documentary stamp taxes paid on all real estate transactions.

Land Acquisition 1963 – 1990

Although we do not wish to dwell on the history of environmental land acquisition in Florida, a brief overview is instructive. Our programmatic history illustrates the evolution of the manner in which lands are selected for acquisition and the type of funding sources we have used over the past several decades.

Prior to 1963, Florida had no established acquisition programs. All acquisitions were the result of either direct legislative line-item appropriations for specific parcels or donations from private individuals or the federal government. The latter included several depression-era Civilian Conservation Corps projects that are now our oldest State Parks. In addition, the Florida Division of Forestry purchased over 300,000 acres that are now part of our system of State Forests, and the Florida Fish and Wildlife Conservation Commission purchased over 120,000 acres that are now part of our system of State Wildlife Management Areas.

Land Acquisition Trust Fund (LATF)

In 1963, the Florida Legislature began the first of a series of land acquisition programs for conservation and recreation purposes, all with dedicated funding sources. The Land Acquisition Trust Fund (LATF) was created to fund a newly-created Outdoor Recreation and Conservation Program, designed primarily to purchase land for parks and recreation areas. The source of funds was a five percent tax on outdoor clothing and equipment, including bathing suits, which generated approximately $1.5 million per year. This was an attempt to fund the program through a tax paid by people who would use the lands after they were purchased. Lands proposed for acquisition were selected by staff of the Division of Recreation and Parks in the Florida Department of Natural Resources (FDNR, now part of the Florida Department of Environmental Protection), with a final list approved by the Executive Director of FDNR.

The tax on outdoor clothing and equipment proved to be very unpopular, referred to derogatorily as the "bathing suit tax." In 1968, the Florida Legislature did away with the tax and began funding LATF through the sale of recreation bonds in the amount of $20 million. These bonds were paid for through funds collected from documentary stamp taxes paid on real estate transactions. Thus, the funding was switched from a tax on potential users of conservation and recreation lands to taxes on real estate transactions and financial documents (i.e., mortgages and other loans, stocks, bonds, etc.). The development that was causing a loss of open space in Florida thus became the source of funds for conserving that open space.

Environmentally Endangered Lands Program (EEL)

In 1972, the Florida Legislature passed the Land Conservation Act, which created the Environmentally Endangered Lands (EEL) program. Later that year Florida voters approved a ballot referendum that authorized the sale of $200 million in EEL bonds and another $40 million in recreation bonds. Debt service on the bonds for both programs continued to be paid from proceeds of our documentary stamp tax on real estate transactions.

The EEL program was designed specifically to protect environmentally unique and irreplaceable lands in the state and was not designed to have outdoor resource-based recreation as its primary goal. Proposals for acquisition of specific properties could come from any source and included individual citizens, government agencies, non-profit organizations, and local governments. All projects were evaluated by staff from as many as twelve environmental departments and divisions, and, after field inspections of sites that passed an initial screening and public hearings to hear input from interested parties, department and division heads prepared a ranked list of projects based on the environmental resources. Recommendations were made to the Executive Director of the Department of Natural Resources, who made the final administrative decisions as to which parcels of land to purchase and how to appraise and negotiate the property, with final purchases being approved by Florida's Governor and an independently elected Cabinet.1

Conservation and Recreation Lands Program (CARL)

Partly in response to a major scandal in which the Executive Director of the Florida DNR was convicted of taking kickbacks from one acquisition transaction, the Florida Legislature replaced and expanded the EEL program in 1979 with the creation of the Conservation and Recreation Lands (CARL) Program. The CARL Program and its authorizing statute (originally Chapter 253, Florida Statutes, but now included in Chapter 259) called for a recurring revenue stream (instead of bond revenues) and significantly altered the administration and oversight of land acquisition activity. From 1979 until 1987, the CARL Trust Fund received funds from an excise tax on mineral extraction (primarily phosphate, but also oil, gas and other solid minerals). From 1987 through 1990, it also received funds from documentary stamp taxes on real estate transactions. From 1979 through 1990, the CARL Program protected approximately 181,000 acres of conservation and recreation lands at a cost of nearly $356 million.

The significant administrative changes in the Conservation and Recreation Lands Act persist in concept to this day. They included the creation of the Land Acquisition Selection Committee (later renamed the Land Acquisition Advisory Council, then the Land Acquisition and Management Advisory Council when it added the role of overseeing management planning on conservation lands), consisting of six environmental agency heads, to select and rank projects, with the final lists presented directly to our Governor and Cabinet. The Committee consisted of the Executive Directors of the Department of Natural Resources and the Florida Game and Fresh Water Fish Commission, the Directors of the Division of Historical Resources and the Division of Forestry, and the Secretaries of the Department of Environmental Regulation and the Department of Community Affairs, the latter being the state land planning agency and containing the Division of Emergency Management2. The Governor and Cabinet could accept or reject the entire list or vote to remove individual projects, but they could not alter the acquisition priorities recommended by the Committee.

The other significant administrative changes accompanying the CARL Program were the establishment of the Division of State Lands within the DNR and its separate bureaus for mapping, appraisal and negotiation of acquisitions. Procedures for appraisal, negotiation, and closing were spelled out in detail, with sufficient checks and openness to ensure that there could be no further illegal activities in the acquisition process.

Save Our Coast (SOC)

There were two significant expansions to Florida's ability to purchase conservation lands in 1981, both at the urging of Governor Bob Graham. The first was authorization by the Florida Legislature to sell $275 million in bonds to purchase lands along Florida's coast, and the second was establishment of the Save Our Rivers program (see below). The

debt service on the bonds for coastal land acquisition was paid from documentary stamp taxes dedicated to the LATF program. Although known as the Save Our Coast (SOC) Program, the program for purchasing coastal lands was implemented as part of the LATF Program, which had been reduced to purchasing only small parcels and inholdings and additions to State Parks after the creation of the CARL Program. Save Our Coast was a response to the growing awareness that Florida's beaches are an important recreational asset vital to our tourist economy and the realization that coastal lands were being lost to development at a rate disproportional to loss of other lands. The SOC program resulted in the purchase of more than 73 miles of coastline, a total of more than 73,000 acres, and significantly increased the number of State Parks conserving our valuable coastal resources and providing invaluable recreational opportunities for residents and tourists.

Save our Rivers (SOR)

The State of Florida is divided into five Water Management Districts (WMD) based loosely on major river drainage basins in the state. The Districts are agencies of the state, each overseen by an executive director who answers to a governing board appointed by the Governor. In 1981, the Florida Legislature created the Water Management Lands Trust Fund, also funded from documentary stamp tax revenues from real estate transactions, for the acquisition and restoration of water resources. The funds for this Save Our Rivers (SOR) Program were distributed among the five Water Management Districts based roughly on relative population within the districts: 30 percent to the South Florida WMD, 25 percent to Southwest WMD, 25 percent to St. Johns River WMD, 10 percent to Suwannee River WMD, and 10 percent to Northwest Florida WMD. Funding for the SOR program has been significantly increased since 1990 (see below), with the result that the five Districts have now purchased more than 1.7 million acres of land through this program. Land acquisition for the much-publicized restoration of the Florida Everglades has been funded to a great extent from the SOR program of the South Florida WMD. Title to lands purchased with SOR funds is held by the Districts, not the state.

Preservation 2000 (P-2000) – 1991 - 2000

In 1989, Governor Bob Martinez appointed a Commission on the Future of Florida's Environment to examine threats to Florida's environmental health and suggest potential solutions. The Commission realized that Florida's then-current pace of acquiring conservation lands was not occurring fast enough to keep up with our rapid population increase and concomitant development pressure. There were already more projects on state and regional acquisition priority lists than could be purchased under existing funding levels, and there were many more areas of the state with significant natural communities and listed species that had not yet been proposed for acquisition. Commission staff estimated that there was an unmet acquisition need of more than $5 billion. The Commission also recognized that land prices were escalating faster than the rate of inflation and that it would be advantageous to sell long-term bonds to fund land acquisition rather than to relying on the year-to-year collection of documentary stamp taxes. They recommended that the state begin a much more aggressive program of land acquisition to protect more of the state's natural environment before it was lost to development.

With the support of the Governor, the Florida Legislature responded in 1990 with passage of the landmark Preservation 2000 Act. This act anticipated the sale of $3 billion in bonds over a ten-year period, $300 million per year, from 1991 – 2000. The funds were to be given to the CARL program (50 percent), the Save Our Rivers programs of the five water management districts (30 percent), a newly-created Florida Communities Trust aimed at helping local governments (10 percent), 2.9 percent each to the Division of Recreation and Parks, the Florida Game and Fresh Water Fish Commission, and the Division of Forestry to purchase inholdings and additions to State Parks, Wildlife Management Areas and State Forests, respectively, and finally 1.3 percent for recreational trails. The CARL and SOR programs continued to operate essentially as they had in the past, only with a substantially larger budget. The Rails to Trails Program3 and the three Inholdings and Additions Programs established their own internal agency procedures for selecting lands to be purchased. The Florida Communities Trust, however, was an entirely new program that needs a bit of explanation.

Florida Communities Trust (FCT)

In 1985, the Florida Legislature enacted a significant Growth Management Act that required all local governments in Florida (counties and incorporated municipalities) to prepare a detailed Comprehensive Plan, backed by extensive data and analysis, with goals, objectives and policies to guide development, provide infrastructure, protect natural resources, and provide resource-based recreation for their citizens. The statewide oversight and approval of these comprehensive plans is a function of the Florida Department of Community Affairs.

The Florida Communities Trust (FCT) was actually established in 1989, but it did not receive funding until passage of the Preservation 2000 Act. The program is housed in the Department of Community Affairs and was designed to assist local governments in implementing the conservation, recreation and open space, and coastal elements of their comprehensive plans. Although the enabling legislation contemplates a broader function, funds from P-2000 were restricted to acquisition of lands in furtherance of outdoor recreation and conservation, and not other activities related to local government assistance not directly related to land acquisition.

FCT has a governing board consisting of the Secretaries of the Department of Community Affairs and the Department of Environmental Protection, plus four members appointed by the Governor. Applications for projects may come only from local governments or non-profit organizations, and they are scored using a numerical scoring system that evaluates not only the quality of the natural resources on sites, but also how well the projects satisfy requirements of the local governments' comprehensive plans. Local governments are expected to provide matching funds for land acquisition, although smaller governments are exempt from this requirement. Title to lands purchased through FCT is held by the local government with a reverter clause in the deed that gives title to the state if the local government does not manage the land for the purpose for which it was acquired.

