



LOUISIANA

Environmental Literacy Plan



NOVEMBER 2014

Sponsored by the Gulf of Mexico Alliance, the Louisiana Environmental Education Commission, and the Louisiana Department of Wildlife and Fisheries



LOUISIANA DEPARTMENT OF EDUCATION

October 23, 2012

Environmental Literacy Plan Committee
Environmental Education Commission
Louisiana Department of Wildlife & Fisheries
P.O. Box 98000
Baton Rouge, LA 70898

Environmental Literacy Plan Committee:

The Louisiana Department of Education supports the development of a quality Environmental Literacy Plan (ELP) that offers a comprehensive approach to improving environmental literacy and environmental education through collaboration among all Louisiana stakeholders.

The ELP serves as a guide to improving environmental literacy for all citizens of Louisiana. Additionally, the ELP demonstrates a commitment to assist all young people in Louisiana in understanding environmental science concepts and our many environmental issues.

The ELP and the collection of environmental resources at the Environmental Education Commission website will provide support for instructors addressing relevant topics to improve student achievement and develop mastery of content standards.

Environmental literacy is vital in developing a citizenry and workforce who are conscious of the environment, show concern for its associated problems, and are willing to work collectively toward the solution of current problems and the prevention of new ones; therefore, your efforts in producing the Louisiana ELP are appreciated.

Sincerely,

John White
State Superintendent of Education

JE:KB:SC:aw

Enclosure

- c. Kunjan Narechania, Chief of Staff
- Ken Bradford, Assistant Superintendent
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Louisiana Believes.



BOBBY JINDAL
GOVERNOR

State of Louisiana
DEPARTMENT OF WILDLIFE AND FISHERIES
OFFICE OF SECRETARY

ROBERT J. BARHAM
SECRETARY

Dear Louisianans,

The Louisiana Department of Wildlife and Fisheries (LDWF), and the Louisiana Environmental Education Commission (LEEC) are leaders in providing opportunities for Louisianans to learn about the wonders of Louisiana's outdoors and the mighty responsibility of stewardship we inherit as citizens.

Those of us whose careers and hobbies bring us out among Louisiana's forests, plains, marshes, rivers and streams know that having a robust environmental literacy plan benefits all Louisianans. We all gain from the process of learning about the problems facing our state and working toward solutions for them.

We have a rich history of environmental education in the Bayou State. As forward-thinking folks like John Muir and Aldo Leopold put forth ideas that would become our modern notion of conservation, the people they influenced, including John D. Rockefeller, Charles Ward and Louisianan Edward McIlhenny used their resources and connections to put the theories of conservation into practice here. Thanks to them, we have LDWF's Rockefeller Refuge, established in 1920 and hosting wildlife students and professionals from around the world at its indoor and outdoor laboratories. In the century since then, many individuals and organizations have contributed ideas, resources, financial support, and physical effort to build a forward-looking agency that values our natural resources and encourages their wise use.

Environmental education takes place in public and private school classrooms, town meetings, through television presentations, online webinars, and good, old-fashioned conversation. Parents teach their children to respect the environment and, just as often, children remind their parents to practice what they preach. All of these factors contribute to each Louisianan's environmental literacy.

This document, the Environmental Literacy Plan, is the work of many people over countless hours. It provides a set of central guidelines for those who implement environmental literacy programs and activities, and for those who want or need to receive them. I hope you find it enlightening and useful.

Sincerely,

A handwritten signature in blue ink, appearing to read "Robert Barham".

Secretary Robert Barham

Louisiana Department of Wildlife and Fisheries

ACKNOWLEDGEMENTS

This plan would not have been created without the hard work of the Environmental Literacy Plan (ELP) Subcommittee members who participated between 2010 and 2014.

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A special thank you goes to the stakeholders who provided valuable input on this guide during the July 2010 Louisiana Environmental Literacy Plan Organizational Meeting held in Baton Rouge.

Thanks to *Heather Szapary*, who helped transcribe participating stakeholders' environmental literacy ideas and vision into a written plan.

Three sub-committee members conduct a site visit to the coast in preparation for hosting an upcoming professional development workshop.



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Students collect elevation data to conduct a beach profile in Grand Isle during a summer geoscience program.



I. EXECUTIVE SUMMARY

Louisiana's rich and dynamic environment encompasses a vast area of land, water, and culture that serve as the lifeblood of this great state. Making wise decisions about using these resources is therefore necessary for us to maintain both a healthy environment and a vibrant economy. The vision of the Louisiana Environmental Literacy Plan (ELP) is to establish a population that understands, feels connected to, and is inspired to protect, preserve, and restore our environment for present use and future sustainability ([insert web link here](#)). This means that "environmentally literate" citizens will have the knowledge, tools, and sensitivity to thoughtfully explore environmental issues, select optimal actions to mediate problems, and routinely include the environment as a crucial element in their work, play, and daily life.

Environmental literacy encompasses the fields of natural resources management and conservation, environmental quality, coastal restoration and protection, and environmental stewardship. It is through the understanding and appreciation of our natural environment that we will become better prepared citizens ready to make wise decisions regarding our natural resources. The plan recommends actions that ensure all Louisianans have the opportunity to learn about and connect with nature in positive ways, developing informed and responsible stewards of our environment.

To foster an environmentally literate populace, citizens should:

- Have opportunities to experience and learn about our natural environment;
- Understand human impact on the environment;
- Develop a sense of stewardship towards the Earth and its finite resources; and
- Choose actions that protect and nurture the natural environment.

Louisiana is now being recognized for its many efforts in the environmental arena. Competing with more than 3,000 buildings across the country, Claiborne Elementary School in Baton Rouge won the Environmental Protection Agency's 2014 National Energy Star competition for reducing its energy needs by 46% in one year (www.energystar.gov/buildings/learn-past-winners).

