Portrait of an Estuary

Functions and Values of the Barataria-Terrebonne Estuary System

LSU AgCenter

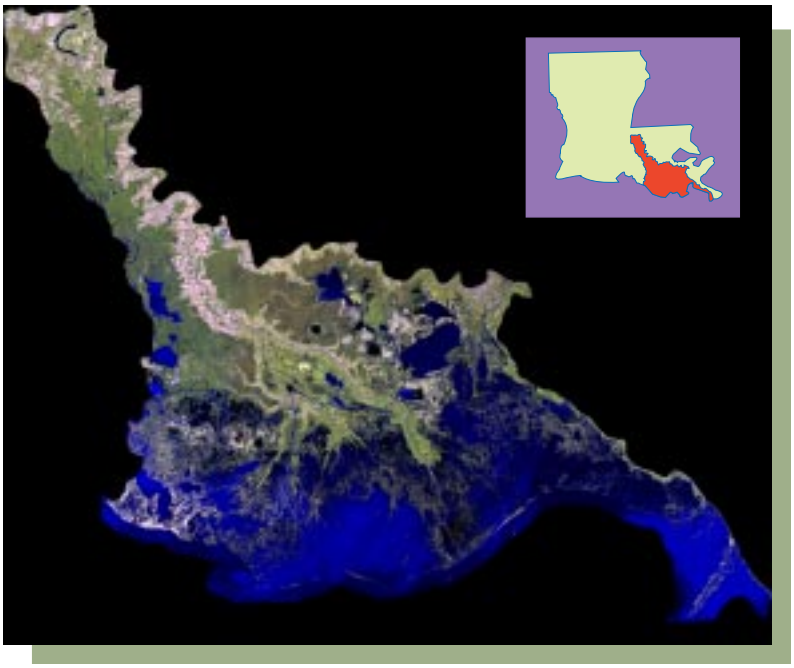
Barataria-Terrebonne National Estuary Program

Early inhabitants of coastal Louisiana consumed great quantities of estuarine clams, leaving behind large shell deposits known as “middens.” Archaeological evidence from these sites reveals much about these early civilizations. A pot shard extracted from a dredged midden in upper Plaquemines Parish depicts a ceremonial hand-and-eye motif common to an estuarine tribe which inhabited the region around 1000 AD. A millennium later the area is home to the Belle Chase Naval Air Station.

Estuaries

Estuaries are coastal regions where salt water from the ocean mixes with fresh water from rivers, rainfall, and upland runoff. This dynamic combination of physical and biological factors produces an ecosystem unrivaled in productivity and a focal point for oceanic and inland commerce. Such characteristics are often cited to describe estuaries as the "cradles of civilization." Indeed, for thousands of years great civilizations have emerged and flourished in estuaries such as those of the Tigris-Euphrates, Nile, and Yangtze river deltas. Today estuaries are the foundation for many modern cities, such as London, Cairo, Calcutta, and Shanghai. However, one of the most expansive and productive estuaries in the world is located in the United States at the interface of the Mississippi River and the Gulf of Mexico. This document inventories the functions and values of this estuary and chronicles the serious plight of landscape deterioration facing its inhabitants. ■

As the world's third largest river, the Mississippi drains about 40% of the contiguous United States, funneling millions of tons of sediments and nutrients annually though lower Louisiana. At the foot of this basin lies the Barataria-Terrebonne Estuarine System (BTES), a wedge of land between the Mississippi and the Atchafalaya rivers comprising 4.2 million acres of levees, forests, swamps, marshes, islands, bays and bayous. The BTES feeds and shelters millions of migratory waterfowl, and it supports a commercial harvest of more than 600 million pounds of fish and shellfish every year. Civilization in this great estuary dates from Native Americans of more than 10,000 years ago to a current population of more than 600,000.



The geologic legacy of the Mississippi River in this region is a vast inventory of coastal and inland wetlands. Forested wetlands in the upper portions of the system total 792,175 acres, providing homes for animals such as deer and squirrel, as well as nesting habitat for bald eagles, herons, ibises, egrets and songbirds. Wetland-prone tree and shrub species in the BTES include ash, hackberry, oak, swamp maple, baldcypress and water tupelo.

Freshwater marshes in BTES total 371,574 acres of prime habitat for an array of plant life such as maiden cane and bull tongue, and animal life such as frogs, turtles, alligators, muskrats, mink, egrets, herons and hawks.

