

## **Louisiana, it's your problem!** **Deforestation of the Redwoods and oil dependency**

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### **ABSTRACT**

The cutting of forests has been practiced for as long as humans have utilized the value of burning carbon and the utilitarian value of making mobile vehicles and shelter. In the Pacific Northwest, there has been great controversy since the creation of the round blade and man's ability to fell forests at lightening speed with monstrous capacity. The externalities or indirect consequences of this cutting has only come to the forefront of people's thinking when such things as spotted owls, or salmon habitat come into the media.

What is vaguely understood is the intricate nature of the workings of the ecosystems in which these trees live, and how important they are to keeping the greater global climate picture intact. What is even more unknown or little considered is the "other redwoods." Those trees called bald cypress in the bayous and marshlands of Louisiana. And now their demise is not at the blade of a sawyer, but suffocation by drowning.

What has happened to the trees besides the felling of the giants for lumber is also an indirect killing due to drowning. Those periodic dry lands come no more, because Louisiana is "losing its land" at such a fast pace that it actually appears that the water is rising. That the sea is rising drowning the cypress trees along with it mangroves, marshlands and thousands of wetland inhabitants.

On a global scale, with an increase in warming of planet Earth's surface we see global rising of the oceans. Unnatural losses at such a rapid rate that are seen every day in Louisiana; 8 feet of shoreline lost in 7 months, 4 feet underwater was a baseball field just twenty years ago. An area the size of Connecticut, the whole southern land area of Louisiana - three million acres - is washing out to sea to the Gulf of Mexico.

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known to have been intact as late as the 1880s. In just over a century, almost a third of that land, 1800 square miles has disappeared due to human interference.

\One-third of the 6,000 sq miles of wetlands has disappeared. Sediments have dropped by half since the 1950s due to the construction of dams along the Missouri and upper Mississippi. The dams allow no more than 40% of the river's flow to be diverted to coastal marshes for land building due to ship navigation requirements of the city of New Orleans.

In the 1930s, at almost the exact same time the lower Mississippi River was finally conquered with levees, oil exploitation began throughout the bayous. This infrastructure still produces 18% of annual US oil supplies and 24% of natural gas supplies. These marshes are filled with uncharted pipeline canals, 10,000 miles of them. These canals trigger disastrous erosion and every 14 years they double their width.

Just offshore there are hundreds of oil platforms, while just 30 miles further south there are more than 4,000 platforms and drilling rigs, servicing 10 fold the number of wells. It is a vast hydrocarbon reservoir below the ocean, and now our oil technology is creating the largest artificial mass of offshore property ever conceived. Oil is 20% of the state's GEP and through this fear of loss; no one is saying there is a problem.

Twenty years ago this tree was on a solid bank of land, today it is under 4 feet of water. The marsh is continuing to disappear at a rate of 25 square-miles each year. If there were a foreign intruder stealing 25 square-miles of the country's land every year, would there not be a force of war to stop this? Why is solar not replacing the destructive nature of the oil industry that is helping to waste our nation's Gulf wetlands? This paper will discuss the history and the current condition of this very vital question.

## 1. History

Louisiana contains 25% of America's total coastal wetlands and 40% of the nation's total salt marshlands, formed and created over a period of 7,000 years. Over these 7,000 years the mighty Mississippi River, more than a half-mile wide and 200 feet deep, carried a vast watershed from parts of three Canadian provinces and two-thirds of the continental United States.

The Mississippi is the world's third-longest river carrying sediments for thousands of miles and depositing it all along coastal Louisiana either through annual flooding along its lower stretches or in creating new land at the mouth of the river called deltas. This land flow equals to 160 million tons per year ravaging at a rate of 600,000 cubic feet per second. It took 7,000 years to create 6,000 square miles of wetlands and just over a century to reduce it close to death.



Figure 1. Mississippi River Drainage Basin

Every thousand years or so, the Mississippi sediments blocked and rerouted the river towards the path of least resistance, the shortest route to the Gulf of Mexico. A new delta would be built spreading new land along a wide coastline, the bayou region of Louisiana.

The barrier islands, only twelve remaining today, are the old remnants created by the Mississippi River, left behind long ago when the river delta used to push farther out into the Gulf of Mexico.

Coastal Louisiana by itself, accounts for an astonishing 30% of America's annual seafood harvest, measured by weight. Crabs, just one small part of this massive estuarine waterscape of fresh, brackish, and saltwater habitats spread across endless bays, lagoons, inlets, and marshes shaped by the Mississippi River and more than half of the shrimp caught in Louisiana is in these waters. The shrimp are here entirely because of the land. 95% of the fish and shellfish caught commercially in Louisiana depend upon the wetlands as a nursery and source of food sometime in their life. A billion dollar industry, oysters harvested from these rich beds produce more than 10 million pounds of oyster meat per year, more than any other state in America.

