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Horticulture Gone Coastal

The LSU Coastal Roots Program introduces plant-based science service-learning to precollege students

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Index words

Service learning, Stewardship, Pre-college environmental education, Coastal Restoration, Habitat Restoration

LSU Coastal Roots Program

Abstract

The LSU Coastal Roots (CR) Program is a sustained pre-college plant-based stewardship program in which students grow native restoration plants in their school plant nursery that they will later transplant in a habitat restoration trip. The CR Program seeks to increase awareness and knowledge of coastal issues and to provide opportunities for active stewardship of natural resources. In this way, the CR Program enables schools interested in a service-learning approach to learning science to participate within a structured horticultural program.

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School-based gardens are not a new concept. Many programs, such as the LSU AgCenter's Junior Master Gardener program and National Wildlife Federation's Schoolyard Habitat, have helped students learn about many facets of plant biology and horticulture in elementary and secondary schools for many years. The advent of service-learning as a teaching methodology has brought school based gardens into the 21st century. Service-learning is defined as having students learn about specific content while performing a service needed by the larger community. Service-learning "combines service objectives with learning objectives with the intent that the activity change both the recipient and the provider of the service. This is accomplished by combining service tasks with structured opportunities that link the task to self-reflection, self-discovery, and the acquisition and comprehension of values, skills, and knowledge content" (National Service Learning Clearinghouse, n.d.). Thus, service-learning goes beyond the simple act of volunteering in the community. Students involved in service-learning are asked to reflect on their learning experiences and to understand how the experience enriched their personal values, skills and content knowledge.

The *LSU Coastal Roots (CR) Program* is a sustained pre-college plant-based stewardship program in which students grow native restoration plants in their school plant nursery that they will later transplant in a habitat restoration trip. The *CR Program* seeks to increase awareness and knowledge of coastal issues and to provide opportunities for active stewardship of natural resources. In this way, the CR Program enables schools interested in a service-learning approach to learning science to participate within a structured horticultural program.

In the late 1990's, agencies within Louisiana were looking for avenues in which they could engage students in learning about critical coastal issues, such as community sustainability and coastal land loss and restoration efforts. In 1999, the Louisiana Sea Grant College Program's educational coordinator (the author) met with LSU wetland and fisheries specialists to discuss how to unite independent efforts to help students grow restoration seedlings into a single project. With the guidance of an LSU College of Agriculture horticulture professor the group began assembling an outreach program that combined the learning of geological and horticultural science with information on critical coastal issues in a hands-on pre-college stewardship and service-learning project involving student-grown and transplanted native plants. The *CR Program* was born with the first schools joining the program in 2000. Today, the *CR Program* currently operates in 18 schools in ten parishes (counties). Participating students are from grades 4-12 and from both public and private schools. School involvement takes many forms, from formal science classes to extracurricular environmental and science clubs to agriscience classes. Nearly 2,000 students in grades 4 through 8 have participated in 57 restoration planting trips and have planted over 10,000 tree seedlings and nearly 8,000 grass plugs at restoration sites since the program began in the year 2000.

Students planting their cypress trees.

Problem description

Louisiana is losing its coastal land at an alarming rate. Between 1978 and 2000, Louisiana lost 658 square miles of land, with an annual loss rate for this period at nearly 30 square miles per year. Future land loss (2000-2050), with consideration for existing restoration projects and diversions, is projected to be 513 square miles, with an annual loss rate of 10.26 square miles per year (Barras, et al, 2003). This land loss has resulted from both human activity and natural processes. Hurricanes such as Katrina and Rita in 2005 have exacerbated the problem. These two storm events resulted in an estimated land loss of 217 square miles (Barras, 2006) and represent nearly half of the pre-2005 projected net land loss for 2000-2050. In addition to the actual loss of land, this coastal land loss has serious state and national economic ramifications. Louisiana's vibrant fishery industries, the tourism industry, as well as the oil and gas and agricultural industries all rely, directly or indirectly, on healthy and sustainable wetlands.

Given the coastal land loss crisis and the importance of these lands to the economic well-being of both Louisiana citizens and the nation, the Coast 2050 Executive Summary (Louisiana Coastal Wetlands Conservation and Restoration Task Force, 1998) gives a clear call to action, "Stewardship requires us to care for and nurture what we have and what we are given. For the coast of Louisiana to survive, we must change the way we do business" (p. 11). The *CR Program* was initiated to provide a sustained hands-on school-based stewardship activity that offers students an opportunity learn about these important issues and have a hand in taking positive actions to preserve and rebuild our coast.