Many new schools and other institutional structures being built in Louisiana are designed with energy efficiency in mind, not just to address environmental concerns, but also to reduce energy costs. The St. Landry Parish Visitor Center was winner of the 2012 Honor Award and Member's Choice Award by the American Institute of Architects, Louisiana Affiliate (www.cajuntravel.com/tourist-info.php?page=visitor-center). These types of comprehensive approaches serve as an environmental education medium and save taxpayer dollars in the process.

"Water-Wise in Louisiana" is a water conservation program developed by the Department of Natural Resources, Office of Conservation (www.waterwise.dnor.la.gov). Lesson plans are available for classroom teachers to emphasize this resource management issue, asking participants to take personal responsibility for limiting their own "water footprint." Louisiana State University (LSU) EnviroMentors is an award-winning program that offers afterschool mentoring on research projects and offers field trips about Louisiana coastal issues (<http://environmentors.lsu.edu>).



Adults and students work together on a community beautification project in the New Orleans area, thanks to a Keep Louisiana Beautiful sponsored grant.



A Louisiana Department of Agriculture and Forestry forester prepares high school students for planting trees.

Resulting from a broad-based planning process among environmental educators led by the ELP Subcommittee¹, this document presents **five main elements** framing the development of an environmentally literate population in Louisiana:

1. PUBLIC OUTREACH to inform and engage all individuals and groups about environmental literacy and environmental education opportunities;
2. ENVIRONMENTAL CAREER PATHWAYS to develop the knowledgeable and skilled workforce necessary to improve Louisiana's environment and economy;
3. PROFESSIONAL DEVELOPMENT OPPORTUNITIES FOR FORMAL AND INFORMAL EDUCATORS to improve and perfect their environmental content knowledge and expertise to effectively teach others;
4. UNIFIED PRE-K-20 EDUCATION APPROACHES that incorporate environmental literacy within Louisiana's academic standards, graduation requirements, and assessment; and
5. PLAN IMPLEMENTATION to ensure that all Louisiana citizens have access to the resources and information they need to make informed decisions regarding our local environment.

¹ The ELP Subcommittee is made up of LEEC members and staff (see Acknowledgements).

These elements are linked to **recommended actions and steps**, which include the creation of:

- A comprehensive statewide database of environmental education resources and opportunities for public use;
- A statewide campaign to promote environmental literacy and explain why it is important;
- A blueprint for pre-K-college education to increase environmental awareness and outdoor experiences for students, to enhance their abilities to discern and practice responsible stewardship of natural resources, and to identify ways they can personally and collectively reduce their carbon footprint; and
- A framework for informal educators to aid in the distribution of environmental and outdoor programming information that addresses water and air quality, wetland loss, habitat restoration, forest and prairie ecology, climate change, or other meaningful environmental subjects.

Expected outcomes of this plan for Louisiana residents include:

- Environmental literacy embedded and integrated throughout education and daily life;
- Increased outdoor experiences in nature, environmental knowledge, and stewardship activities;
- Awareness of a unified effort to establish environmental literacy guidelines;
- All citizens in Louisiana understanding each other's environmental problems; and
- Statewide collaboration to address environmental issues.

There is no better time than now to present a guide for all Louisiana citizens to become more connected to our natural environment. All stakeholders will be empowered by improved access to information and experiences that lead to responsible practices benefitting our people and environment.



Paddlers prepare for a beautiful day of exploration and recreation on Louisiana's bayous.

II. LOUISIANA ENVIRONMENTAL LITERACY PLANNING PROCESS

In 1993, the Louisiana Legislature had the notable vision to pass the Louisiana Environmental Education Act (RS 30:2501), which created the Louisiana Environmental Education Commission (LEEC) (<http://www.wlf.louisiana.gov/eec>). This legislation included a mandate for the LEEC to “develop, review, approve, and transmit a plan for environmental education to the governor, the legislature and the public.” The LEEC continues to take an active part in helping youth and the public become aware of personal choices to improve the environment. Prompted by mandate and by the state’s growing need for a comprehensive environmental literacy plan, the LEEC members formed the ELP Subcommittee to create the Louisiana Environmental Literacy Plan.

The subcommittee held an ELP Summit in Baton Rouge in July 2010 to gather input and begin the plan development process. Seventy-seven stakeholders representing universities, local, state, and federal agencies, pre-K-20 school and university systems, professional organizations, industries, and nonprofit organizations from around the state came together to share ideas on environmental literacy needs in Louisiana and determine how to translate those needs to a state plan. Three key questions were explored during the Summit:

- What do Louisiana citizens need to be environmentally literate?
- What actions are needed in our plan to improve environmental literacy?
- How can your organization possibly contribute to environmental literacy in Louisiana?

Responses from the diverse stakeholders reflected a wide variety of needs and suggested actions that were used to outline a plan that targets ALL citizens. Summit participants acknowledged that plan development came at a critical time for Louisiana residents as they face complex environmental challenges associated with



coastal land loss, energy use and extraction impacts, and fresh and marine water quality concerns. Presentations were made to the Louisiana House of Representatives' Natural Resources and Environment Committee in 2010 and 2011 emphasizing the need for a plan and informing the members about the current status of plan development. ELP subcommittee members researched other state plans, identified Louisiana's environmental education strengths and weaknesses, and prepared this document for stakeholder revisions and ultimately for consideration by the general public, the Louisiana Department of Education, and Governor Bobby Jindal.

III. LOUISIANA ENVIRONMENTAL LITERACY PLAN ACTIONS

Environmental education stakeholder input and ideas supporting strong, environmentally sound legislation guided the creation of five main plan elements: public outreach, environmental career pathways, professional development opportunities for educators, unified pre-K-20 formal education approaches, and plan implementation. The current conditions and recommended actions are described further.