Florida Forever – 2000 to the Present

Preservation 2000 was a phenomenal success. Florida was able to preserve almost two million acres of land for conservation and resource-based recreation through the many programs it funded. We made substantial headway in protecting the state's natural heritage for the future, but it was clear that many plant and animal species and several different natural vegetative communities would still be lost if we did not devote more resources to their protection. There had already been talk among environmental groups of a successor to Preservation 2000, but it became clear in 1998 that the general public also supported continued funding for land acquisition.

The 1968 Florida Constitution required that a Constitution Revision Commission meet in 1978 and again in 1998 to evaluate the Constitution and suggest revisions. The 1998 Commission proposed several substantial changes to our Constitution that would be put before the voters in November, 1998. The one that is relevant to this discussion was Amendment 5, which, among other things, extended indefinitely the state's ability to sell bonds to finance environmental land acquisition and created a more difficult test for the disposal of land purchased for conservation purposes, thereby attempting to ensure that what is bought for conservation, stays in conservation. Even though Florida was becoming increasingly conservative and "property rights" was a frequent topic of discussion, 72 percent of Florida's electorate voted to approve Amendment 5. It was clear that the citizens of Florida were fully behind continued protection of our dwindling natural resources.

The groundwork for a successor program began under Governor Lawton Chiles, and in 1999, the Florida Legislature passed the Florida Forever Act with the support of Governor Jeb Bush. Florida Forever resulted in a major revision and replacement of the Save our Rivers and CARL Programs, now called the State and Water Management District Florida Forever Programs, respectively, while continuing funding to the Florida Communities Trust, the three Inholdings and Additions programs, and Greenways and Trails. As did its predecessor, Florida Forever authorizes the sale of up to $300 million in bonds for ten years, but the funds are distributed differently than under Preservation 2000. The Florida Forever Program that replaced CARL receives 35 percent, another 35 percent is divided among the five water management district programs, Florida Communities Trust receives 22 percent, each Inholdings and Additions program receives 1.5 percent, as does Greenways and Trails. The final 2 percent goes to the Florida Recreational Development Assistance Program to fund development of recreational facilities.

The Florida Forever Act made several changes. There is a greater focus on urban and community parks, as illustrated by the increase in funding to Florida Communities Trust. There is a greater emphasis on protecting water resources and water supply, and there is a new emphasis on purchasing conservation easements on lands that do not necessarily need to be held in fee title by the state. Unlike Preservation 2000, Florida Forever allows bond funds to be used for facilities development, for ecological restoration and invasive exotic plant removal, and for conducting species inventories and land management planning. Finally, the Florida Forever Act provides for land management funding through the CARL and SOR trust funds.

The Florida Forever Act set out specific goals to guide land acquisition throughout the state through its several programs. They include coordination and completion of projects unfinished under previous programs, emphasis on protecting Florida's biodiversity and protecting, restoring and

maintaining natural ecological functions. It also calls for ensuring that the state has sufficient quantities of groundwater. There is continued recognition of the need to provide recreational and educational opportunities for citizens and tourists, to protect archaeological and historic sites and to provide forest land for sustainable management. Finally, there is a goal to provide more urban open space.

Unlike earlier statutes governing environmental land acquisition in Florida, the Florida Forever Act provides 34 performance measures under its eight goals. Three deal with acquisition coordination and completion, six are concerned with protecting biodiversity, eleven cover ecological restoration and ecosystem protection, three are concerned with quantities of water, three with public recreation, two with archaeological and historical resources, four with sustainable forestry, and two with urban open space. We are now required to identify priority areas for satisfying these goals and measures and to determine the number of acres we have acquired that fulfill each measure. These changes insure much more legislative guidance directing land acquisition.

The Florida Forever Act also replaced the old Land Acquisition and Management Advisory Council (LAMAC) with a new nine-member Acquisition and Restoration Council (ARC). This new Council has the heads of the five agencies that were on LAMAC (minus the double representation of the Department of Environmental Protection) plus four private citizens with an environmental background appointed by the Governor.

Project Evaluation and Selection

We will now explain the process by which lands are chosen for purchase under the Florida Forever Program and how the lands are actually purchased. This process has remained basically unchanged since the inception of the CARL program in 1979, although there have been a few substantive changes that we will explain below. We will also introduce our land management planning process.

From 1979 – 1990, the CARL program had one selection cycle per year. We increased this to twice per year under Florida Forever. Anyone may submit an application to ARC to have a project considered for acquisition. We have routinely received applications from private landowners, real estate agents and other representatives, state and federal agencies, local governments, water management districts and conservation groups. The application form and various support materials are available online at www.floridaforever.org. It is very important to note that our program depends on landowners who are willing to have their property considered for purchase by the state. Prior to an application being submitted, all landowners must be contacted by the applicant, and an owner's property must be removed from a project boundary if they owner requests it.

After the application deadlines of January 1 and July 1 of each year, all submittals are distributed to the nine ARC members and to the Florida Natural Areas Inventory (FNAI). FNAI is our state natural heritage program, part of a nationwide Heritage Network that gathers and organizes information relating to the biodiversity of each state (Stein et al., 2000). FNAI provides initial resource information from their databases for each of the new projects. Based on the application materials, FNAI data, and, very importantly, a public hearing with input from citizens, environmental groups, project sponsors and others, ARC members perform an initial evaluation of each new project. If a minimum of five members vote in a public meeting to move the project forward, it then moves to a more detailed evaluation.

The Florida Natural Areas inventory has developed an iterative modeling tool called F-TRAC (Florida Forever Tool for Efficient Resource Acquisition and Conservation) for identifying projects that contribute the most toward satisfying our conservation needs (Oetting et al., 2006). The model incorporates species, natural communities, high quality watersheds, wetlands and sustainable forestry. It is run every six months in conjunction with each new application cycle and takes into account land currently in public ownership, land in existing projects, and lands proposed for acquisition. Because it evaluates unprotected land in relation to land that we already own, the relative importance of unbought parcels may change as new land is purchased and resources that were underrepresented in our inventory become better protected through public ownership.

The Florida Natural Areas Inventory plays a critical role in the next steps of project development. After a project passes the initial vote, FNAI staff recommend a project Resource Planning Boundary that may vary from the boundaries proposed in the initial application. Property may be added to the Resource Planning Boundary if there are tracts with significant natural resources adjacent to the original proposal or if it makes sense to include entire ownerships when only partial ownerships were proposed. They may also delete areas with known disturbances or development or even recommend that only a part of an ownership be pursued.

After the Resource Planning Boundaries are determined, FNAI and agency staff perform site visits and write a detailed evaluation of the project. The project evaluations contain descriptions of the vegetative communities, listed species found on the property, descriptions of groundwater and surface water resources, historical and archaeological resources, recreation potential, a proposed management concept and suggested managing agency, and recommendations regarding phasing and whether all or part of the project would be appropriate for a conservation easement or should be bought outright.

The completed project evaluations are distributed to the ARC members, who then hold a second public hearing on the projects before a second vote to approve the projects to an acquisition list. Those projects that receive at least five affirmative votes are then voted onto either an "A" or "B" list. "A" list projects are those considered most important for acquisition and may be pursued by the acquisition staff of the DEP Division of State Lands. "B" list projects are a lower priority and may only be worked on if the state can pay no more than 50 percent of appraised value. To be purchased, these projects typically require matching funds from a local government or water management district partner. The cost to purchase all of the projects on our acquisition lists has always substantially exceeded our acquisition budget, so some sort of prioritization is essential.

The separation of projects into two lists, basically high and low priority, is a new phenomenon under Florida Forever. Under the CARL program, from its inception through its end at the end of Preservation 2000, we ranked projects from highest to lowest priority and developed acquisition work plans based on the relative ranking of individual projects. There was much more certainty about which projects would be worked on in any given fiscal year, but less of an opportunity to respond to changes in landowner willingness to sell, imminent threat of development, and other contingencies unforeseen at the time of ranking. Each method has its advantages. With a formal ranking of the projects from highest to lowest priority, the Council had more direct input into acquisition priorities. By lumping projects into just two groups, within which all projects are equal, acquisition priorities are determined to a much greater extent by staff of the Division of State Lands. Ranking reduces the ability to exert political or interest-group influence on which projects are pursued.

We should note that a project may range from a tiny site of less than ten acres (e.g., to protect a historical site like the Key West Customs House or a localized natural resource like a Southeastern Bat maternity cave) to one of more than 200,000 acres (e.g., the Tate's Hell Swamp in Franklin County). They may have one or a few landowners, as is the usual case, to more than 20,000 owners, as was the case in our Save Our Everglades project, which included thousands of individual platted lots in the Southern Golden Gate Estates. Projects are not necessarily designed to be completed in a single year, and some larger projects may take more than two decades to complete (e.g., a large landscape project in the Wekiva River basin in Orange, Seminole and Lake counties, or the Save Our Everglades projects). We are not always successful in negotiating purchases of lands that we consider important, but by maintaining essential parcels on our acquisition list, we are able to respond if an owner's willingness to sell changes or the ownership itself changes. If a parcel within a project is lost to development, we can reevaluate our priorities within a project to determine if the project is still worth pursuing or if priorities within the project need to be adjusted.

The final step in creating the acquisition lists is approval of the final "A" and "B" groupings by our Governor and Cabinet. As with the CARL program, the Cabinet may approve or reject the list or remove individual projects, but it may not move projects from "A" to "B" or vice versa. The lists are submitted in the form of an Annual Report and Interim Report, both of which include project summaries, purposes of acquisition, management concepts, and other pertinent information. By approving the report, the Governor and Cabinet approve both the groupings of projects into two lists as well as the rationale for their inclusion as acquisition projects and the determination of how they will be managed.

Steps to Acquisition

The actual acquisition process occurs in several discrete steps spelled out in detail in Chapter 259, Florida Statutes, and by administrative rule.

After a project is approved by the Governor and Cabinet, and if it is deemed to be sufficiently important for acquisition to begin on at least one of the ownerships within the project, it is given to our Bureau of Survey and Mapping for title research and preparation of an appraisal map. The appraisal map is not a survey, but rather is based on plats, aerial photointerpretaion and other information available from public records. It typically delineates wetland and upland acreages, known easements on the property, and any other features that might affect the value of the land.

The completed appraisal map is then given to the Bureau of Appraisal. Appraisals are conducted by private-sector professionally-licensed property appraisers under contract to the state. For parcels whose value is estimated to be $1,000,000 or less, one appraiser is used. For parcels valued above $1,000,000, two independent appraisers are used. Their appraisals are then submitted to a third review appraiser, also under contract to the state, who evaluates the work to ensure compliance with statutory and rule requirements and to make a professional judgment as to the suitability of comparable sales and other factors. The review appraiser then submits the finished report to the Bureau. If the higher of two appraisals exceeds the lower by more than 20 percent, a third appraiser may be asked to provide another opinion. The higher of the two appraisals or the higher of the two closest appraisals in the event of a third appraisal becomes the maximum price that we are allowed to pay for the property unless the Governor and a majority of the Cabinet votes to exceed that maximum. Under Florida law, the results of the appraisals and the establishment of the maximum price we can pay are not revealed to the potential seller until two weeks prior to the meeting of the Governor and Cabinet at which approval of the purchase will be considered.