LSU Coastal Roots Program Goal and Objectives

The primary goal of the *CR Program* is to assist students in grades 4-12 in developing an attitude of stewardship toward our natural resources and to provide an active learning situation in which they can explore strategies for sustaining our coastal habitats. Three objectives align with this goal: (a) to conduct an on-going school-based nursery program involving the growing and restorative transplanting of native plants, (b) to develop in students an attitude of stewardship toward natural resources, and (c) to provide teachers and students with instruction on relevant issues such as ecological stewardship, wetlands functions and values, habitat restoration and conservation, as well as basic geology and horticulture skills.

Environmental club students planting cypress seeds.

Program components and activities that address these objectives include school-based plant nurseries, student restoration planting trips, teacher professional development, and supporting program materials. The program components are designed to make the program as hands-on as possible, as meaningfully integrated into school subjects as possible, and as flexible as possible to accommodate a wide range of school courses and needs.

The *CR Program* serves students in public, private or charter schools in grades 4-12 (Table 1). The program is run by classroom teachers either through direct integration in classes or through afterschool clubs or organizations. Multiple schools in are expected to join the program in 2008.

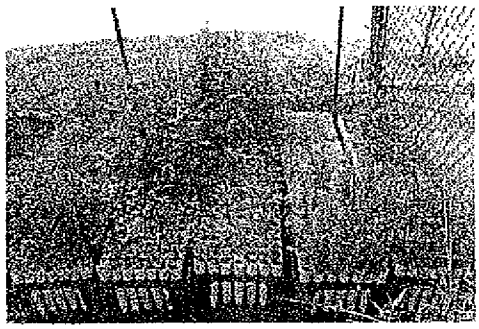
Table 1. Participating Schools by Parish, as of November 2007

Assumption Parish	Pierre Part Elementary (Pierre Part)
East Baton Rouge Parish	Buchanan Elementary, St. Joseph's Academy, St. Louis, King of France (Baton Rouge)
East Feliciana Parish	Jackson High (Jackson)
Jefferson Parish	St. Martin's Episcopal (Metairie)
Lafayette Parish	Lafayette Middle (Lafayette)
Lafourche Parish	South Lafourche High (Galliano)
St. Charles Parish	Albert Cammon Middle (St. Rose), Harry Hurst Middle (Destrehan), Luling Elementary (Luling), R.K. Smith Middle (Luling)
St. James Parish	St. James Parish Science and Math Magnet (Vacherie)
Terrebonne Parish	Montegut Middle (Montegut)
Vermillion Parish	Abbeville High (Abbeville), Erath High (Erath), J.H. Williams Middle (Abbeville)

School-based plant nurseries

When schools join the program, the first task is to have the students help install their plant nursery, which is contained within a 10'x10' area and located on school property (Bush and Blanchard, submitted). Students assist with all aspects of the plant nursery installation. A typical installation requires about five hours to complete and involves digging trenches for irrigation lines, assembling the irrigation system, installing gravel and a groundcover cloth, and assembling a dog kennel to keep stray dogs, balls and children out of the nursery area (Coleman and Bush, 2002; Blanchard, 2008). An automatic battery-operated irrigation timer is fitted into the system to facilitate daily watering, as well as watering over school holidays and summer vacations. The irrigation system is checked once or twice a week by teachers and students during the school year and over the summer to insure that it is working properly and that the plants are receiving sufficient irrigation.

In early spring students plant their seeds in the reusable plant cells filled with planting media. Each plant nursery is outfitted with 980 plant cells that are held in ten trays. Students (and teachers) monitor the germination and growth of their plants through the summer into the fall, fertilizing the seedlings and keeping the nursery yard weed free. In the late fall, depending on the size of their seedling crop, students may retain about 100 trees in their school nursery that will be "bumped up," or transplanted, into one-gallon tree pots and grown in the school nursery for an additional year. This extra year of nursery growth ensures stouter two-year seedlings for transplanting the next year – ones that will better withstand the rigors of growing in the wild. The whole process begins again after the restoration planting trip, with the students cleaning and sterilizing their reusable yellow cells and planting their seeds for their new crop of seedlings with the coming of early spring.



A school nursery growing cypress and loblolly pine seedlings.