1. Public Outreach

Current Status and Existing Information



Events like Louisiana Earth Day are an excellent venue to share current environmental information with the public.

Reaching as many members of the public as possible and making them aware of the hundreds of opportunities to experience and learn about nature in Louisiana is paramount to improving statewide environmental literacy. Many governmental agencies, nonprofit organizations, and private companies provide research-based information and programs that aim to educate the public about environmental issues and solutions, but these resources are under-utilized due to a lack of public exposure.

The LEEC presently provides a webpage with environmental education program opportunities that span multiple disciplines, with topics organized to aid the general public, formal and informal educators, and students. Like many organizations, the LEEC provides website posts and sends weekly news to an email-based list of participants, notifying them of upcoming events, workshops, conferences, funding opportunities, and student competitions available throughout

Louisiana and the Gulf Coast region. Other sources of localized environmental education news, each with their own unique stakeholder group, include those coming from the Louisiana Environmental Education Association (LEEA) (<http://louisianaenvironmentaleducation.org>), the Louisiana Wetland Education Coalition, the Coastal Wetlands Planning, Protection and Restoration Act, the Louisiana Science Teachers Association (LSTA) (<http://www.lsta.info>), and the Gulf of Mexico Alliance (<http://www.gulfofmexicoalliance.org>).

In order for the general public to become aware of environmental information and opportunities, there is a need for a statewide environmental literacy hub that connects all citizens. Connecting people to region-based environmental issues, such as linking north Louisiana aquifer replenishment to central Louisiana black bear protection to south Louisiana coastal land loss to the dead zone in the Gulf, would ultimately benefit and engage all Louisiana stakeholders.



Citizens young and old learn about fly fishing at a local festival.

Actions

- i. The LEEC will create an online one-stop resource matrix of environmental literacy opportunities for all. The complete inventory will categorize environmental education assets into home or classroom activities, field experiences, volunteer events or clubs, and professional development pursuits specific to multiple audiences by age and/or grade level. Types of programming include standards and/or curriculum-based guides or programs, field experiences, service learning activities, and professional development opportunities.
- ii. With support from groups offering environmental literacy opportunities, the LEEC will maintain an environmental education and outreach database and update it on a regular basis.
- iii. The LEEC will create and manage an Environmental Literacy automated electronic mail list that will disseminate information to those who register.
- iv. An educational marketing campaign is recommended to highlight the importance of environmental literacy, to show that there is a unified plan for our state, and to introduce the many enjoyable learning opportunities available to everyone throughout Louisiana. Possible specific actions follow.
 - Press releases will be sent to various media outlets across the state regarding the ELP, and interviews on radio and television programs will be scheduled.
 - A social media campaign focused on providing environmental information and offering forums for individuals to share environmental knowledge will be undertaken and will include Facebook, Twitter, LinkedIn, YouTube, and others.
 - Active participation will be sought from the State Library of Louisiana system; the Louisiana Library Association; universities and state agencies; as well as economic,



cultural, and community organizations to help disseminate information to their members.

- Public service announcements will be created and distributed.
 - Print media, including flyers or other items, will be designed and disseminated.
 - Outreach at festivals and similar events will be provided.
 - A quick reference code (QR code) will be created to link marketing materials with the online plan and list.
- v. Formal educators will coordinate with area environmental and natural resource professionals to conduct, collaborate on, or advertise outdoor service learning and field experiences at schools and off campus.

2. Environmental Career Pathways

Current Status and Existing Information

State agencies support many jobs in environmental sustainability, resource management, and regulation, including the Louisiana Departments of Culture, Recreation and Tourism (<http://www.crt.state.la.us>); Environmental Quality (<http://www.deq.louisiana.gov>); Health and Hospitals (<http://www.dhh.state.la.us>); Natural Resources (<http://www.dnr.louisiana.gov>); and Wildlife and Fisheries (<http://www.wlf.louisiana.gov>), among others. Many federal agencies in Louisiana have similar workforce needs, for example, the National Park Service, U.S. Army Corps of Engineers, U.S. Department of Agriculture, U.S. Fish and Wildlife Service, and the U.S. Geological Survey. The 2012 State Coastal Master Plan paves the way for \$50 billion worth of new coastal restoration projects over the next 50 years, which are slated to create many jobs for individuals versed in environmental science, biology, geology, engineering, and geographic information systems (GIS). The private sector, including engineering, environmental planning, oil and gas, and biotechnology firms,



This LDWF biologist takes vital signs on a bear cub as part of an ongoing study of this threatened species.



High school students assess wetland health using a spectroradiometer, which measures reflectance of light from vegetation.

requires staff with applied science education and experience. There are indications that these skills will continue to be in demand into the foreseeable future.

To meet the immediate and future needs of Louisiana, the state must have an environmentally oriented workforce with strong science, technology, engineering, and math skills. Environmental career pathway information will help youth link their interests and talents to the green jobs initiatives across the state. Currently, the Louisiana Workforce Commission has a Growing Green program that provides information about available green jobs, Louisiana's green economy, analysis of the sector, career videos, training providers, coastal restoration associations, and other news and information (<http://www.laworks.net/green>). Training providers, including four-year colleges, community colleges, technical colleges, and approved apprenticeships, offer a variety of environmental career pathways. Linking grade-level students to continued learning opportunities in predicted job markets is critical for both students and for Louisiana's dynamic economy.

Actions

- i. The Louisiana Department of Education (LDOE) Office of Content will use the ELP as a source of information and support for environmental educators (<http://www.louisianabelieves.com>).
- ii. Connections will be made with local and regional universities, community colleges, and technical colleges to share resources, career days, service learning opportunities, and other events to facilitate career choices.



Barataria-Terrebonne National Estuary Program (BTNEP) staff leads an educator training on land loss.

- iii. The LEEC will build a relationship with the Louisiana Workforce Commission's Growing Green program to share the list of environmental education opportunities to support training programs.