Approximately 473,370 acres of salt to intermediate marsh are home to a variety of plants such as wiregrass, three-corner grass and arrowhead. A sample of regional fauna includes waterfowl, wading birds, fur bearers and economically vital fish, crustaceans and mollusks. ■

Diverse flora and fauna and a unique combination of land and water attributes yield a variety of benefits in the BTES. These resources are described below by their ecosystem function and the values derived from various commercial, recreational and cultural activities in these wetlands.

Ecosystem Functions

It is difficult to place a dollar value on many functional aspects of wetland ecosystems. Hurricane and storm surge protection, erosion and flood control, water quality and treatment, and fish and wildlife habitat are examples of ecosystem functions that are not typically bought and sold in a market. Non-market valuation techniques have been used to develop economic values for these functions. Such techniques assume that the implied value of a wetland function is the cost society would have to pay to replace that service or repair the damage that would result in the absence of the service. ■

Hurricane and Storm Surge Protection

Barrier islands and coastal marshes create a zone of friction that slows the winds and waters of tropical storms and hurricanes arriving from the Gulf of Mexico. This buffering effect protects the lives and property of inhabitants further inland by reducing the storm surge height. Data from the U.S. Army Corps of Engineers on past hurricanes suggest that the loss of a one-mile strip of wetlands along the coast in the BTES results in an estimated $5,752,816 average annual increase in property damage. The estimated value of this protection per wetland acre is between $6,879 and $8,020 annually. ■

Erosion and Flood Control

Wetland vegetation provides a natural substructure that collects and binds the soils of riverbanks, lake shores and beaches. When the vegetation is removed or damaged, soil erosion increases dramatically. As shorelines erode, hurricane and storm surge damage increases and inland marshes are converted to open water. Expanding areas of opened water in the BTES are worsening erosion through increased wind fetch and wave and tidal energy.

Water stored in inland wetlands after a heavy rain is released slowly, reducing flood peaks and property damage. Flood-related risks have increased, however, as wetlands have been destroyed by channel construction and converted to agriculture or residential areas. ■

Water Quality and Waste Assimilation

As wetlands are converted to open water, local aquifers and surface waters that supply drinking water are more vulnerable to contamination by salt water. Wetland losses along the Louisiana coast are so pronounced that some Barataria-Terrebonne towns will require an alternative freshwater source by the year 2013. Costs associated with this new water source are estimated at $84 to $119 annually per acre of wetland lost.

Treatment of wastewater from municipal and industrial sites is another service provided by these wetlands. As water passes through wetlands, nutrients, pathogens and sediment are collected and filtered. Wastewater assimilation services provided by wetlands are worth an estimated $5,389 to $6,337 per acre annually.

Fish and Wildlife Habitat

Many animals of the BTES migrate from one habitat to another during their life cycle; others may reside their entire life in a single habitat. Each habitat plays a critical role in maintaining this bounty of fish, shellfish, birds and other animals. Most fish and shellfish harvested in the coastal areas of Louisiana depend on the estuarine habitats of the BTES. These wetlands support shrimp, oysters, blue crab and more than 60 species of fish.

The wetlands of the BTES also provide excellent habitat for migratory birds and other natural wildlife. Barrier islands such as Grand Isle, Grand Terre, Timbalier, Raccoon and Deniers are the point of first landfall for neo-tropical migrants. Behind these islands, a vast marsh matrix provides the wintering grounds for millions of migratory ducks and geese as well as nesting and nursery for several threatened and endangered species like the brown pelican, bald eagle and piping plover. Further inland, the BTES is home for wetland mammals such as raccoon, deer, squirrel, bobcat and otter. In total, the BTES provides habitat for an estimated 682 species of vertebrates.

Commercial Values

Fishing

Louisiana leads the lower 48 states in fisheries landings and, in any given year, about two-thirds of these landings originate in the BTES. In 1998, BTES harvested seafood with an estimated dockside value of more than $220 million, 72% of the total state value for marine and freshwater fisheries. More than 10,000 jobs a year rely on the commercial fishing industry of the BTES. Species of primary commercial importance include menhaden, shrimp, oysters and crabs.