Restoration sites and plantings

Each school is partnered with a long-term restoration site. Once a year, generally in the fall or early winter, students transplant the plants they have grown at their long-term partner restoration site. When students arrive at fertilizer and a shovel or dibble, and are sent off to plant their seedlings. In addition, some teachers have students collect data on their newly transplanted seedlings, such as seedling diameter, height, and GPS coordinates. Restoration sites include state parks, hurricane protection levees, conservation areas, wildlife refuges, and private property. Site managers work with the partner school teacher and students understand the need for the particular seedlings that were requested for the site.

The current list of native plants growing in the *CR Program* school nurseries includes black mangrove (*Avicennia nitida*), bitter panicum (*Panicum amarum*), southern waxmyrtle (*Myrica cerifera*), hackberry (*Celtis laevigata*), smooth cord grass (*Spartina alterniflora*), southern

the restoration site they are instructed about how to properly plant their seedlings, including how to use a dibble and fertilize their seedlings. Students are divided into planting teams, given a bag of slow-release

baldcypress (*Taxodium distichum*), live oak (*Quercus virginiana*), long leaf pine (*Pinus palustris*), loblolly pine (*Pinus taeda*), and swamp red maple (*Acer rubrum*). Since Louisiana is in one of the main migratory bird flyways in the United States, many of the chosen seedlings fulfill specific food or habitat needs of some of the migratory bird species. Ultimately, the goal for the restoration partnership is for the teacher and students at the school to communicate with the site manager on a regular basis so that they can jointly determine what species of seedlings would best fill the needs at the site in the coming year.

Middle school students getting ready to plant one-year old cypress seedlings at a restoration site.

Teacher Support

The most successful schools in the *CR Program* have full support of their administrative staff and usually more than one teacher involved in the program. Teachers are enthusiastic about the project, however, they need a great deal of coaching and reassurance to successfully grow their first couple of seedling crops. Part of the coaching involves monthly trips to each school nursery by *CR* staff to ensure that the timer is working properly, the nursery is free of weeds and other problems, and the seedlings are growing as they should be. Regular newsletters and emails also help teachers to be aware of the needs of their nurseries. The vigilance by CR staff pays off in the long run because these monthly visits and friendly communications remind teachers and students that they need to be mindful that they are growing a living plant – one that will die quickly should the water to the nursery be inadvertently shut off during the many hot Louisiana spring, summer and fall days.

In addition to the monthly visits, two professional development workshops are organized for the participating teachers each year. The summer institute is two days in length and is held immediately after school is dismissed for the summer. This workshop focuses on how to help students manage a successful seedling nursery, coastal issues and hands-on activities that can be incorporated into class work. Perhaps most importantly, teachers are asked to talk with one other how they integrate the *CR Program* into their existing courses. A second professional development workshop occurs in mid-January. At this one-day Saturday workshop, participating schools share updates on their nurseries, lessons and nursery management ideas, and pick up planting media and seeds for their spring seed planting.

Ultimately all of the support and interaction with the teachers and schools helps to form a learning community centered on horticultural issues, habitat restoration, and critical coastal issues. Teachers learn from the CR staff, but they also learn from each other. Many of their teaching innovations have been implemented in the program.

Partners of the CR Program

Individuals from three LSU units combine to direct and ensure the success of the *CR Program*: Dr. Pam Blanchard (LSU College of Education), Dr. Ed Bush (LSU College of Agriculture) and Mr. David Bourgeois (LA Sea Grant College Program/LSU AgCenter). Dr. Blanchard provides the pedagogical and geological knowledge for the program and helps connect schools with planting site partners. She is also the grant writer for the program. Dr. Bush provides horticultural expertise and directs the installation of the can yard and can yard production. Mr. Bourgeois provides wetlands and fisheries expertise and provides assistance with many of the planting days. Each school that participates is considered to be an authentic partner in the program, each with their own design for student involvement and classroom integration of the program (Table 1).

The *LSU CR Program* is designed to be an ongoing school-based program. Several schools have been operating continuously since the program began in 2000. Schools participate as long as there is teacher and administrative support for the program. Funding for the LSU administrative and supporting program components is entirely grant based. Dean M. Jayne Fleener, LSU College of Education, has provided staff time in the college's grants office to help identify potential donors to support the program as well as staff time in the college's public affairs office to help schools organize publicity about their planting events.

Other important partners for the *LSU CR Program* are the restoration planting site managers. An as example, the Louisiana State Parks system, has provided four of their parks as long-term restoration partners for seven Coastal Roots schools. These sites provide access to restoration areas and educational programs for students visiting the park on their restoration trip. Another partner agency, the Black Bear Conservation Committee, also provide a similar service and help with identification of restoration planting sites as well as educational information.