- iv. Educators and guidance counselors will assist students with career and academic planning, including involvement in environmental volunteer, intern, and service learning opportunities.

3. Professional Development Opportunities for Formal and Informal Educators

Current Status and Existing Information

Professional development opportunities for formal and informal educators on environmental issues in Louisiana occur primarily through workshops and annual conferences, where participants are introduced to current issues and important content concepts and engage in learning activities that represent exemplary teaching strategies. The Environmental Education Symposium (<http://www.wlf.louisiana.gov/louisiana-environmental->



Teachers get their feet wet in the marsh near Port Fourchon during WETSHOP, a week-long workshop for teachers.



Educators weigh marine debris at a workshop held at the LDWF Rockefeller Wildlife Refuge.



The Environmental Education State Symposium provides professional development for teachers and informal educators.

education-symposium), a joint effort of the LEEA and the LEEC, is the only conference in the state that solely targets environmental education. Environmental workshops are also offered at annual conferences of the LSTA, Louisiana Earth Science Teachers Association (<http://www.nestanet.org/cms/content/welcome>), and the Southern Association of Marine Educators (<http://www.lamer.lsu.edu/same>). (There are also many opportunities for educators to enroll in workshops that focus on state standards.) These workshops are typically held by state, university, or nonprofit organizations that have developed and currently implement specific programs.

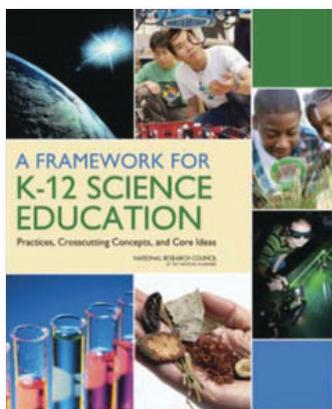
Since its inception, the LEEC has been working to identify areas where environmental education can be strengthened. In December 2010, the Environmental Education and Training Partnership (EETAP) published a study of professional development priorities of formal pre-K-20 environmental educators. Teachers participating in the survey from the southeastern region of the United States, including Louisiana, responded that their top three priorities in environmental education were: (1) renewal opportunities to share models of what works; (2) implementation of environmental education strategies and facilitation for teaching and thinking skills; and (3) networking with others for support. Using these responses and on feedback received from Louisiana educators in professional development settings, the following actions were developed to meet the needs of Louisiana's educators.

Actions

- i. The LEEC and other partners will provide a comprehensive list of in-state professional development and continuing education opportunities that are found in the matrix of environmental literacy opportunities.
- ii. The LEEC will promote more research experiences for teachers. These programs provide rich, hands-on learning experiences for educators that are easily transported to the

classroom. These endeavors open new avenues for learning and thinking like a scientist or mathematician and are financially supported by the National Science Foundation.

- iii. Periodic surveys will be conducted with formal and informal Louisiana educators to determine their current professional development needs.
- iv. Regionally targeted professional development opportunities will be developed by environmental and/or education groups.
- v. To ensure that everyone has access to important environmental information, presentations will be adapted to serve each audience, regardless of education level or age.
- vi. Professional development workshops will be provided on the strategies and management skills needed for planning and implementing outdoor experiences and service learning projects.
- vii. Partners from other professions like planning, architecture, engineering, and landscaping will be identified and encouraged to offer environmental sustainability professional development workshops to engage educators and the public.
- viii. A partnership will be formed among environmental educators/organizations to offer an online forum to facilitate learning that encourages asking questions, exchanging information, and sharing research findings.
- ix. Efforts will be made to better understand how people interact and connect with nature, what leads people to take action, and how to engage diverse audiences and integrate environmental education within education communities and the general public.
- x. The LEEC will identify and recruit a diverse group of partners to accomplish these actions.



4. Unified Pre-K-20 Education Approaches

a) Standards and Content

Current Status and Existing Information

Current and future science education standards contain many environmental concepts. These concepts are woven throughout grades 1-8 and are integrated into essential science courses at the high school level.

In July 2011, the National Research Council released *A Framework for K-12 Science Education Practice, Crosscutting Concepts, and Core Ideas*. This framework served as a guide for the development of the *Next Generation of Science Standards (NGSS)*, which were released in April, 2013. Environmental concepts and issues are integrated throughout all content domains in the framework and are incorporated into the new national science standards.

In August 2011, the Louisiana Board of Regents completed the *Master Plan for Public Postsecondary Education in Louisiana: 2011*, updated each year thereafter (<http://regents.louisiana.gov/planning-research-amp-performance/master-plan-for-public-postsecondary-education-in-louisiana>). Its first goal is to “increase educational attainment” of the adult population, which involves developing a skilled workforce to support an expanding economy. Hence, postsecondary educational entities may also benefit from incorporating environmental science concepts throughout their curriculum for both

academic and economic purposes. For additional information on Louisiana's Science Content Standards, visit: <http://www.louisianabelieves.com/resources/library/academic-standards> and select the grade or course you wish to examine.

Actions

- i. The LDOE has reviewed the Next Generation Science Standards and will develop Louisiana Science Content Standards based on NGSS.
- ii. Instructional materials and outdoor activities produced by informal educators will be aligned to new science standards adopted by the LDOE.
- iii. The LDOE and LSTA will be available to collaborate with the environmental education community in producing high-quality, standards-aligned resources and materials for use in formal education, informal education, and outdoor activities and events in Louisiana.
- iv. Assistance for informal educators in aligning their activities to new content standards will be provided.
- v. Professional development will be provided to ensure proper implementation of environmental activities that are aligned with state standards.

b) Graduation Requirements for Environmental Literacy

Current Status and Existing Information

Louisiana's Core 4 Curriculum includes four science courses required for graduation from high school (<http://www.louisianabelieves.com/academics/graduation-requirements>). Biology I is required, but students choose from science courses available in their school, including Physical, Earth, and Environmental sciences; Chemistry; and Physics. As in Biology I, most science courses have strong cross connections to environmental concepts.