The appraisal results are given to an acquisition agent in our Bureau of Land Acquisition. The agent then develops a negotiation strategy that must be approved by management. This strategy spells out the opening offer and the maximum that we will offer. The Governor and Cabinet typically do not like to pay the full appraised value of property, so the Bureau must balance the importance of the resources we wish to protect with the insistence by our elected officials that we negotiate a good deal for the State. Each step in the negotiation itself (initial offer, counteroffers and final agreed upon price) is done in writing. When the negotiations are complete, the acquisition agent, with our legal staff, prepares a contract for sale that must be agreed to by both parties.

We must emphasize that Florida's acquisition programs depend on willing sellers. Although we have the statutory authority to use the power of eminent domain to acquire conservation land under certain circumstances, we have only done so very rarely, and then very reluctantly. In the vast majority of cases, if an owner is unwilling to sell his or her land, we will not pursue it.

If the final negotiated purchase price exceeds $250,000, the acquisition must be approved by the Governor and Cabinet at one of their biweekly public meetings. The Cabinet and their staff receive agenda packages with details of the property being acquired, assignment of a manager, negotiation steps, final price, and the results of the appraisals. It is at this time that the maximum price the state could pay is revealed publicly.

When the Cabinet approves the purchase, the acquisition package then goes to our closing agents. It is at this time that a final survey is done, any title problems are resolved, and an environmental site assessment is performed to identify and remove any potential hazardous substances on site. The survey determines the final acreage, and the purchase price is adjusted to reflect deviations from the acreage estimated from the original appraisal maps. Finally, the state pays the landowner and takes title to the property.

The final step in the acquisition process is to lease the property to the designated manager of the property. This is done by the Bureau of Public Land Administration, which oversees all property the state owns, including conservation lands, submerged lands, and any other land owned by the state for other purposes (schools, prisons, state office buildings, etc.).

Management of State Conservation Lands

Every parcel of state-owned conservation and resource-based recreation land must have a manager assigned to it. We have four primary land managers within the state system. The Division of Recreation and Parks within DEP manages our state park system, which includes state parks, state recreation areas and state preserves. The Office of Coastal and Aquatic Managed Areas, also in DEP, manages aquatic preserves, our three National Estuarine Research Reserves and the Florida Keys Marine Sanctuary. DEP's Office of Greenways and Trails manages the Cross Florida Greenway State Recreation and Conservation Area. The Division of Forestry, housed in the Department of Agriculture and Consumer Services, manages the state forest system. Finally, the Fish and Wildlife Conservation Commission (formerly the Game and Fresh Water Fish Commission, but now merged with the former Marine Fisheries Commission) manages the Wildlife Management Areas Division which focuses on hunting, and the Wildlife and Environmental Areas Division which focuses on protecting listed species. The Division of Historical Resources within the Department of State also manages a few historical and archaeological sites around the state, and DEP's Office of Greenways and Trails manages the Cross Florida Greenway State Recreation and Conservation Area.

The purpose for which a project is purchased is identified as part of the project evaluation process, and the manager is confirmed by the Governor and Cabinet when the acquisition is approved. After receiving a lease from DEP's Bureau of Public Land Administration, the land manager has one year to develop a management plan for a new management unit or an amendment to the management plan of an existing unit. The management planning process involves holding public meetings in which citizens living near the park, forest, preserve, reserve or wildlife area are given the opportunity to participate in deciding how a parcel will be managed.

The management plans themselves identify in much greater detail the natural resources on the site, outline the management needs of the site and how those needs will be addressed, provide site plans for any proposed development (cabins, camping areas, ranger residences, trails, roads, bathhouses, etc.), and provide an estimate of the amount of funding and personnel that will be needed for optimal management of the site. Upon completion, the management plan must be submitted to and approved by the Acquisition and Restoration Council, who ensure that the sensitive natural resources on the property will be protected.

Land Management Review Teams

As part of an ongoing process to provide accountability to the public for proper management of state-owned conservation lands, the 1997 Florida Legislature added a new process to inspect parks, forests, wildlife areas and buffer preserves to ensure that they are being managed appropriately in accordance with their acquisition purposes and management plans. The Department of Environmental Protection is responsible for establishing regional Land Management Review Teams to inspect and evaluate management of units of our state-owned conservation lands inventory. The review teams consist of an individual from the county or local community in which the parcel or project is located and who is selected by the county commission in the county which is most impacted affected by the acquisition; individuals from the Division of Recreation and Parks, the Division of Forestry, and the Fish and Wildlife Conservation Commission; an individual from DEP's district regulatory office in which the parcel is located; a private land manager, a member of the local soil and water conservation district board of supervisors; and a member of a conservation organization.

The review teams are required to visit and report on all of our management units greater than 1000 acres in size every five years and may also inspect smaller units as time permits. We currently have approximately 485 State Parks, State Forests, Wildlife Management Areas, State Buffer Preserves, and other environmental and cultural management units in Florida (including several jointly owned with local government, water management district, and other partners), of which 148 are greater than 1000 acres in size. All 148 of these have been inspected at least once, and we are in the process of visiting all of them a second time. We have also inspected approximately 40 of the smaller units.

The Department of Environmental Protection compiles the results of the site inspections into an annual report for the Governor and Cabinet. Prior to being presented to the Cabinet in October, DEP staff also make a presentation at a public meeting of the Acquisition and Restoration Council. Members of the general public have an opportunity to comment on Land Management Review Team findings at both the ARC and Cabinet meetings.

Management Funding

Funding for land management prior to Preservation 2000 was historically from a hodge-podge of individual trust funds (State Park Trust Fund, Division of Forestry's Incidental Trust Fund, State Game Trust Fund, etc.), unpredictable general revenue appropriations to individual managing agencies, and various other state and federal funds. We were often criticized, perhaps fairly, for purchasing more land than we were able to manage. Certainly management needs exceeded the available funding. It was also difficult for managing agencies to begin to take care of newly-acquired lands and open them to the public because they could not get management money until the next time the legislature was in session.

Management funding became more timely and more stable under Preservation 2000 with a system that continues today. First, with the majority of acquisition funds now coming either from the sale of bonds or directly from general revenue, the old CARL Trust Fund began to be used as a source of funding for land management. Bond funds cannot be used for land management. The old mixture of trust funds and other assorted funds still exists, but there is now a more reliable recurring source of revenue for land management.

The management funds are distributed among managing agencies in accordance with the number of acres they manage, weighted by the intensity of management required by some sites. In particular, the Division of Recreation and Parks receives three times the amount per acre for managing state parks, which typically require more infrastructure and

facilities development, more personnel, and more active supervision of visitors. At the beginning of each fiscal year (July 1 of each year), 90 percent of available long-term management funds are distributed among the managing agencies for ongoing management of their lands. Ten percent is held in reserve for managing historical resources and for any special management needs. Any funds from this reserve that are not spent by April 1 of each year are distributed among all managing agencies based on the weighted formula used at the beginning of the fiscal year.

We have also instituted a procedure for allocating interim management funds to land management agencies as soon as they execute their lease from the Division of State Lands. These interim management funds allow the managing agencies to begin taking care of their lands as soon as they receive them in their system rather than having to wait until the lands are included in the next round of long-term management fund allocation. Immediate needs typically include fencing and various activities necessary to prepare a site to accept visitors.

There are still insufficient management funds for ideal management of all of our conservation lands, as outlined in the long-term plans for site development and management in individual land management plans, but we have significantly improved management funding since enacting the Preservation 2000 Act. Although funding shortages are still the primary reason that our parks, forests, wildlife areas and buffer preserves are not managed to their full potential, all of our conservation lands are being adequately managed to conform with the reasons for which we bought them, and all are open to the public.

Local Governments

We could not tell a complete story of successful land acquisition programs in Florida without mentioning the extraordinary role of local governments. Since 1972, 29 of Florida's 67 counties, eight municipalities, and the Lake County Water Authority have developed their own local land acquisition programs. Most of these have resulted from local referendums in which citizens have voted overwhelmingly to increase their sales taxes or property taxes to fund land acquisition and management. Much of the incentive for these programs has come from the ability of local governments to receive matching funds from state programs like CARL, Florida Forever, the Florida Communities Trust, and Water Management Districts which assist in purchasing lands of local and regional significance. Local governments in Florida have raised more than $2 billion and have been responsible for the purchase of approximately 375,000 acres of conservation and resource-based recreation lands, an astonishing feat in this era of tax reform and private property rights.

Conclusions

Florida continues to lead the nation in purchasing property to protect natural resources and provide resource-based recreation. Our programs have been successful for many reasons, the most important of which is the enthusiastic support, even demands, of our citizenry, who do not have to live in Florida for very long to notice treasured areas being lost to development at an alarming rate of 165,000 acres each year (an average of 453 acres each day) and who are keenly aware of the need to preserve our natural areas to provide the basis for our tourism-based economy. Our political leaders have recognized the popularity of natural resource protection and have responded with a series of land conservation programs spanning more than four decades. Funding for our programs has been based primarily on activities that have resulted in the need for conservation: documentary stamp taxes on real estate transactions, which are becoming increasingly numerous as development continues, and severance taxes on environmentally damaging mineral extraction activities.

Our programs invite public participation throughout the process, beginning with the ability of anyone to submit an application, through the project evaluation and selection process, the development of management plans, and oversight of how the lands are managed. There are public conservation and resource-based recreation lands in each of our 67 counties, with large tracts accessible to all citizens within relatively short distances. Our citizens have clearly been rewarded for their support and participation with a myriad of conservation lands available for their enjoyment.

Finally, and most importantly, we have been successful in preserving for posterity a substantial portion of our natural heritage. Our natural lands contain hundreds of listed species, our most imperiled vegetative communities, significant cultural and historical sites, watersheds and water recharge areas. Our lands contain rivers, lakes, springs, beaches, central Florida scrub, north Florida sandhills, significant wetlands, and an incredible variety of upland habitats. They provide us a myriad of recreational opportunities, including nature study, camping, hiking, swimming, canoeing, hunting and fishing. Our 159-unit system of State Parks has twice been awarded the National Recreation and Parks Association's Gold Medal Award, honoring Florida as the Nation's "Best State Park Service." Through our environmental land acquisition efforts we are able to embark on

restoration of large natural areas like the Florida Everglades and north Florida longleaf pine habitat. Our citizens, their descendents, and our visitors have all gained a heightened quality of life.