The Louisiana Sea Grant College Program is where the *CR Program* began in 2000 and it continues to support the program both by providing a transition grant to reorganize and run the program (2006-8), as well as helping to secure additional funding to continue to sustain

the program. Over the years, many grantors have supported the *CR Program*, including the Barataria-Terrebonne National Estuary Program, the Coalition to Restore Coastal Louisiana through funding from the NOAA Restoration Center's Community-Based Restoration Program, Louisiana Coastal Impact Assistance Program, and Restore America's Estuaries. Currently, the Louisiana Sea Grant College Program is supporting the *CR Program* through a two year grant (2006-8). The directors of the CR Program continue to seek both inkind and financial support for the administering of the program.

Recognition of the *LSU Coastal Roots Program*

CR Program staff and supporting administrative departments at LSU have assisted schools in getting positive news media coverage of student restoration plantings. Many of the participating schools have been featured in the local newspaper and on the evening news. Several schools have had more wide-reaching opportunities to share what they are doing to restore the Louisiana coast:

- Grace King High School students were featured in a National Geographic's TV program entitled *EarthPulse* (2002)
- Montegut Middle School students were featured in the *EstuaryLIVE* video on Elmer's Island (2002)
- Coastal Roots students were invited to visit with Christy Todd Whitman, EPA Director, on her visit to Thibodaux, LA (2003)
- Lafayette Middle School students were featured in *Southern Living Magazine* while on a restoration trip to Fifi Island near Grand Isle, LA. (August, 2007)
- Montegut Middle School students participated in the IMAX production of *HURRICANE!* (2005)
- Montegut Middle School will be filmed by a French documentary team for a program entitled "*Sentinelles de la nature*" (*Guardians of Nature*) which is airing on the French TV Channel *Ushuaia*. (Nov 2007)

The *CR Program* was awarded the 2003 Gulf of Mexico Program's Gulf Guardian Award (2nd Place, Youth/Education category). The Gulf of Mexico Program Partnership developed the Gulf Guardian Awards in 2000 as a way to recognize and honor the businesses, community groups, individuals, and agencies that are taking positive steps to keep the Gulf healthy, beautiful and productive. The Gulf Guardian Awards is a way to recognize the many companies, organizations, and individuals in the Gulf States that are "Gulf Guardians." In addition to the Gulf Guardian Award, the Louisiana Coastal Wetlands Planning, Protection, and Restoration Act Program honored the CR Program at a dedication ceremony for six large restoration projects in October 2007. Five students from Montegut Middle School were present to represent all 18 schools in the program and one student spoke to the gathered dignitaries about what her participation in the Coastal Roots Program meant to her.

Middle school students planting Spartina alterniflora on a hurricane protection levee in Terrebonne Parish.

Positive Impact of the *CR Program*

If the animals and plants could talk I think they would say we are their heroes.... Because that is the way I feel when we do our work in the wetlands.

- Seventh-grade student, Harry Hurst Middle School

We planted a cypress tree at my house.

- Seventh-grade student, Our Lady of Mercy School

Success at the program level for the *LSU Coastal Roots Program* is defined as students and teachers increasing their knowledge and awareness of coastal issues by actively participating in a coastal stewardship plant restoration program. Three outcomes are defined for the CR Program: (a) teachers help students to actively manage a school-based nursery program; (b) students participate in a restoration planting trip once a year, and, (c) teachers use the program to teach about important coastal issues. Because our students begin with seeds, plant them and nurture them, and then trek out to a restoration site to plant those trees, students can see for themselves how what they are doing is important.

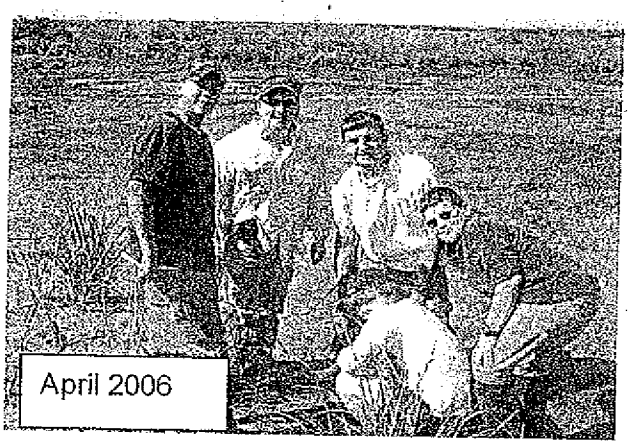
Students in the *CR Program* have been working hard to rebuild or preserve the landscape of south Louisiana. From 2001-2007, *CR Program* schools have involved more than 1,930 students in grades 4-12 in 57 planting events at 25 locations across the Gulf Coast of Louisiana (Table 2). The students, representing 21 schools in 11 parishes, have transplanted 10,283 shrub and tree seedlings, and over 7,660 grass plugs since the program's inception.