Actions

- i. The LDOE will continually review and update graduation requirements. There are



Water quality testing serves as an excellent cross curricular opportunity.



Students enjoy examining pond samples for macroinvertebrates.



Schoolyard gardens are fun, increase children's interest in healthy food choices, and help make the connection between farm and plate.



Students analyze water quality with the assistance of a scientist at LUMCON.

environmental concepts included throughout new science national standards under review.

ii. Educators will encourage schools with community service requirements to include environmental service learning hours that are tied to curriculum.

c) Assessment of Environmental Literacy

Current Status and Existing Information

Louisiana has a statewide assessment program in place for public school students in grades 3-8. The Biology End of Course (EOC) exam is administered at the conclusion of the Biology I course, which is usually in grade 10.

Actions

- i. The LDOE will continue to assess environmental concepts as part of the grades three through eight statewide assessments and as part of the Biology I EOC assessment at the high school level.
- ii. The LEEC will develop a list of evaluation tools to assess environmental literacy for informal educators to apply to their programs as appropriate. This will assist informal educators in demonstrating the value of their programs to formal educators, the general public, and to potential funders.

5. Plan Implementation

Current Status and Existing Information

Some actions in the plan will only become achievable with sustained funding. There are a number of national and state agencies and private foundations that offer grants for environmental education, grant writing training, and fundraising.

Actions

- i. The LEEC will provide links on its website to federal, state, and other organizations that provide funding opportunities specifically related to improving environmental literacy.
- ii. The LEEC will provide sources for grant writing assistance on its website.
- iii. The LEEC and LEEA will disseminate timely information on funding opportunities through digital newsletters.



IV. WHY LOUISIANA NEEDS AN ENVIRONMENTAL LITERACY PLAN

1. Ecosystem Health

Louisiana's unique lands, waters, and cultures are treasured by its citizens and visitors alike. Protecting and preserving its richness and natural resources for current and future generations is the driving force of the ELP. Louisiana's abundant resources are located along 400 miles of coastline, in underground reservoirs, in the shallows of bayous and backwaters, and within topsoil supporting all manner of agriculture and forestry.² Louisiana's assets of oil and gas reserves found deep below Gulf waters and coastal wetlands supply significant energy needs for the United States. The nation also depends on healthy Louisiana ecosystems for its timber, agricultural products, commercial fisheries, viable port system, and outdoor recreation opportunities.



Louisiana's diverse ecosystems include barrier islands and coastal lowlands, rolling and hilly coastal plains with evergreen and deciduous forests, large river floodplains, and a variety of aquatic habitats.³ Coastal wetlands protect the lives and property of two million inhabitants⁴ and our 14 million acres of forestland provide almost 13,000 jobs and add billions of dollars to the state's economy.⁵ Each eco-region offers unique contributions that provide the resources necessary to sustain our environment and



² Coastal Protection and Restoration Authority (CPRA). 2011.

³ Chapman et al. 2011.

⁴ Coastal Wetlands Planning, Protection, and Restoration Act (lacoast.gov). 1997.

⁵ Louisiana Forestry Association. 2010.

livelihoods.

Louisiana's Ecosystems Support Our Economy

- The 2014 Loren Scott study revealed that Louisiana's oil and gas industry currently has a \$73.8 billion economic impact and provides 300,000 in-state jobs.⁶
- Forestry is the top agricultural industry in Louisiana, resulting in a \$3.1 billion impact including 12,694 jobs.⁷
- Rice is Louisiana's second largest crop grown, is dependent upon almost 400,000 acres of fertile ground, and was worth \$144 million in 2007.⁸
- Today Louisiana sugarcane produces 180 to 40 pounds of sugar from each ton of cane, much more than the tropical growing regions.⁹
- One out of 70 jobs in Louisiana is related to commercial fishing, an essential Louisiana economic asset.¹⁰
- Recreational saltwater fishing supports 18,000 jobs and has a sales impact of \$2 billion in Louisiana.¹¹
- Louisiana Offshore Oil Port (LOOP) is the only offshore oil port in the nation, receiving, storing, and distributing oil imports and domestic oil from the Gulf of Mexico.¹²
- In a 2011 NOAA report, the U.S. Army Corps of Engineers stated that the port of South Louisiana has been ranked first in the United States for total tonnage for more than a dozen years and is the largest tonnage port in the Western Hemisphere.¹³

6 Louisiana Mid-Continent Oil & Gas Association. 2014 .

7 Louisiana Forestry Association. 2010.

8 United States Rice Federation. 2012.

9 LSU AgCenter. 2012.

10 The Nature Conservancy. 2011.

11 National Marine Fisheries Service. 2013.

12 Louisiana Offshore Oil Port. 2012.

13 Ports of South Louisiana. 2014.



Ports in Louisiana account for the largest tonnage of material transported in the entire Western hemisphere. (<http://www.portsl.com>)

Total value of Louisiana cotton production during 2012 was \$278 million with 228 million pounds or 476,000 bales produced. (LSU AgCenter's Ag Summary 2012 <http://www.lsuagcenter.com/agsummary>)



Louisiana Ecosystems Protect Human and Natural Habitats

- Louisiana has over three million acres of swamps and marshes. These wetlands filter contaminants from overlying waters, anchor sediments in place, and slow and absorb flood waters.
- Wetlands provide refuge for juvenile fish, shrimp, and crabs; protect economically critical infrastructure; and maintain elevation against sea level rise if critical marsh processes are not disrupted.
- Louisiana is home to over 30 species listed as endangered or threatened, including the Louisiana black bear, pallid sturgeon, Kemp's Ridley sea turtle, and whooping crane.¹⁴
- More than five million migratory birds depend on Louisiana's wetlands for stopover habitat.¹⁵
- Based on data from past hurricane events, a one-mile strip of coastal wetlands can reduce the average annual increase in property damage due to hurricanes by almost \$6 million or by \$6,000 to \$8,000 per acre.¹⁶
- Long-leaf pine forests and savannahs serve as homes to endangered species like the red-cockaded woodpecker, pine snake, and gopher tortoise, and have the highest diversity of rare plants in the state.¹⁷

14 United States Fish and Wildlife Service. 2012.

15 Coastal Protection and Restoration Authority. 2012.

16 Caffey, et. al. 2012.

17 Stouffer. 2006.



Thanks to an intense state/federal reintroduction program, whooping cranes are now making a comeback in Louisiana after a more than 60 year absence.