Jim Farr began working with Florida's land acquisition programs in 1989 as Department of Community Affairs staff person to the CARL program. In 1990 he was hired as the first staff person for the newly-created Florida Communities Trust, where he served for two years, and he continued as staff person to the CARL program until 2000. In 2002 he was hired as Conservation Easement Coordinator in the Office of Environmental Service. Dr. Farr can be contacted at jim.farr@dep.state.fl.us.

Greg Brock began work as a biologist with the Division of Recreation and Parks in 1981 and became the lead staff person for the CARL Program in 1986. He was made Chief of the Office of Environmental Services in 1996. Dr. Brock can be contacted at greg.brock@dep.state.fl.us.

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Stein, Bruce A., Kutner, Lynn S. and Adams, Jonathan S. (Eds.) (2000). Precious Heritage: The Status of Biodiversity in the United States. Oxford University Press, New York.

Web Resources

Florida Department of Agriculture and Consumer Services, Division of Forestry http://www.fl-dof.com/

Florida Department of Community Affairs, Florida Communities Trust http://www.floridacommunitydevelopment.org/fct/

Florida Department of Environmental Protection, Division of Recreation and Parks http://www.dep.state.fl.us/parks/

Florida Department of Environmental Protection, Division of State Lands http://www.dep.state.fl.us/lands/

Florida Department of Environmental Protection, Office of Coastal and Aquatic Managed Areas http://www.dep.state.fl.us/coastal/default.htm

Florida Department of Environmental Protection, Office of Greenways and Trails http://www.dep.state.fl.us/gwt/

Florida Fish and Wildlife Conservation Commission http://www.floridaconservation.org/

Florida Natural Areas Inventory http://www.fnai.org/

Florida Statues (for Chapter 259 pertaining to acquisition of conservation lands) http://www.leg.state.fl.us/Statutes/

Northwest Florida Water Management District http://www.nwfwmd.state.fl.us/

St. Johns River Water Management District http://sjr.state.fl.us/

South Florida Water Management District http://www.sfwmd.gov/

Southwest Florida Water Management District http://www.swfwmd.state.fl.us/

Suwannee River Water Management District http://www.srwmd.state.fl.us/

1 Prior to 1999, Florida had six independently elected Cabinet members: Secretary of State, Commissioner of Education, Commissioner of Agriculture, Insurance Commissioner, Treasurer, and Attorney General. Constitutional revisions approved by voters in 1998 reduced the number to three: Attorney General, Commissioner of Agriculture and Chief Financial Officer, the latter combining the duties of the former Treasurer and Insurance Commissioner. The Secretary of State and Commissioner of Education are now appointed by the Governor.

2 In 1993, the Department of Environmental Regulation and the Department of Natural Resources were combined to form the Department of Environmental Protection (DEP). The DEP had two representatives on the Land Acquisition and Management Advisory Council, one representing the old DNR land acquisition/land management side of the agency, the other representing the water resource and permitting side of the agency.

3 Rails to Trails later evolved into our current Greenways and Trails Program

Maryland's Green Infrastructure:
The Land Plan Science

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What is Green Infrastructure?

Maryland has been called "America in miniature". From east to west, Maryland varies from ocean, to barrier island and beaches, to tidal marshes and estuaries, to fertile low-lying farmland, to pastoral rolling hills, to mountains, valleys and plateaus. This is Maryland's Green Infrastructure; its geology, climate, water, soils, flora, and fauna. These resources provide the bulk of the state's natural support system. Ecosystem services, like the following

- Cleaning the air
- Filtering and cooling water
- Regulating climate
- Storing and cycling nutrients
- Maintaining aquifers and streams
- Protecting areas against storm and flood damage
- Pollinating crops and other plants
- Conserving and generating soils
- Providing marketable goods and services such as forest products, fish, wildlife and recreation.

All of these are provided by the existing expanses of forests, wetlands, and other natural lands. These ecologically valuable lands serve as vital habitat for resident and migratory species, maintain a vast genetic library, provide scenery, and contribute in many ways to the health and quality of life for Maryland residents.

Like America, the state contains big cities, small towns and sprawling suburbs, and hosts regions that vary from forested to agricultural to urban. Like many other states in America, Maryland also experiences an ever increasing conversion of resource lands (agricultural and forested) to developed uses.

Threats to Green Infrastructure and Forest Interior Dependent Species (FIDS)

In the past, Maryland's Green Infrastructure (GI) was so plentiful that little thought was given to protecting it. However, population growth and land development have continued to erode and fragment the once vast tracts of forests and wetlands that covered Maryland. Between 1973 and 1997, Maryland's population grew by 983,125 people, a 30 % increase, and was accompanied by a loss of 376,416 acres of forested and agricultural land to development (15,684 acres/year)[1]. More recently, between 1997 and 2002, rates of resource land conversion have escalated to a yearly loss of about 26,500 acres[2]. Most of the recent residential development in Maryland has been in low density development (1/2 acre or larger lots), resulting in a greater consumption of land per household. In 2000, the State hosted 5,296,486 residents[3]. By 2030, the State expects to receive over 1.4 million more residents, nearly a 27 % increase over 2000 population estimates. Accompanying this increase will be more suburban sprawl, increasing forest fragmentation and loss of Green Infrastructure.

Many species are officially listed as rare, threatened, and endangered because of habitat loss. Large, unbroken tracts of forest offering deep interior forest conditions are

one of the most imperiled habitats in the state as a result of increasing forest fragmentation. Some species require a substantial area of interior forest in order to carry out some or all portions of their lifecycle. Twenty-one species of birds that breed in coastal Maryland are classified as Forest Interior Dependent Species (FIDS)[4]. As an example, the worm-eating warbler is believed to be the State's most area-sensitive FIDS (Figure 1). Many FIDS are neotropical song bird migrants, whose breeding habitat here, as well as winter habitat in tropical countries, is increasingly threatened. The Maryland Department of Natural Resources (MD-DNR) selected FIDS as its umbrella species group of concern in order to set conservation priorities for the state. By acting upon the habitat needs of species at greatest risk from forest fragmentation, MD-DNR is also able to address the accompanying ecosystem services and other species habitat needs that are critically dependent upon large blocks of intact habitat, such as forested land and wetlands.

The Land Plan Science: Maryland's Green Infrastructure Assessment (GIA)

Identification Phase: The GIA was developed by MD-DNR in 2000 as a response to the growing recognition that coordinated and focused conservation efforts were needed to maintain basic environmental functions and quality of life, not only for the citizen's of today, but for future generations as well. The goal of the GIA was to identify a network that contains Maryland's most ecologically important remaining lands. The lands within the network may include large contiguous tracts of forest lands, important wildlife habitats, wetlands, riparian corridors and areas that reflect key elements of Maryland's biological diversity, as well as agricultural and residential areas. The network is a linked system that connects large contiguous blocks of natural resource lands, or hubs, through corridors that encompass the most ecologically valuable areas between these hubs (e.g., areas of high aquatic integrity, wetlands, wildlife migration routes and important forest lands). Figure 2 illustrates the hub and corridor design concept behind the GIA.

Principles of landscape biology and conservation biology were used to guide the effort to identify the most ecologically valuable areas in the state. For example, large habitat patches, located close to each other and were connected by natural land cover, were favored over isolated habitat patches surrounded by unsuitable, or developed, land uses. Size thresholds for hubs and corridors were established based on the conservation needs of Maryland FIDS.

Hubs consist of contiguous forest blocks with at least 250 acres of interior conditions; complexes with at least 250 acres of unmodified wetlands; rare or sensitive species locations; biologically important rivers and streams; and existing conservation lands managed for natural values.

Corridors are linear features connecting hubs together to help animals, plant seeds, water and other important natural processes move between hubs. They are generally at least 1100 feet wide and follow the best ecological or most natural routes between hubs. Typically these are streams with wide riparian buffers and healthy fish communities. Other good wildlife corridors include ridgelines or forested valleys. Developed and other "non-natural" areas were avoided to the extent possible.

Statewide and regional maps were developed using satellite imagery, Geographic Information System (GIS) data such as road and stream locations, and biological data. The methodologies and resulting maps were reviewed by scientists, field ecologists and county planners. Human-modified "gaps" in the GI were also identified as potential candidates for restoration.

Gaps are developed, agricultural, barren, or mined lands within hubs or corridors that could be managed less intensively. For example, dredged or drained wetlands could be restored. Structures such as underpasses or bridges can be designed to help wildlife movement where roadways and railways cross corridors and hubs. Similarly, stream blockages can be identified for fish ladders, bypasses, or other structures.

When complete, the GIA (including gaps) captured about two million acres in hubs and 400,000 acres in corridors, totaling 39% of the State's land area (Figure 3). The network includes the majority of Maryland's most important ecological lands.

63 % Forested Land
90 % Interior Forests
87 % Unmodified Wetlands
88 % Rare, Threatened and Endangered Species Occurrences
89 % Brook Trout Streams

Assessment Phase: The GIA also provides an approach for ranking or prioritizing land protection efforts. At a GI "element" scale, hubs and corridors were evaluated and ranked for their relative ecological value (Figure 4). As an example, hubs that were larger, contained more interior forests, headwater streams, diverse aquatic communities,

wetlands, sensitive habitat and rare, threatened and endangered species occurrences were given higher ecological ranks than smaller hubs that contained fewer important ecological features. High ranking hubs and corridors are those areas that receive higher prioritization for protection actions.

Land area within GI elements (hubs and corridors) were also evaluated and ranked for ecological significance. Within each element, land areas of approximately 1/3 acre in size were given an ecological score, partly dependent on the existing overlay of ecological features (such as presence of wetlands, sensitive habitat, etc.) and partly dependent on the overall hub or corridor ranking as described above. This approach allows MD-DNR to evaluate the ecological significance of land parcels within any GI hub or corridor. This ability has proved to be extremely useful to MD-DNR's land conservation programs as a way to objectively and quantitatively evaluate easement or acquisition opportunities.

Intended Objectives of the Green Infrastructure Assessment

This concept is not a plan or a mandate to protect these valuable lands, rather it is information that can enhance the cooperative efforts of many people and organizations including government agencies, land trusts and interested private landowners. The purpose of the Green Infrastructure land network is to create a coordinated statewide approach to land conservation and restoration that will:

- systematically identify lands with important ecological and biodiversity related characteristics;
- address problems of forest fragmentation, habitat degradation and water quality;
- maximize the influence and effectiveness of public and private land conservation investment;
- promote shared responsibility for land conservation between public and private sectors; and
- guide and encourage compatible uses and land management practices.