Table 2. Summary of *CR Program* school participation and restoration plantings

	2001	2002	2003	2004	2005	2006	2007*	Totals
Total schools in program	8	14	15	14	14	17	18	n/a
# schools planting	8	13	9	9	8	2	4	n/a
# students planting	227	415	365	409	240	136	141	1933
# plantings	9	13	10	10	8	2	5	57
total plants	1963	1979	2464	1837	2770	580	6350	17943
# shrub seedlings	1963	1979	2464	1757	940	580	600	10283
# grass plugs	0	0	0	80	1830	0	5750	7660
total # plant species	3	3	5	8	4	1	4	n/a

** data through August 2007. Eleven school plantings will take place Oct-Dec, 2007, and are not represented in these numbers.*

In April 2007, students at Montegut Middle made a planting trip to the hurricane protection levee near their home town of Montegut, Louisiana. They planted *Spartina alterniflora,* or smooth cord grass. As you can see from the before and after pictures, they did make a difference.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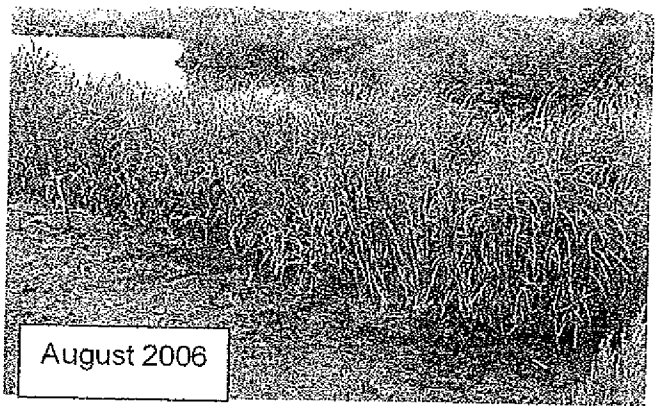
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CR Program as a Model Program

While there are other plant-based stewardship projects in Wisconsin, Florida, Alabama and in the Chesapeake Bay area, the *LSU CR Program* is unique to Louisiana in two ways. First, growing tree seedlings is unique to the *CR Program*, as most other programs work with herbaceous species or semi- or fully submerged plants. Secondly, the large variety of plants that are grown in the *CR Program* is also unique. Most other plant-based programs work with only one or two species of plants across their entire program. For instance, the Tampa BayWatch Salt Marsh Grass Nursery Program only grows *Spartina alterniflora* in all of their participating schools. This is partly because the need in the Tampa Bay area is for this particular grass, and it is easy to grow and maintain, which is crucial for this non-profit organization. The *CR Program* grows plants that are specifically needed by the long term planting partners for each school. So one school might grow loblolly pine and southern bald cypress seedlings, while another might grow black mangrove and southern waxmyrtle seedlings. Currently, the plant list in our 2007-8 nurseries includes black mangrove (*Avicennia nitida*), bitter panicum (*Panicum amarum*), southern waxmyrtle (*Myrica cerifera*), hackberry (*Celtis laevigata*), smooth cord grass (*Spartina alterniflora*), southern baldcypress (*Taxodium distichum*), live oak (*Quercus virginiana*), long leaf pine (*Pinus palustris*), loblolly pine (*Pinus taeda*), and swamp red maple (*Acer rubrum*).

The *LSU Coastal Roots Program* is being adapted to the needs of the Galveston Bay watershed by the Wetland Restoration Team of the Texas Cooperative Extension Service in Houston, Texas. We are assisting this program with information for their grants, writing letters of support and will help with setting up their school nurseries when the funding is in place. Two cooperative extension agents from the Houston office attended our summer CR Institute last June to learn more about the program and how it works. They had the opportunity to speak with more than a dozen teachers participating in the program and went home to Texas excited about getting the program running in TX. This expansion is truly exciting for our program.