Louisiana Ecosystems Face Problems

- While the Mississippi and Atchafalaya rivers provide substantial economic benefits for the state, they also drain 41% of the continental United States, bringing with them pollutants from urban and farm runoff and atmospheric deposition.
- Evidence of overuse of fertilizers, fungicides, and pesticides is found in the Gulf of Mexico's hypoxic or "dead zone" into which the nutrient-rich drainage waters of the Mississippi and Atchafalaya rivers flow. Too much decomposing organic matter in the water creates low oxygen levels that cannot support aquatic animals.
- Coastal wetlands in Louisiana make up the seventh largest delta on earth, containing about 37% of the estuarine marshes in the conterminous United States, yet this landscape experiences makes up 90% of the coastal wetland loss in the lower 48 states.¹⁸
- Based on 60 years of records, the Louisiana Gulf Coast relative sea level is rising approximately three feet every 100 years, which is likely due to subsidence and the effects of climate change, which is related to global sea level rise. This loss diminishes cities like New Orleans' first line of defense against storm surge, and allows for more flooding of main access routes for residents, oil and gas industries, and major ports like Fourchon.¹⁹

2. Children's Health

To ensure that Louisiana's children grow up happy, healthy, and job-ready, they need a well-rounded, challenging education that introduces them to a wealth of ideas and information. Providing opportunities for children to spend time learning and playing outdoors in natural settings can educate, challenge, engage and connect them to nature while providing them with the opportunity for the exercise that their growing bodies need.

The 2012 Louisiana Report Card on Physical Activity and Health for Children and Youth, published by Pennington Biomedical Research Center, reports that Louisiana's children fail to perform the daily levels of physical activity necessary to improve health, fitness and quality of life. The same document points to a lack of outdoor activities as a contributing factor.²⁰

According to Louisiana's healthcare professionals, there have been sizable increases in the number of overweight children over the course of the last 20 years. Dr. Stewart T. Gordon, chief of pediatrics at LSU Health Sciences Center believes this epidemic could be tied to a more sedentary lifestyle and that children need to spend more time exercising. In 2013, Pennington Biomedical Research Center scientists reported that 1 in 3 children in Louisiana are overweight or obese²¹ and Governor Bobby Jindal called this current obesity trend in Louisiana's children one of the gravest issues that we face today and noted that it will result in one of the most expensive healthcare crises Louisiana will face for years to come.²²

¹⁸ Lellis-Dibble et. al. 2008.

¹⁹ National Oceanic and Atmospheric Administration. 2013.

²⁰ Pennington Biomedical Research Center. 2013.

²¹ Pennington Biomedical Research Center. 2013.

²² Addo. 2014.

To promote healthy outdoor activity, some Louisiana municipalities are providing excellent examples of programs that promote healthful outdoor engagement using public facilities. The city of Lake Charles recently proclaimed a “Kids to Parks Day” in order to encourage locals to use public parks.²³ The Louisiana Department of Wildlife and Fisheries recently completed the renovation of Eunice City Lake, which was severely impacted by a fiery train crash in 2000. It now boasts many recreational opportunities, including swimming, boating, fishing and picknicking.

The 2012 Louisiana Report Card also indicated that fewer than 12 percent of Louisiana students eat vegetables at least three times daily as recommended by the US Department of Agriculture. However, students involved in schoolyard gardens consistently exhibit increased interest in eating new foods when they grow fruits or vegetables in their gardens. Sandra Saye-Foucqueteau, a teacher at Upper Pointe Coupee Elementary and 2013 LEEC grant recipient, shared the following in her grant report. “At least 90% of the students had declared they would not eat cabbage. But after planting the cabbage, creating natural “fertilizer” from the worms (vermicomposting project), harvesting their crops and actually making their own Citrus Slaw, every student ate seconds and took home their own cabbage to share with their families.”



Edible garden planted and tended by students at St. Paul's Episcopal School in New Orleans.

Research also suggests that there is a positive correlation between the amount of time children spend outdoors and increased attention spans. Scholarly research over time has shown that engaging students in discovery and environmental-based education promotes higher-order thinking skills and is correlated with higher test scores in math and reading.²⁴ In Louisiana, a study published in 2009 showed that integrating horticulture lessons from Louisiana State University's Coastal Roots Program into middle school science curriculum significantly improved participating students' overall science scores.²⁵ Terrebonne Parish middle school participants in LUMCON's Bayouside Classroom showed similar success in their science scores

In summary, engaging in our natural world has a positive impact on a child's cognitive and physical development and therefore needs to be not only supported, but promoted.

3. Green Jobs

Interest in environmental impacts, quality of life issues, and alternative fuels has spurred job creation over the past decade. For instance, a research study for the Environmental Defense Fund in 2010 by Frost & Sullivan demonstrated that companies continue to hire more employees due to increased demand and federal funding support of green energy infrastructure improvements. Nationally,

²³ City of Lake Charles. 2014.

²⁴ Gerald and Hoody. 1998. Coyle. 2005.