Fur Bearers

Trapping has been a way of life in the BTES since early settlement by Europeans who commercialized this industry in the 1800s. Production from the BTES constitutes more than 60% of the value of Louisiana's fur industry. Wild alligators comprise a major portion of this income; more than 15,000 were harvested in the BTES in 1998, with a gross market value of about $1.4 million. The nutria is an exotic species that is especially problematic in the BTES because of its voracious appetite for wetland vegetation. Recent initiatives have been implemented to increase trapping incentives by developing new consumer markets for these animals.

Agriculture and Forestry

Sugarcane is the dominant row crop planted in the BTES, with approximately 282,000 acres harvested in 1998 at a farm gate value of $207 million. Annual timber sales for the BTES parishes were more than $18 million in 1996. Hardwoods (oak, gum and cypress) account for 93% of the area's revenue from forest products. Livestock operations accounted for $31 million in gross sales. In addition to other BTES crops, such as feed grains and vegetables, these agricultural commodities had a farm-level value of $615,171,633 in 1998.

Also found in the region is an alternative and comparatively new agricultural form, aquaculture. Aquaculture involves the production of fish, shellfish, and other aquatic organisms in a controlled environment. Crawfish, catfish, alligators and oysters are but a few of the aquaculture commodities that contributed $56 million to the BTES in 1998. ■

Oil and Gas

Oil and gas production is a vital part of the Louisiana economy, providing both jobs and revenues for government services. Annual BTES revenues from the oil and gas industry averaged more than $2.4 billion from 1988 through 1994, or 39% of oil and gas revenues statewide. The economic activity supported by the exploration and production of oil and gas supports the inhabitants of the BTES, providing more than 39,000 jobs and revenues for government services. Subsidence and erosion, however, threaten the infrastructure of coastal pipelines, ports and roads, which support these industries. ■

Shipping and Commerce

Ship and boat building revenues in the BTES averaged $701 million annually in 1994. An estimated 13,000 people are employed in shipbuilding, and 1,000 to 2,500 in boat building within the BTES boundary. Ports along the Mississippi River in south Louisiana constitute the world's largest port tonnage, handling more than 450 million tons yearly. Of the state's six deep draft ports, four are located within the BTES: Port of Baton Rouge, Port of New Orleans, Port of South Louisiana at Reserve and Plaquemines Parish Port. The region is also home to America's only supertanker port, the Louisiana Offshore Oil Port (LOOP). Located in the Gulf of Mexico just south of Fourchon, LOOP handles 800,000 barrels of crude oil each day, 12% of the U. S. supply of daily crude imports. ■

Sport Fishing

Freshwater and saltwater recreational fishing licenses sold in the BTES area totaled 353,749 for the fiscal year 1998-1999, about 41% of the licenses sold for the entire state. Barataria-Terrebonne anglers supply a tremendous amount of revenue in the area, creating jobs by their purchases of equipment, supplies and lodging. The average economic value of recreational fishing in this region is estimated at $324 million annually. ■

Hunting

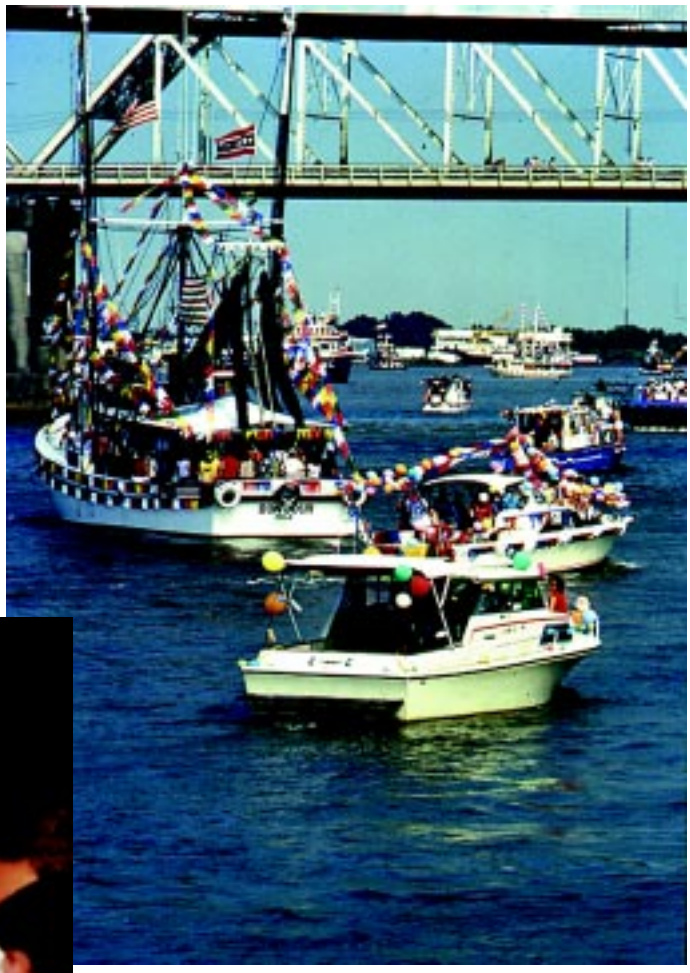
People come from all parts of Louisiana and the United States to experience the bountiful hunting in the region. More than 850,000 leased hunting acres in BTES provided $2.9 million to landowners in 1998. Resident hunters purchased 123,000 licenses between July 1997 and June 1998, but the true economic impact of these hunters comes from their use of ancillary goods and services. Restaurants, gas stations, hotels and sporting goods stores receive $170 million annually in hunting-related expenditures. ■