Applications of the Land Plan Science

Decisions involving expenditure of public conservation funding, development of land use plans, siting of construction projects and other activities impacting natural resources typically rely on a variety of environmental, socio-economic, and financial considerations. The GIA offers an unbiased, defensible scientific approach that decision makers have come to rely on. Since 2000, when the GIA was completed, the approach continues to gain more support and greater acceptance among resource managers and organizations, in both Maryland's public and private sectors. Innovative applications continue to develop that use the GIA as a planning framework. Here are some examples of successful applications of the GIA, the State's land plan science.

Land Conservation: MD-DNR has an impressive record in land conservation. Program Open Space, established in 1969, is a nationally recognized program providing dedicated funds for Maryland's state and local parks and conservation areas[5]. The Rural Legacy Program, initiated in 1997, provides the focus and funding necessary to protect large, contiguous tracts of land and other strategic areas from sprawl development[6]. Because the concept and the science behind the GIA was so convincing and addressed a critical conservation need, the Maryland State Legislature devel-

oped an additional land conservation initiative, the GreenPrint Program. GreenPrint provided yet another source of dedicated funds, between the years 2000 to 2005, to strategically focus on Green Infrastructure acquisitions and easements. The State chose not to reauthorize the GreenPrint program upon its expiration. Instead, Maryland's Governor issued a land conservation policy that directed all State conservation programs to address GI conservation priorities[7]. Today, every parcel that is being considered for conservation action through the MD-DNR is evaluated using GI science. Parcel profiles are developed rating property as "poor", "fair", "good" or "excellent", based on ecological benefits to the GI network (Figure 5). This information is transmitted directly to Maryland's Board of Public Works, staffed by the State's Governor, Comptroller and Treasurer, and used to make multi-million dollar funding decisions. Currently, about one fourth of Maryland's GI is protected. The State continues to aggressively pursue GI conservation in partnership with local land trusts, local and federal government agencies and non-profit conservation organizations before these valuable lands are lost to development.

Local Planning and Zoning: In Maryland, local land use authority is delegated to county governments through zoning and comprehensive planning efforts. A number of counties have undertaken their own GI planning. Most have needed to adjust the size thresholds of their GI components, particularly in urban communities, in order to focus on environmental benefits and connectivity that operate at smaller, more localized scales. For example, in Prince George's County, certain planning areas require minimum corridor widths of 200 feet in contrast to the state threshold of 1100 feet[8]. In addition, more emphasis is given to recreational benefits, such as bike trails and walkways. Planning for natural area protection at the local level has to be coordinated with planning for development. Talbot County, which is predominately agricultural, has integrated its GI assessment into its master plan to better designate areas that are suitable for development and those that should be protected[9]. In order to restrict development in large, contiguous patches of forestland, Baltimore County enacted the RC 6 zone, which does not allow development density to be given to parcels that include any part of a 200 acre or larger forest patch[10]. This is a unique example of how an off-site resource condition can reduce site density and provide regional ecological benefits.

Transportation Planning: The Maryland State Highways Administration (SHA) now considers GI protection priorities in its transportation projects. When addressing the environmental impacts of new roads and highways, SHA uses the GI to inform alignment alternatives in an effort to avoid or minimize impacts that have regional ecological consequences. In instances where impacts are unavoidable, SHA evaluates gaps in the GI for mitigation efforts. By restoring GI gaps, ecological benefits beyond the site level are conferred to regional scales by strengthening the integrity of the regional network.

Regional Planning: The US Environmental Protection Agency's (EPA) Chesapeake Bay Program has adopted Maryland's GI approach in its Chesapeake Bay watershed-wide Resource Lands Assessment (RLA)[11]. The RLA provides a multi-state identification and assessment of the most important remaining resource lands in the Chesapeake Bay Watershed which stretches across six states; New York, Pennsylvania, Maryland, Delaware, Virginia and West Virginia, in addition to the District of Columbia. The RLA performed an analysis, following Maryland's example, to identify the most ecologically important lands within the watershed in recognition that Green Infrastructure values do not cease to exist at state boundaries and in an effort to provide guidance and recommendation to Bay state communities (Figure 6). Through EPA's assistance, large-scale ecological network priorities can be integrated into growth management and land preservation at multiple spatial scales.

Mapping, Technical Assistance and Further Information

MD-DNR provides a host of tools to support GI planning, protection and restoration initiatives. County maps are available for download through the Maryland Atlas of Greenways, Water Trails and Green Infrastructure web site[12]. Interactive on-line mapping, which allows users to produce customized maps relevant to their area of interest, is available through Maryland's Environmental Resources and Land Information Network (MERLIN) web site[13]. For sophisticated users with GIS expertise, GI data can be downloaded through the Maryland geospatial data download site[14]. Abbreviated methods and full detailed documentation of the analysis are also available on-line at the Green Infrastructure web site[15]. MD-DNR staff is available for personal consultation and technical guidance and welcomes the opportunity to promote GI assessment and planning both within its state borders and beyond.

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What We Need is Here:
Land Conservation in Kentucky

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Geese appear high over us, pass, and the sky closes. Abandon, as in love or sleep, holds them to their way, clear in the ancient faith: what we need is here. And we pray, not for new earth or heaven, but to be quiet in heart, and in eye, clear. What we need is here.

-Wendell Berry

Introduction

Kentucky is truly a state blessed with beautiful land. Twenty years ago when one of the authors first moved to Kentucky from Colorado, her then-brother-in-law, a Kentucky native, frequently exclaimed, "God has kissed Kentucky!" The pride of Kentuckians in their land includes both "natural areas," which often are seen as forest, state and national parks, and agricultural lands such as family farms and horse farms. Both are land uses that are critical to protect the land from unplanned or poorly planned development.

As we write this, there is a plan under consideration by the Bush administration to sell off 4,518 acres of the Daniel Boone National Forest in Kentucky. Perhaps we Kentuckians should count our blessings: California could be the biggest loser at over 85,000 acres, and the national forest acreage lost for the entire country totals over 310,000. The proposal aims to "make up for declining timber sales" (The Courier-Journal, Tuesday, 2/28/06, p. B4). Farmlands are also at risk. As of 2003, farming and livestock use of Kentucky land was still high at 42 percent, however approximately 130 acres per day are being developed (National Resources Inventory, USDA, Kentucky Farm and Ranch Lands Protection Program). This large percentage of land makes the preservation of farm and ranch land a necessity when discussing preservation of natural and "open" areas in the state from encroaching urban development.

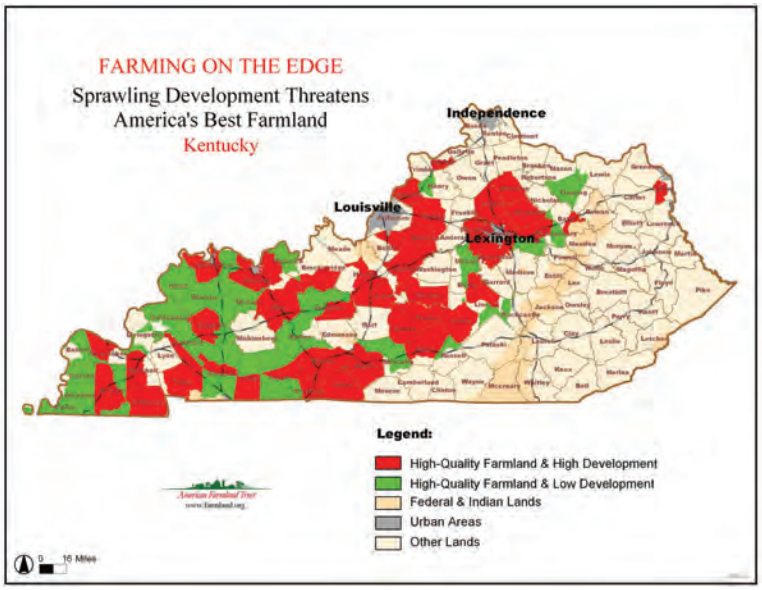

Figure 1: Farming on the Edge: Sprawling Development Threatens America's Best Farmland-Kentucky (AFT 2005)

Conservation and preservation are often used interchangeably when addressing the issue of retaining natural and farm lands. The definition of conservation is "the protection, preservation, management, or restoration of wildlife and of natural resources such as forests, soil, and water" (www.dictionary.reference.com). Preservation is defined as the act of maintaining and protecting, to "keep intact," and a preserve is "an area maintained for the protection of wildlife or natural resources." Both involve ongoing action in the form of management and maintenance. Both involve protection of resources for the future. The approach was one endorsed by conservationists at the beginning of the conservation movement, around 1901. Gifford Pinchot, an early proponent of conservation, said, "Conservation means the greatest good to the greatest number for the longest time" (Nash, 1990, p. 69). Aldo Leopold defined conservation as follows:

Conservation is a state of health in the land-organism. Health expresses the cooperation of the interdependent parts: soil, water, plants, animals, and people. It implies collective self- renewal and collective self-maintenance.

When any one part lives by depleting another, the state of health is gone. As far as we know, the state of health depends on the retention in each part of the full gamut of species and materials comprising its evolutionary equipment.

Culture is a state of awareness of the land's collective functioning. A culture premised on the destructive dominance of a single species can have but short duration.

-Flader and Callicott, 1991, p. 300

Leopold's view included people as one of "the interdependent parts" of a healthy "land-organism." This view does not preclude growth and change. Organisms, whether single cell or a complex living ecosystem, do not remain stagnant. The concept of "smart growth" works in harmony with conservation. Smart growth is meant to be healthy growth, planned growth. As Ed Abbey said, "Growth for the sake of growth is the ideology of the cancer cell."

In this article we will examine the reasons why the citizens of Kentucky should be concerned about land conservation in the state, the economic considerations involved, and the tools for conservation of Kentucky's "open space," which includes farmland and forests. Smart growth ideas and principles are compatible with and promote the use of these tools.

Brief History of Land Conservation

There is much information about the history of conservation in the United States and several excellent sources are referenced at the end of this article. With the realization of the end of the frontier, in the period from 1901-1910, also came the realization that resources might not be infinite, especially resources like water. From then to the present, conservation has been viewed as protection of natural places in their most natural, most pristine, state. Conservation was seen by some as protection of the vanishing wilderness.

Freyfogle (1993) wrote that "environmental groups" wanted wilderness to be for all species except "man" and quotes the federal statute that defines wilderness as land "where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain" (p. 95). In this scenario, still promoted by some, "wilderness is nature with no signs of the inevitably dirty human; it is nature with the people erased" (p.99). This disdain of human interaction with the wilderness even includes indigenous tribes which often are following their traditions of living in harmony with the land. For Freyfogle the concept of wilderness is symbolic, "evidence of character" (p. 101), and this character is reflected in our national parks which are publicly owned. Yellowstone was the first national park created in the world; to Freyfogle and his ilk, this counts as a demonstration of American "foresight, sensitivity, and restraint" (p. 101).