²⁵ Karsh, Bush, Hinson and Blanchard. 2009.

jobs in environmental science are expected to increase 25% by 2016, and green chemistry jobs alone are projected to increase from a \$2.8 billion industry to a \$100 billion industry by 2020.²⁶

According to the Louisiana Workforce Division, green job growth is projected to increase by 14% over the next ten years. In fact, green job employment is growing faster than overall employment, mostly due to increased demands for limited energy resources, consumer preferences, and federal environmental policy changes. These shifts offer will strongly influence changes in workforce development needs and a population that comprehends environmental issues and solutions.



Coastal restoration efforts include the use of many new, innovative techniques.

4. Decision-making Today

While youth are our future, adults are currently the overall decision-makers, leaders, parents, consumers, and industrialists. It is in the state's best interest to educate adults both directly and through their children. Studies from the National Environmental Education and Training Foundation have found that Americans have low levels of knowledge on basic environmental facts, underlying science concepts, causes of certain conditions, and important public environmental issues. Environmental "illiteracy" spans different age groups, as there is no appreciable difference in knowledge levels between people who completed high school before 1970 and those who graduated after 1990, when environmental education became more common.²⁷

To be competitive, the state works collaboratively among agencies and builds on the knowledge and established programs already in existence. The state has spent tax dollars to develop plans, initiatives, and guidelines that preserve and sustain our environment for economic, recreational, and cultural use. Each effort depends upon a population that can comprehend the natural and human-caused processes forming the lands, supporting the waters, and leading to their degradation. Efforts include *The 2012 Coastal Master Plan*; *Louisiana Speaks Regional Plan*; *Louisiana Wildlife Plan*; *Recommended Forestry Best Management Practices for Louisiana*; *Louisiana Department of Environmental Quality's Best Management Practices* (for point source and non-point source pollution); and parish, regional, city, and town comprehensive resiliency plans.

V. ENVIRONMENTAL LITERACY BACKGROUND

There has been a growing widespread interest in environmental comprehension, appreciation and stewardship in Louisiana. However, there is much room for improvement. In 2002 the LEEC commissioned RoperASW, a marketing research and consulting agency, to conduct a survey of

²⁶ Bureau of Labor Statistics. 2012.

²⁷ Coyle. 2005.

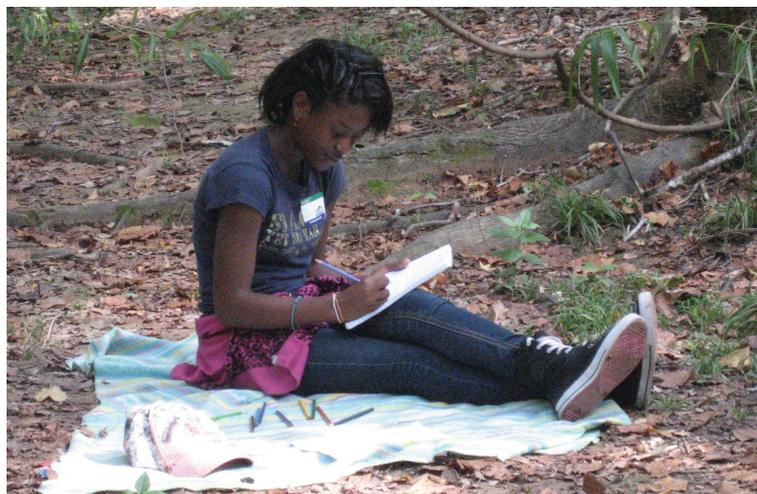
Louisiana residents on the topics of environmental knowledge, attitudes and behavior. The results of this survey indicated that a majority of Louisiana residents (63%) self-reported that they had at least a fair amount of knowledge of environmental issues. Despite their estimates, when presented with a quiz of 10 multiple-choice questions about current and emerging environmental issues, few Louisiana residents (4%) answered 7 or more questions correctly. This reconfirmed the LEEC's commitment to increasing environmental literacy in Louisiana through a broad array of offerings ó professional development workshops, grant opportunities, public outreach events, and social media exposure.

The environmental literacy movement addresses the need for environmental education as a means to a clearer path of integrating learning with multiple disciplines and addressing overlapping issues of growth in education, green jobs, health and the environment. With issues such as coastal land loss, water quality, air quality, global climate change, litter abatement, healthy agriculture and forestry practices, and energy solutions all at the forefront for Louisiana citizens, environmental literacy needs to be strongly supported so that we all make responsible choices in our professional, recreational, and daily lives.

VI. CONCLUSION

It is expected that this plan will result in the following outcomes:

- Environmental literacy becomes embedded and integrated throughout educational and daily life activities for Louisiana residents;
- Children and adults increase outdoor experiences in nature, environmental knowledge, and stewardship activities;
- Stakeholders are aware of widely



An Oil City student journals about her experience in nature.

At home in Louisiana's Caddo Parish, Oil City Elementary Magnet leaders have transformed their school by incorporating the surrounding natural environment into its daily curriculum. A decayed tree trunk, once scheduled for removal, was left in place and now serves as a decomposition station. With the help of parents and area residents, a greenhouse was constructed for the study of plant life cycles. A nature trail, lined with trees and shrubs native to the area, encircles the school's former football field. Annual field trips to Caddo Lake allow fourth-grade students to capture, measure, weigh and release various fish, while sixth-grade students hike nature trails and note observations for writing assignments that describe seasonal changes. Since making these changes there have been marked improvements in student attendance, teacher recruitment, and standardized test scores, which are above average for the state.



accepted environmental literacy guidelines that not only provide opportunities to learn, but also follow national and state education standards; and

- All regions of Louisiana understand each other's environmental problems and share ideas regarding solutions.