The LSU Coastal Roots Program is also being implemented at informal learning sites such as museums. For instance, we will be working with the SciPort Discovery Museum in Shreveport, Louisiana, to start their nursery in 2008. While this location is not near the Louisiana coast, we recognize that habitat restoration is needed in other areas of Louisiana as well. This museum will be working with

school groups and summer camp students to grow southern bald cypress for planting out at Lake Bistineau State Park, their long term planting partner. We are also talking with a community association from the New Orleans area to help grow plants to restore one of the bayous decimated by Hurricane Katrina.

Summary

The LSU Coastal Roots Program is a vibrant and growing service-learning horticultural project for pre-college students. The program involves a sustained yearly cycle of seed germination and seedling planting that helps students to understand not only the horticultural and plant sciences involved in raising plants, but provides a meaningful way for students to understand critical coastal and habitat issues that face Louisiana. Teachers are supported in their efforts to implement the program by knowledgeable staff affiliated with the program. In effect, the participating teachers have formed a learning community of their own with regard to knowledge necessary to successfully grow restoration seedlings.

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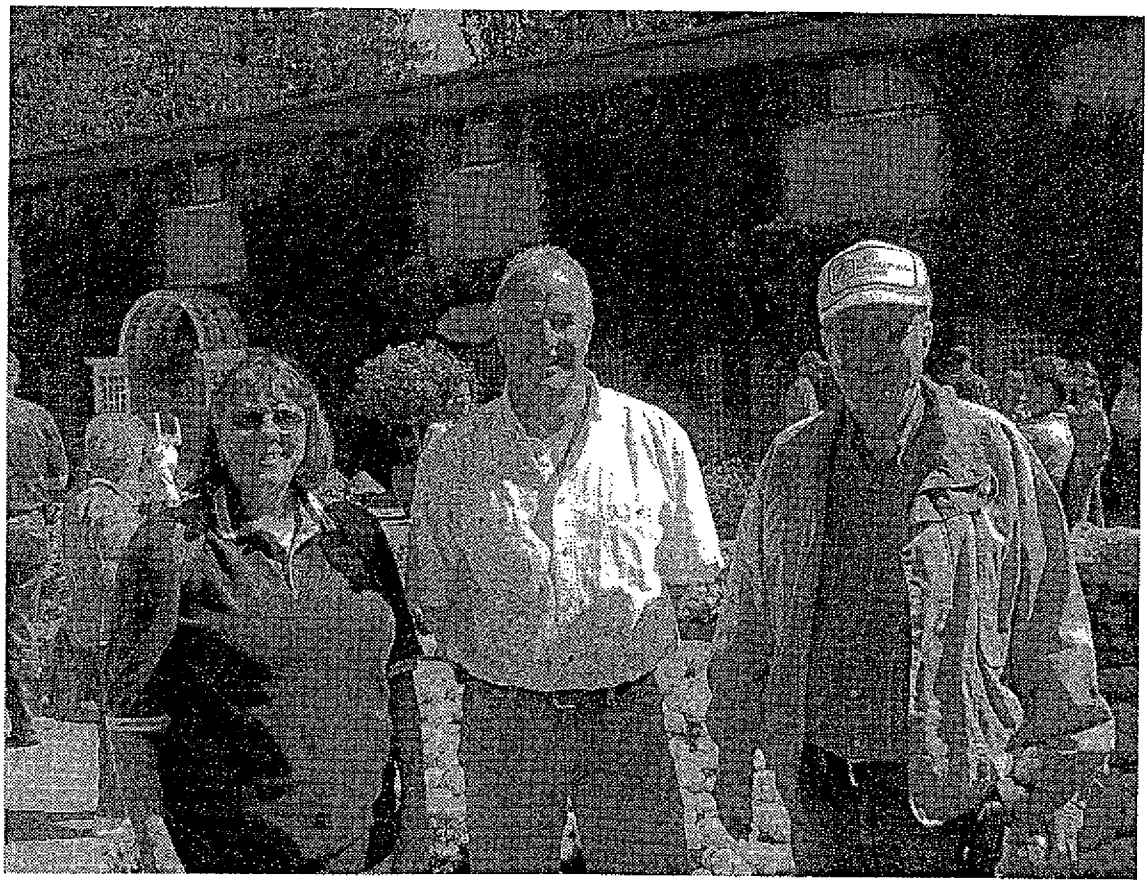

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