This perception of wilderness or natural areas is in marked contrast to the perception of natural areas as pastoral. This view is often termed the "garden-earth" scenario or what Leo Marx called "the middle landscape" (Nash, 1967, pp. 383-384). Environmental historian Roderick Nash points out that this view has been "celebrated" for three centuries and cites Rene Dubos and Kentucky's own Wendell Berry as proponents of it. In this landscape, farmland is cultivated, but cultivated in a way that promotes the health of what Leopold termed the "land-organism," which represents the best of both worlds, of wilderness and of land occupied by people. Nash demurs, arguing that for many the rural experience is not optimum but rather experience where we can alternate between wilderness and city. Nash quotes Gary Snyder's ideal of "elk and computers" and continues, "The middle, rural option may in fact be the worst of both worlds, lacking both elk and computers."

In Kentucky, we are fortunate enough to have both elk and computers. The elk are more recent, reintroduced in 1997-1998 in eastern Kentucky after an absence of 150 years. Prior to the arrival of European settlers, Kentucky's "barrens" or grasslands accounted for ten percent of the land and were maintained by fires set by Native Americans, as well as by the grazing of the elk and bison (Kentucky Biodiversity Task Force, 1995, p. 99). Timber cutting and lumber production began in 1810 and destroyed millions of acres of forest (Ibid). Conservation efforts began in the late 1800's in response to awareness of depletion of resources, especially water. In 1876 Kentucky formed a fishing commission and in 1912 was one of the first states to establish hunting and fishing licenses for residents. Revenue from the sale of these licenses to both residents and out-of-state visitors continues to support the majority of Kentucky's conservation efforts. The current decline in the sales of the licenses and subsequent decrease in revenue has been cause for concern for Kentucky's Department of Fish and Wildlife Resources, whose name reflects their primary focus since their inception in 1944.

Kentucky's Biodiversity Task Force Report includes a section addressing what the writers see as the difference between "conservation" and "preservation" (1995, p. 102). Conservation is defined as having a "consumptive view of natural resources," while preservation is based upon the view that nature has "an intrinsic value apart from its commercial value." The Task Force then moves on to examine Leopold's land ethic, which is portrayed as both going beyond and uniting both approaches. "The land ethic does not oppose human use of nature or scientific management of natural systems; in fact, it assumes both. According to the land ethic, it is in the self-interest of humans to treat the land well since we are part of nature and our well-being depends upon it" (pp. 102-103). In 1949 Leopold wrote that "All ethics rest upon a single premise: that the individual is a member of a community of interdependent parts" (Nash, 1989, p. 55). The idea of community, of a local sense of place, is one that Wendell Berry tirelessly promotes and fosters and one that holds much hope for Kentucky's future efforts of preservation and conservation of both farmland and natural areas.

In the past, preservation of both farmland and natural areas has been fragmented, with the least valuable areas being preserved, the pieces nobody wanted. Sometimes, it has seemed as though the two were incompatible or pitted against each other in a war of limited resources. Recently when one of the authors mentioned her admiration of Berry to a conservation biologist, he smiled and called him an "agricultural apologist." The author had never heard this term. It appears to be a relic, an epithet from the days of the war between the bio-centrists and the anthropo-centrists, between those who focus on other species and those who focus on humans as not only the center of the interdependent web of life, but as the most important species, the species whose needs must always prevail regardless of the cost to other species. However, we are beginning to realize that this is a meaningless war, that there is no conflict. Interconnected means just that. Interdependent means that we cannot survive without each other. We cannot protect natural areas and not farmland, and vice versa. And, furthermore, it is economically beneficial to protect and conserve both farmland and natural areas.

Kentucky's long-range planning for the next century (Kentucky Outlook 2000, 1997) looks at factors affecting land quality in Kentucky, the effects on ecological health, and ranks farm management practices (loss of agricultural land area and soil loss) and urban and suburban sprawl as the only factors which are considered high risk. Protecting Kentucky's biodiversity is a critical consideration for ecosystem health. Practices in forest/woodland management (silviculture) and practices in agriculture are two factors or hazards rated **high risk** because of their impact on habitat conversion and modification. Another area of high risk is "ecosystem manipulation" and subsequent loss of species and conversion of land use due to invasive exotic (non-native) species. Quality of life in Kentucky, which includes economic factors, aesthetics, "peace of mind," recreation, among other elements, was considered to be at high risk due to habitat destruction and species destruction, as well as the invasion of exotic species.

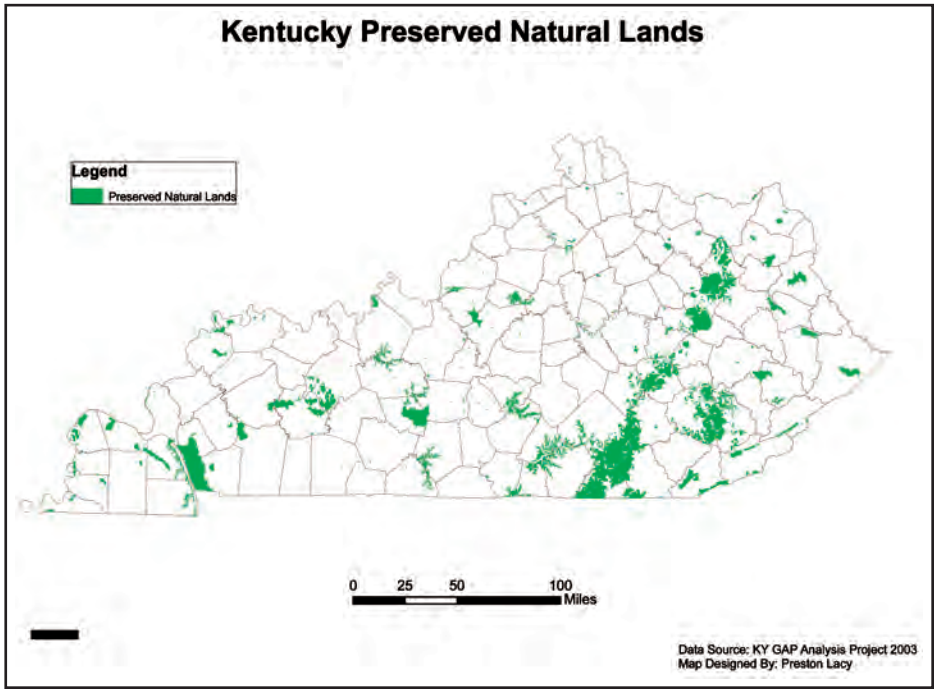

Figure 2: Kentucky Preserved Natural Lands. KY GAP Analysis Program 2003

Economic Issues in Land Conservation and Protection

"Many hard lessons have taught us the human waste that results from lack of planning."

-Franklin D. Roosevelt

(quoted in Nash, 1990, p. 113)

Economic factors have often been blamed, fairly or unfairly, for decisions impacting conservation of both farmland and natural areas. Economic reasons are given for the

need for growth, regardless of what type. Addressing this, economist and environmentalist Kenneth Boulding said, "Anyone who believes exponential growth can go on forever in a finite world is either a madman or an economist" (Adams, p. xi). However, there have been changes in this perspective and now economists are exploring and demonstrating the economic value inherent in "green" practices, such as land conservation.

Due to the old idea of conservation as setting aside areas that did not include people, areas that were designated as natural areas or open space were often small fragments of land that were not considered "prime" land for use by humans. And these fragments of less productive land were cheaper to purchase and to maintain. Small pockets of natural or wild areas are often isolated and disconnected. In some ways, this has protected them from development. However, we are learning that small fragments of "wilderness" cannot serve as "museums" of what ecosystems used to be. John Steinbeck was a critic of this approach, saying, "It is my opinion that we enclose and celebrate the freaks of our nation and of our civilization. Yellowstone National Park is no more representative of America than Disneyland" (Adams, p. 49).

Current thinking has led to the concept of wildlife corridors which interconnect larger ecosystems and protect biodiversity, especially larger species, such as elk, mountain lions, wolves, etc. Economically, organizations devoted to land protection and conservation are discovering that they need to put their money into a broader vision, into systems and larger, more connected parcels of land, rather than buying pieces here and there just because they are available.

Adams' recent book *The Future of the Wild: Radical Conservation for a Crowded World (2006)* is an excellent resource for an in-depth look at past practices and subsequent problems such as fragmentation, as well as current state-of-the-art thinking like the use of gap analysis (using geographical information system or GIS mapping techniques to assess how to best protect diversity of both landscape and species), identification of a state's "critical areas" for protection, community driven conservation, and corridors and linkages of a variety of types of spaces and land rather than the old, fragmented approach. This is economics based on the concept of sustainability, on a long-range view, rather than short-term.

Arguments over reasons to conserve and protect open space, whether natural areas or farmland, often are between two stances: economic reasons to conserve, or not, versus ethical and aesthetic ones. Leopold spoke to this dichotomy as follows:

I have an ulterior motive, as everyone has. I am interested in the thing called "conservation." For this I have two reasons: (1) without it, our economy will ultimately fall apart; (2) without it many plants, animals, and places of entrancing interest to me as an explorer will cease to exist. (in Flader and Callicott, p. 336)

Even Leopold sees economics and aesthetics as separate, rather than interconnected, reasons for conservation. However, increasingly, we understand that economic value is tied to "plants, animals, and places."

Myers (1983) writes about a chapter in his previous book entitled "What Are Species Good For?" addressing the issue of economics and aesthetics. His final arguments are economic ones and written, he says, with "a tone of calculation" (p. ix) that did not appeal to him. He felt that "[a]nyone who thinks there is a need to argue a case for the worth of elephants and butterflies and sea anemones does not know the true value of wildlife. Nor will he ever know as long as he looks in that direction. Wildlife is its own justification." He was surprised when the interest of readers seemed to be mainly about the economic approach to the value of other species. He decided to focus his next book on this issue, detailing the economic worth of other species of animals and plants in terms of medicines, foods, industrial products and processes, as well as items each of us uses daily.

I realize that this approach will not sit well with every reader. Indeed some observers view an economic rationale for conservation as a perversion, even as something "evil." But in developing nations especially, there is little space for the luxury of wildlife that exists for its own sake. In face of an incoming tide of humanity, with its growing numbers and growing expectations, an ethical stance or an aesthetic argument will achieve little more than a Canute-like gesture. However much I may agree that every species has its own right to continued existence on our shared planet, I do not believe that the world yet works that way. So in a practical workaday world of politicians and economists and planners, we must make the best case we can in favor of wildlife. While waiting for the millennium, we must set about some pragmatic conservation strategies that will stand up in our marketplace-motivated societies. To the extent, then, that I can demonstrate that wildlife means something in terms of dollars and cents, and pounds and

francs and yen, I believe there will be a better chance of wildlife aplenty left at the end of the century, and at the end of all centuries to come. If species are enabled to survive through crass economics, should that detract from the pleasure of the purist who gazes at zebras and polar bears and flamingos with a spirit that is not jaundiced with considerations of mere money? (p. xiii)

Open space, undeveloped space, adds to our "quality of life," which is valuable to us. We will pay for it. Diamond (2005) examined why whole cultures and societies "collapse" and die. He quotes Steve Powell (p. 65):

I tell my real estate agent and developer friends, 'You have to protect the beauty of the landscape, the wildlife, and the agricultural land.' Those are the things that create property value. The longer we wait to do planning, the less landscape beauty there will be. Undeveloped land is valuable to the community as a whole: it's an important part of that 'quality of life' that attracts people here.