As more legislation becomes focused on integrating environmental and sustainable thinking throughout our education and economic institutions, the state of Louisiana will have a prepared population of environmentally literate citizens. **This plan provides a set of central guidelines for those who implement environmental literacy programs and activities and for those who want or need to receive them.** Environmental literacy is truly for everyone in that we all gain from learning about the successes and problems facing our state and working toward solutions. We are all part of Louisiana's story. Let's make it a good one together.





Fisheries: Economic Value as an Incentive to and Restore Estuarine Habitat. U.S. Department of Commerce National Oceanic and Atmospheric Administration National Marine Fisheries Service, November 2008. Web. 2012. <<http://spo.nmfs.noaa.gov/tm/>>.

Gerald A.; and Linda L. Hoody. "Closing the Achievement Gap: Using the Environment as an Integrated Context for Learning." State Education and Environmental Roundtable, 1998. Web. 2012. <<http://www.seer.org/pages/research/execsum.htm>>.

Louisiana Community and Technical College System, et al. Louisiana Career Planning Guide. August 2010. Web. 2014. <<http://www.laworks.net/downloads/LMI/LouisianaCareerPlanningGuide.pdf>>

Louisiana Department of Wildlife and Fisheries. "Contacts". Web. 2012. <<http://www.wlf.louisiana.gov/contacts>>.

Louisiana Forestry Association, 2010, Web. 2012. <<http://www.laforestry.com/site/>>.

Louisiana Offshore Oil Port (LOOP) LLC, Web. 2012. <<http://www.loopllc.com/Home>>.

Louisiana Mid-Continent Oil and Gas Association. Web. 2014. <http://www.lmoga.com/assets/2014_Loren_Scott_Economic_Impact_Study_FINAL.pdf>.

Louisiana Standards and Curriculum, Louisiana Department of Education. Web. 2012. <<http://www.louisianabelieves.com/resources/library/academic-standards>>.

Louisiana Workforce Commission. "The Greening of Louisiana's Economy: Summary Report." Sep. 2011. Web. 2012. <http://lwc.laworks.net/sites/LMI/GreenJobs/Reports/Green_Jobs_Summary_Report.pdf>.

LSU Ag Center. "Sugarcane". Web. 2012. <http://www.lsuagcenter.com/en/crops_livestock/crops/sugarcane/>.

LSU Media Center. "LSU EnvironMentors Receives Coastal Stewardship Award, Adds to Local and National Recognitions". Web. 2014. <<http://www.lsu.edu/ur/lsunews/MediaCenter/News/2014/05/item70087.html>>.

National Ocean Service, NOAA. June, 2011. The Gulf of Mexico at a Glance: A Second Glance. Washington, DC: U.S. Department of Commerce. Web. 2012. <<http://stateofthecoast.noaa.gov> and stateofthecoast.noaa.gov/NOAAs_Gulf_of_Mexico_at_a_Glance_report.pdf>.

The Nature Conservancy. "Restoring Oyster Reefs for People and Nature." 2 March 2011. Web. 2012. <<http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/louisiana/oyster-reef-restoration-in-louisiana.xml>>.

National Marine Fisheries Service. "NOAA Report Finds Commercial and Recreational Fishing Generated \$199 Billion in 2011". Web. 2013. <http://www.nmfs.noaa.gov/mediacenter/2013/03/07_noaa_report_finds_commercial_and_recreational.html>.

National Oceanic and Atmospheric Administration. "Underwater: Land loss in coastal Louisiana since 1932." 5 April 2013. ClimateWatch Magazine. Web. 2013. <<http://www.climatewatch.noaa.gov/image/2013/underwater-land-loss-in-coastal-louisiana-since-1932>>.

Pennington Biomedical Research Center. "Reducing Childhood Obesity in Louisiana". Web. 2013 <http://pbrc.edu/prism/docs/PRISMReport_web.pdf>.

Pennington Biomedical Research Center. "2012 Louisiana Report Card on Physical Activity and Health for Children and Youth". Web. 2012 <http://pbrc.edu/report_card/pdf/2012_LAReportCard_web.pdf>.

Ports of South Louisiana. "Overview". Web. 2014. <<http://portsl.com/overview.htm>>.

St. Landry Parish. "Visitor Center". Web. 2014. <<http://www.cajuntravel.com/tourist-info.php?page=visitor-center/>>.

Stouffer, Philip C. "Longleaf Pine Forests: Wildlife of Louisiana's Threatened Grasslands". LSU Ag Center, 17 July 2006. Web. 2012. <<http://text.lsuagcenter.com/en/communications/publications/agmag/Archive/2006/Spring/Longleaf+Pine+Forests+Wildlife+of+Louisianas+Threatened+Grasslands.htm>>.

Stuart, Don. "Conservation Markets for Agriculture Issue and Discussion Paper". American Farmland Trust, 5 Nov. 2008. Web. 2012. <donstuart.net/wp-content/uploads/2012/01/4-Conservation-Markets-for-Agriculture-An-Issue-and-Discussion-Paper1.pdf>.

United States Department of Education. "Green Ribbon Schools". Web. 2014. <<http://www2.ed.gov/programs/green-ribbon-schools/index.html/>>

United States Environmental Protection Agency. 2014. News Release Region 6. "Baton Rouge Elementary School Wins EPA's National Energy Star Competition". Web. 16 May 2014. <<http://yosemite.epa.gov/opa/admpress.nsf/0/4DE95F5F9A9F31DC85257CBD006A839A>>.

United States Fish and Wildlife Service. "Species Reports: Listing and Occurrences for Louisiana". Web. 2012. <http://www.fws.gov/ecos/ajax/tess_public/pub/stateListingAndOccurrenceIndividual.jsp?state=LA&submit=Go>.

United States Rice Federation. "Louisiana Rice". Web. 2012. <<http://www.usarice.com/doclib/188/219/3677.pdf>>.

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