Eco-tourism is defined as tourism-related visitation associated with ecological resource attractions such as boating, skiing, swimming, hiking, bird watching, camping, nature photography and painting. Bed and breakfast lodging and swamp tours are growing industries that provide visitors with the opportunity to experience the natural and cultural resources of the area. The net economic value of wildlife viewing alone is about $15 million annually. ■

Unique Cultural Heritage

As with any great estuarine civilization, Barataria-Terrebonne has a unique culture distinguishing it from any other area of the world. Early in the 19th century, the infamous pirate Jean Lafitte supplied French settlers in the region with goods captured from Spanish ships. These French settlers were Acadians, exiled from their land in eastern Canada in the 1750s. The original "Cajuns" are their descendants who settled in South Louisiana, primarily in the BTES.

During the past three centuries, civilization in the area has evolved from a melting pot of cultures. Inhabitants represent several nationalities including French-speaking Cajuns, Spanish, French, English, German, Italian, African, Philippine, Croatian, Irish, Vietnamese and Native American. These diverse cultures flourished in the swamps, bayous and marshes and established a reputation for a unique cuisine and lifestyle that depend on wetlands. ■



13,500 acres a year...

Unfortunately, the functions and values of this world-renowned estuary are a rapidly disappearing legacy. Human impacts to the region, combined with natural forces, have produced a wetland loss rate that is globally unparalleled. Loss rates in the region are alarmingly high, estimated at 13,500 acres of wetlands a year in 1990. Although this rate shows some decline, scientists predict that residents of many coastal communities will be forced to relocate within the next 15 years as the land under their homes converts to open water.

An estimated 446,971 acres of wetlands (10% of BTES landmass) were converted to open water between 1932 to 1990. Two-thirds of that loss, 292,198 acres, occurred in the 25-year span between 1958 and 1983. Landmass loss in the BTES occurred three times faster than the rate of loss reported for the entire state of Louisiana in the 1980-90 decade. Statewide, Louisiana's wetlands are being lost at a rate of 21 to 25 square miles per year, with as much as 21 of those square miles being lost from Barataria-Terrebonne. ■

Many factors contribute to landscape deterioration, but perhaps none is more damaging to wetlands than the deprivation of sediment. During the 1920s, a contiguous network of enlarged levees was completed on the Mississippi and Atchafalaya rivers for the purpose of flood control and navigation. While levees protect residents from flooding, they also prevent sediment and nutrient-laden water from being dispersed onto surrounding wetlands.

In the past, spring floods on the river spread out for miles over the adjacent estuary, replenishing the marshes with alluvial deposits from 40% of the continental United States. The lone testament of this legacy is Louisiana's only naturally building delta at the mouth of the Atchafalaya River. Today, these valuable soils are primarily channeled into the Gulf of Mexico. Each year, over 160 million tons of valuable soils are channeled through the Mississippi River and deposited off the continental shelf into the Gulf of Mexico.

Additional factors have also contributed to wetland loss. Before regulatory restrictions, thousands of acres of wetlands in the BTES were converted to commercial development or agricultural production. The remaining wetlands in the BTES are sinking. Net subsidence rates in the region are extremely high, ranging from 2 -3 feet per century in many areas.