Realtors and developers are among the groups looking carefully at the economic reasons for conservation. The National Association of Realtors publishes On Common Ground, which covers concepts and tools related to smart growth, two times a year. The Winter 2006 issue includes articles about preserving rural character and farmland, conserving subdivisions, and "solving sprawl," among others. One article examines the economic benefits of "conservation design," such as reduced site grading and street costs, as well as the higher prices commanded by "conservation lots" due to the presence of open space/natural areas. Another article looks at increasing the economic viability of small towns and uses Elkhorn City, Kentucky, as an example. This small town hopes to capitalize on tourism dollars through protection of its natural resources, promoting hiking, canoeing, and its historical sites. Yet another article in this issue lists principles for smart growth (adapted from the Urban Land Institute), including the identification and protection of green infrastructure (parks, habitat, easements, farmland, etc.). The authors of these articles clearly see an economic advantage to smart growth planning, including conservation of natural areas and farmland: a marriage of economics and aesthetics.

In Kentucky, as elsewhere, economics, aesthetics, and ethics can work together to promote understanding of the economic value of protected land.

Recreational/Economic Value of Land Conservation in Kentucky

In Kentucky, wildlife management and restoration programs are directly dependent on the number of hunting and fishing licenses sold. This is a result of the 1937 Federal Aid in Wildlife Restoration Act, which provides that each state receive federal funds according to the number of licenses sold. According to a study by Fedler and Leahy (1996), there has been minimal growth in angling or fishing in the USA since 1980. Hunting has also been declining. Hunting and fishing are consumptive uses of resources. However, at the same time, some aspects of non-consumptive use of resources, such as use of parks and bird watching, have been increasing. A U. S. Fish and Wildlife report (La Rouche, 2001) states that the United States average rate of "birding" participation was 22% and in Kentucky it was a whopping 35% (p. 9). There were only seven states with higher rates than Kentucky's. In Kentucky 91% of those participating in birding or bird watching are state residents. Wildlife watching and photography are some of the additional recreational activities that are growing rapidly in the United States and in Kentucky. These and other "non-consumptive" activities generate about $81 million in state revenue yearly (Kentucky Environmental Quality Commission 1992, p. 246). In 1990, fishing and hunting licenses brought in approximately $1 billion in revenue in Kentucky with 1.56 million licenses sold (p. 247).

Both residents of Kentucky and non-residents performed the following activities: 780,000 fished, 323,000 hunted, and 1.4 million watched wildlife. There was a total of $1.8 billion in expenditures from these activities. Of this, $602 million was from wildlife watchers, $373 million by hunters, and $545 million by anglers. Over the ten years from 1991 to 2001 the number of Kentucky hunters and anglers decreased, while expenditures in wildlife watching increased, and those for hunting increased from 1991, then remained the same from 1996 to 2001. For our state, when looking at percent of total participation by activity, 74% were wildlife watching, 43% fishing, and 18% hunting. If one adds the expenditures in Kentucky by both hunters and anglers, the total is $918 million, with an additional $602 million from wildlife watching.

Consumptive use of resources, for example, hunting and fishing, and non-consumptive uses, such as wildlife watching and hiking, bring in money to the state. These uses depend upon conservation of natural areas, both farmland and open space. Recreational use of land unites economics with aesthetics and ethics. Ethics involves the appreciation

of wildlife, of soil, of natural beauty, and the desire to conserve them for others into the future.

Types of Land Conservation Tools

Donations of Land or Agricultural Conservation Easements – An outright donation of land or agricultural/conservation easements to a nonprofit or government entity that provides tax benefits to the donor (Placer Land Trust). The donation of both types of easements performs the function of restricting urban development. The terms agricultural easements and conservation easements may be used together or interchangeably.

Acquisition – Land preservation organizations or programs can purchase land and then sell it to a state or federal agency or a conservation buyer.

Land Exchanges – Land preservation organizations or programs can assist with land exchanges between public agencies and private landowners by negotiating the acquisition and then finding a buyer for the land.

Fee Title Acquisition – Can occur through a donation, bargain sale, or purchase at pure market value and gives land preservation organizations and programs direct control of the land. Fee titles work well with a natural area preserve in order to appropriately manage the land, but should not be used for working agricultural lands where the private owner should continue to manage the land. In the latter case, an agriculture easement would be best to preserve the land.

Purchase of Property in Installments (Installment Purchase Agreement) – Land preservation organization or program can pay the sales price in two or more installments.

Bequest Donation in Will – Donation of property or conservation/agricultural easement can be made through a will and turned over to the land preservation organization or program upon death.

Life Estate Donation/Sale – Seller retains the right to continue to use and live on the property until death and may run simultaneously or consecutively. For example, a husband and wife may simultaneously share a life interest and/or the life interest may be passed on for consecutive generations. Once both generations are deceased, the land is passed on to the designated nonprofit or government agency.

Conservation/Cluster Subdivisions – Conservation subdivisions are developed to provide open space that can be maintained as farmland, forest, or natural areas through such incentives as density bonuses. Though similar, cluster subdivisions do not usually focus on what areas of the property are most naturally significant and most important to conserve when developing the plan. Both conservation and cluster subdivisions have the potential to provide a buffer between urban development and agricultural and natural areas (Arendt, 1997).

Property Tax Incentives – Include differential tax assessments, deferred taxation with rollback penalties, and restrictive agreements. Property tax policies help decrease the financial burdens of a farming operation but do very little to directly avoid developmental pressures.

Agricultural Zoning – Relatively inexpensive to apply and commonly used as a tool for farmland preservation in 24 states including Kentucky (American Farmland Trust 1998), agricultural zoning can be divided into two major categories. Exclusive zoning restricts the construction of non-farm buildings but does little to protect farmland on the fringe of a growing city as the land can easily be rezoned at any time by the local planning commission. Nonexclusive zoning allows a limited amount of development to occur while preserving a predetermined percentage of either natural areas or farmland. This can be a useful tool for providing large individual lots or small areas of preserved open space, but it cannot act as a boundary preventing growth of cities and suburbs.

Large Lot Zoning – When used to preserve open space, the minimum lot size should be no less than forty acres to effectively protect farmland and natural areas while at the same time deter urban sprawl (Nelson, 1992).

Agricultural District Program (Agriculture Security Area) – Voluntarily created by farmers in order to receive improved property tax incentives and limit the amount of agricultural land being annexed or rezoned for development by adjacent cities (Daniels and Bowers, 1997), these districts are legally recognized geographic entities where agricultural activities and their land bases are encouraged and protected" (USDA, 2005). Much like property tax incentives, the formation of agricultural districts provides some economic incentives.

Right-to-Farm Laws – Provides a more stable investment climate for agricultural infrastructure and allows farmers to continue operating without fear of nuisance lawsuits as surrounding properties develop.

Transfer of Development Rights (TDR) Program – Allows development rights from areas that are earmarked for preservation to be sold to developers who can then transfer those rights to increase densities on pre-approved sites that have been delegated for a city's future growth. This program is not used in Kentucky.

Purchase of Development Rights (PDR) Program – Also known as Purchase of Agricultural Conservation Easements (PACE). This program allows development rights to be purchased from the individual property owners. Though the current owner and future owners still have control over the land, they have made a legal agreement to never develop their land for residential or any other non-agricultural use (Halich, 1999).

Smart Growth and Level of Service (LOS) Programs – Both programs indirectly preserve farmland and natural areas through economic incentives and basic regulations that slow development on the urban fringe.

Urban Growth Boundaries – Low density and decentralized development is prevented on nearby farmland by creating a boundary where a city's public services must stop.

GAP Analysis Program – This research provides key information to help policy makers decide which natural areas are most important and which areas must be preserved first with existing funding. The Kentucky GAP Analysis Project produced its final report and data in July 2003.

Governmental and Non-governmental Programs for Land Conservation

National Governmental Programs

Farm and Ranch Lands Protection Program (FRPP): Partnering with state, tribal or local governments and non-governmental organizations, FRPP provides matching funds used to help purchase agricultural conservation easements on productive farm and ranchlands.

Forest Legacy Program: Administered by the USDA Forest Service and States' division of forestry, the program funds the purchase of conservation easements on working forestland threatened by conversion to non-forested uses. Participation is limited to private forest landowners. The federal government may match up to 75% of the cost of the easement.

Grassland Reserve Program: This voluntary program helps landowners and operators restore and protect grassland, including rangeland, pastureland and scrublands while maintaining the areas as grazing lands.

State Programs

Kentucky State Nature Preserve and Natural Areas Program –Currently owns and/or manages 23,190 acres of state nature preserves and state natural areas containing natural habitats for rare species across the state. Negotiations for acquisition of additional nature preserves are ongoing.

Kentucky PACE Program – Established in 1994, this program not only purchases conservation easements but also encourages land owners to donate easements in order to dedicate their land to agricultural uses. A large number of purchase applications are pending due to lack of funding.

Local/Regional Programs

Lexington PDR Program – The only local PDR program in Kentucky operates in Fayette County through the Lexington-Fayette Urban County Government. Since its first land acquisition in 2002, 142 farms totaling over 16,044 acres are now permanently protected by conservation easements within Fayette County. (See Figure 2) Local PDR programs work within a smaller geographical area and have a denser, more focused area of preserved agricultural land when compared to statewide PACE programs.

Louisville & Jefferson County Environmental Trust – Created by the Louisville Metro Government in 1997, the trust operates in Jefferson County focusing on education, stewardship, and public land management. It holds conservation easements on ten significant privately owned properties and works closely with local government agencies on land conservation planning and management on publicly-owned sites.

Nongovernmental Organizations (National, Regional, Local)

Land Trusts – Not only have land trusts provided one of the most common ways to permanently preserve agricultural and natural lands by accepting donated conservation easements that restrict development rights, they also purchase conservation easements or directly buy properties at an agreed upon discounted rate from landowners and partner with state and local governments to monitor compliance with easements. The 2002 Farm Bill allows nongovernmental organizations such as these trusts to receive the same matching federal funding given to the state and local PDR

programs (United States Department of Agriculture 2005). Many land trusts are forming partnerships with the federal, state, and local governmental land preservation programs. According to the Land Trust Alliance (2005), which is the national organization for all of these trusts, there are currently over 1,500 nonprofit land trusts that have protected 9.3 million acres in America.