As land is converted to open water, the effects of wave erosion are compounded, exacerbating the loss of coastal wetlands and exposing a greater portion of the coastline to the damaging effects of hurricanes and tropical storms. As if this were not enough, climate experts predict that by the year 2050, global sea levels will rise by an additional 8 inches. The potential increase in saltwater levels would have devastating effects on interior marsh vegetation. Such impacts are already manifest in the deterioration of coastal wetlands surrounding canals constructed for oil and gas exploration and production, ship navigation and hunter/trapper access.

In addition to loss of land, the estuary is challenged by severe water quality problems including pathogen contamination from untreated or under-treated sewage, toxins from industry and agriculture, and an excess of nutrients from agriculture, lawns and sewage contamination.

Partners in Progress

In 1990, a novel partnership called the Barataria-Terrebonne National Estuary Program was formed. This partnership consisted of hundreds of stakeholders from all walks of life. Their goal was to conduct a comprehensive study of the environmental problems facing the Barataria-Terrebonne estuary and develop community-supported solutions to these problems into a Comprehensive Conservation and Management Plan (CCMP). This holistic plan seeks to protect and restore ecological resources, promote sustainable economic growth, better coordinate environmental planning efforts, and to involve and educate the estuary's citizens. Much progress has been made, but there is still a long way to go if this bountiful yet imperiled estuary is to be preserved.

Recent Restoration Efforts in the Estuary

- Coast 2050 was formed in 1997 as a federal / state / local partnership to continue multi-stakeholder, consensus-based planning for the state's coastal resources.
- State coastal restoration projects in the BTES scheduled from1995 to 1999 benefited more than 54,250 acres of wetlands.
- CWPPRA (Coastal Wetlands Planning, Protection and Restoration Act) projects from 1995-1998 benefited 5,765 acres.
- Barrier island projects (included in the benefited acres above) used dredge material to build more than 2,266 acres and placed rocks and vegetation in strategic areas.
- Freshwater diversion projects are being implemented that will mimic, on a small scale, the historic over-bank flooding of river water into the estuary to nourish the wetlands and slow their loss.
- Dredge materials, once considered low value spoil, have been used to restore natural hydrology, manage salinity and to create, maintain and restore marshes.
- Marsh restoration projects using recycled Christmas trees have decreased marsh erosion and increased community awareness of wetland loss.
- Natural wetlands are being enhanced by receiving effluent from the City of Thibodaux municipal wastewater treatment plant.
- With assistance from the Natural Resources Conservation Service (NRCS), farmers have implemented a number of Best Management Practices (BMPs) on agricultural lands throughout the estuary.
- The Louisiana Department of Environmental Quality awarded $440,000 for control of nonpoint-source pollution within the Barataria-Terrebonne estuary.
- The U.S. Environmental Protection Agency's Gulf of Mexico Program and the BTNEP have initiated the Barataria-Terrebonne Shellfish Challenge Initiative for implementation of four priority projects to reduce sewage contamination of oyster growing beds in the BTE and enhance wetlands.
- The BTNEP program office has disseminated more than 44,500 informational products over a three-year period.

For additional information on recent improvements in the BTES estuary, readers are encouraged to review the most recent BTNEP Stakeholders Report.

Next Steps

The Barataria-Terrebonne Estuary System is a truly unique example of an estuarine civilization built upon the functions and values of fertile wetlands. Yet, the foundation of this system is in peril. Our wetlands are still disappearing at a much higher rate than we are able to compensate for. Alliances forged between government, business, professional and civic groups need volunteers and better public cooperation. It will take more effort and commitment from all of us to preserve the beauty and diversity of this unique wetland landscape for future generations. For additional information on how to become involved, please contact the Barataria-Terrebonne National Estuary Program office or visit our web site.

In 1995 a non-profit foundation was formed to assist with preserving and restoring the estuary. This program, the Barataria-Terrebonne Estuary Foundation, has its mission "to be a steward of the cultural, economic, and ecological resources of the estuary." The foundation is committed to involving and representing a broad base of people who share the vision that the estuary's resources be sustained for future generations. For more information, contact the Barataria-Terrebonne Estuary Foundation at (504) 447-8092.

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Barataria-Terrebonne NATIONAL ESTUARY PROGRAM