National Land Trusts Preserving Land in Kentucky

Name	U.S. Acres Preserved	KY Acres Preserved
The American Farmland Trust	1,000,000 +	1,300 +
The Conservation Fund	5,000,000 +	36,000 +
National Park Trust	n/a	232
The Nature Conservancy	15,000,000 +	35,000 +
Trust for Public Land	2,000,000 +	2,020

Regional and Local Land Trusts Preserving Land in Kentucky

Name	Regions/Counties of Operation	Acres Preserved
The Bluegrass Conservancy	Bourbon, Clark, Fayette, Jessamine, Madison, Scott and Woodford	2,524
Civil War Preservation Trust	U.S.: Civil War Battlegrounds KY: Boyle, Hart, Laurel, Madison and Wayne	US: 20K + KY: 1,180
Future Fund, Inc.	Jefferson County	775
Kentucky Natural Lands Trust	Bell, Harlan, Letcher, and Whitley	3,148
Kentucky Rails-to-Trails	Fayette County	0
River Fields, Inc.	KY: Jefferson, Meade, and Oldham IN: Clark, Floyd, and Harrison	KY: 1,797 IN: 0

Financing Mechanisms

Governmental

Heritage Land Conservation Fund: Provides funding to other governmental programs from a portion of unmined minerals tax, environmental fines, and Kentucky Nature License Plates. It provides funds to preserve natural areas that possess unique features such as habitat for rare and endangered species, migratory birds, areas of important natural function subject to alteration or loss, and natural areas for public use. (Heritage Land Conservancy Fund http://www.dnr.ky.gov/heritageland).

Kentucky Financing Tools

Appropriations
Bonds
State Tobacco Settlement funds
State Match Grant
FRPP

Other Financing Tools used in Governmental Programs around the Nation

Sales Tax
Property Tax
Income Tax
Benefit Assessment District
Utility Tax
Use Tax
Estate Planning
Private Contributions
Transportation Funding
Agricultural Transfer Tax
Real Estate Transfer Tax
Portion of Lottery Proceeds
Credit Card Royalties
Cigarette Tax
Deed/Recording Fees

Non-Governmental (NGOs)

Land Trusts: Donations can include money or equipment and land. Items like equipment and land with little conservation value can be resold and the money can then be put into the land trust budgets.

Charitable Remainder Trusts: A donor can transfer cash and/or appreciated property (stocks, bonds, land, or other marketable property) into a trust. Taxes are not paid on

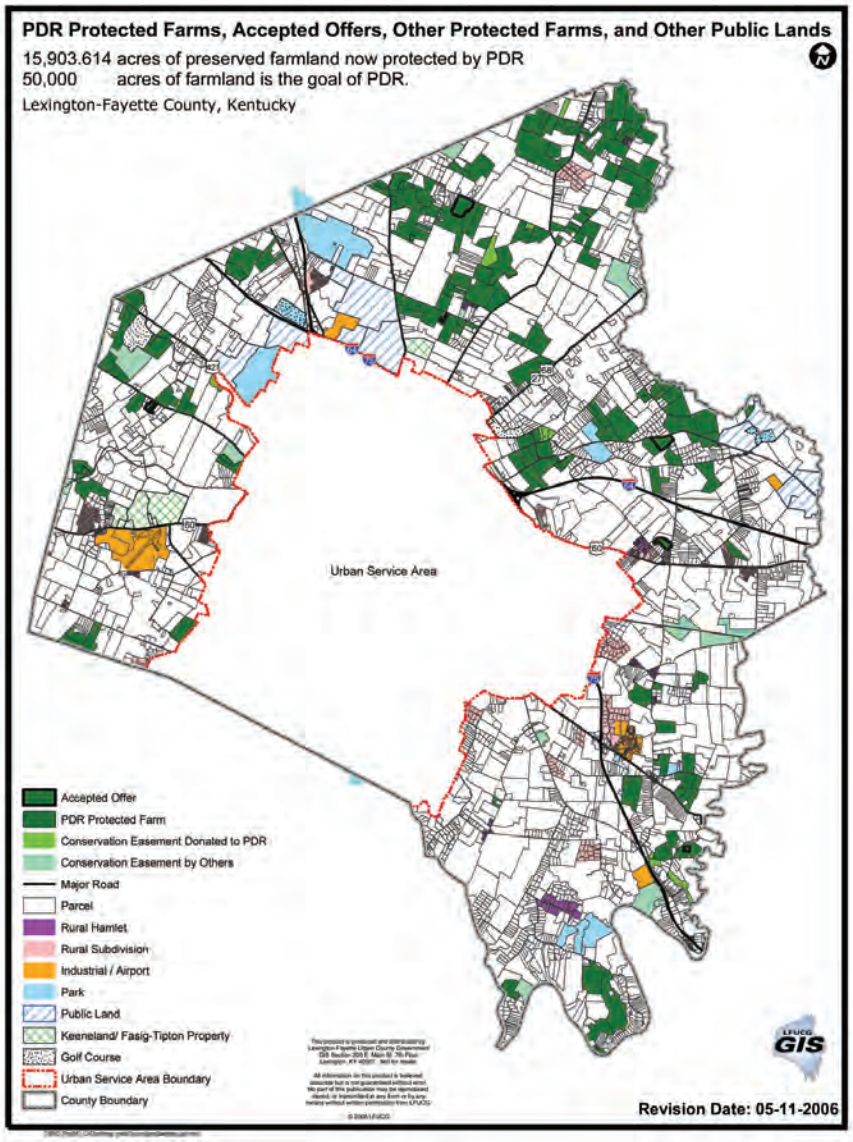

Figure 3: PDR Protected Farms, Accepted Offers, Other Protected Farms, and Other Public

appreciation and the interest in income goes to the land trust(s). Once the income interest ends, either by death or the conclusion of the term, the trust terminates. Then the trustee pays the remaining assets to the charity or charities named in the trust for whatever use the donor originally stipulated.

Charitable Gift Annuities: Gift annuities give the donor an immediate tax deduction and regular income payments for life when donating property, while providing long term financial support to the chosen land trust. A charitable gift annuity is partly a charitable gift and partly a purchase of an annuity contract. The land trust enters into a contract agreeing to pay the donor a fixed annuity for life. After death, the land is sold by the land trust. If the land has conservation value, a permanent conservation easement is placed on the land. The income would then be set aside in a reserve account.

CONCLUSION

We value the quality of life we have in Kentucky. To maintain this quality at its present level, and possibly even improve it, conservation of the state's greatest resources, its natural areas and farmland, is necessary. By contrast, if actions to conserve these resources are not taken, sprawl is inevitable. "Devoting vast acres to new urban sprawl should be an event worth mourning, even if some good has come from it, for the loss is great. It should be a source of embarrassment, a reason for finger-pointing and name-calling" (Freyfogle, 1993, p. 164). Natural areas and farmland are both economic and aesthetic resources to be valued and protected.

In order for conservation of natural areas and farmland to reach its full potential, the proper conservation tools must be combined. Lexington, Kentucky has seen great success when compared to the rest of the state due to its combination of conservation tools. The most important tools used are: Urban Service Boundary (USB), Large lot zoning with a minimum of 40 acres (outside the USB), the Lexington-Fayette Urban County Government Purchase of Development Rights Program (PDR), and the nongovernmental Bluegrass Conservancy land trust. Figure 3 shows the concentrated success that occurs when a combination of tools are used in conjunction with the collaboration between governmental and nongovernmental entities. This combination of tools and organizations is vital if a region is to have a successful natural areas and farmland conservation program.

Lands (Lexington-Fayette Urban County Government 2006)

Land and its resources are a part of our community, and people are part of the land. Regional planning with community involvement, working with agencies such as the Forest Service, fosters collaborative efforts with both public and private agencies. One current approach looks at restoration of lower land forests with use for recreation, sustainable logging, etc., with the idea that this will better protect higher

wilderness areas. However, another view is that we desperately need to reassess what land we are conserving, with the goal of protecting more valuable lower or bottom land as well, which in turn will better serve other species (forming "corridors," the larger, more connected, tracts of natural areas which larger species need). Conservation necessitates constant assessment, dialogue, and reassessment. Leopold's Land Ethic states: "The practice of conservation must spring from a conviction of what is ethically and esthetically right, as well as what is economically expedient. A thing is right only when it tends to preserve the integrity, stability, and beauty of the community and the community includes the soil, waters, fauna, and flora, as well as people" (Flader and Callicott, p. 345). Conservation may not always be economically "expedient" in the short-term view, but in the long-term it provides a more secure economic foundation for the future.

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RESOURCES FOR PROGRAMS

Farm and Ranch Lands Protection Program (FRPP) www.nrcs.usda.gov/programs/frpp/

Forest Legacy Program (FLP) www.fs.fed.us/spf/coop/programs/loa/flp.shtml

Grassland Reserve Program (GLP) www.nrcs.usda.gov/programs/GRP/

Kentucky State Nature Preserves and Natural Areas Program www.naturepreserves.ky.gov/stewardship/preserves.htm

Kentucky Purchase of Agricultural Conservation Easements (PACE) www.kyagr.com/enviro_out/pace/index.htm

Lexington-Fayette Urban County Government Purchase of Development Rights Program (PDR) www.lfucg.com/pdr/

Louisville & Jefferson County Environmental Trust www.louisvilleky.gov/PlanningDesign/Environmental+Trust/Environmental+Trust.htm

GAP Analysis Program. Online at http://gapanalysis.nbii.gov/portal/server.pt?open=512&objID=200&PageID=0&cached=true&mode=2&userID=2).

RESOURCES FOR LAND TRUSTS

Land Trust Alliance www.lta.org

The American Farmland Trust www.farmland.org/

The Conservation Fund www.conservationfund.org/

National Park Trust www.parktrust.org/

Nature Conservancy www.nature.org/

Trust for Public Land www.tpl.org/

The Bluegrass Conservancy www.bluegrassconservancy.org/

Civil War Preservation Trust www.civilwar.org/

Future Fund, Inc. www.ltanet.org/findlandtrust/one.tcl?pc_id=126095

Kentucky Natural Lands Trust www.knlt.org/

Kentucky Rails-to-Trails www.kyrailtrail.org/

River Fields, Inc. www.riverfields.org/

Rocky Mountain Elk Foundation www.rmef.org/

Southeastern Cave Conservancy www.scci.org/

The Boone Conservancy www.theblooneconservancy.org/

The Hillside Trust www.hillsidetrust.org/properties.htm

The Kenton Conservancy www.kentonconservancy.org/