Wetland habitats are the most biologically productive areas on earth. In Louisiana's coastal zone there are no fewer than 353 species of birds residing here. 20% of all the ducks in North America, 4 million of them, over-winter in coastal Louisiana. It is the Mississippi "flyway," that area in the migratory path between North and South America.

Forest dwelling songbirds alone are disappearing at a rate of 1 to 3 percent each year, and over a 10 year period at least nine types of Gulf shorebirds declined to half or less of their former numbers. Most disturbing, the total number of birds detected by radar crossing the Gulf of Mexico each year has decreased by half within the last twenty years. Habitat loss is at top of the list.

## 2. Trouble

It took 7,000 years to create 6,000 square miles of wetlands known to have been intact as late as the 1880s. In just over a century, almost a third of that land, 1800 square miles has disappeared due to human interference.

One-third of the 6,000 sq miles of wetlands has disappeared over the last century solely due to human interference. Sediments have dropped by half since the 1950s due to the construction of dams along the Missouri and upper Mississippi that allow no more than 40% of the river's flow to be diverted to coastal marshes for land-building due to ship navigation requirements to the city of New Orleans.

It was the great flood of 1927 that killed over a thousand people in Arkansas, Mississippi and Louisiana and the beginnings of the Army Corps of Engineers perfecting the construction of massive, unbreachable levees along the entire lower Mississippi, never to let it stray its course again. This frozen river streams past New Orleans and out into the Gulf where its sediments are dumped off the continental shelf thousands of feet below. Through this reactive adaptation, Louisiana adopted the Dutch model: flood control, levees, dredged canals for navigation, forced drainage of swamps, large-scale marshland elimination, and the end result was all the same.....the land began sinking.

In the 1930s, at almost the exact same time the lower Mississippi River was finally conquered with levees, oil exploitation began throughout the bayous. This infrastructure still produces 18% of the annual US oil supplies and 24% of natural gas supplies filling these marshes with 10,000 miles of pipeline canals. These canals trigger disastrous erosion and every 14 years the canals double their width.

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and drilling rigs, servicing ten-fold the number of wells. It is a vast hydrocarbon reservoir below the ocean, and now our oil technology is creating the largest artificial mass of offshore property ever conceived. Oil is 20% of the state's GDP and through this fear of loss; no one is saying there is a problem.

### **2.1 20 years ago...**

This tree was on a solid bank of land; today it is under 4 feet of water. The marsh is continuing to disappear at a rate of 25 square miles each year.

Every 2.7 miles of marsh grass absorbs a foot of a hurricane's storm surge. There are 2 million people that rely on this buffer and New Orleans, already 8' below sea level, is concerned. The Gulf shore was 50 miles away a century ago; today it is about 20 and shrinking fast.

In places like Leeville and Grand Isle, tombs visible many months ago are now underwater as are many cemeteries in the area. Another ecological collapse is the city of Houma, now just 2 feet above sea level, sitting on land that is sinking 4 feet a century. Its main source of drinking water is increasingly contaminated by saltwater intrusion, which force officials to draw water from the bayou that further drains the murky swamp. (Tidwell, 2003).

With the death of marsh grass - as each square foot dies, so does the root system holding together the delicate soil below. Once the roots decompose completely, erosion quickly follows and it is this square foot that joins the others in its conversion to open water. Although this process is natural and has always been occurring, the problem now is that no new sediment is being added to generate new land as it always had been.

### **2.2 Perception**

Many people feel that the problem is just too big for them to solve. People's perceptions are skewed because the estuaries are productive and even more so when the grasses die in the marshes. The decomposing grass provides more food than expected for the shrimp, which multiply, increase the catch, but it is a short fix it that will progress rapidly to a total collapse.

That coastline is dying not because anyone wanted it to die or consciously made it happen, but because of the unintended consequences of human engineering and technology.

### **3. The value is in the land**

The value is in the land that provides crucial wildlife habitat, nature and beauty that also provides one-fifth of America's domestic oil, and a billion dollar seafood

industry. It is also the hurricane protection for over 2 million people.

The Coalition to Restore Coastal Louisiana, along with many conservationists and volunteers are finding quick fixes that are only small parts of the puzzle to correct this huge flaw. Things like Christmas-tree barriers, and sandbag barricades are common as artificial barriers, including the addition of concrete barrier islands to replace the rapid loss of the last remaining 12 natural ones barely above water today.



Figure 2. Natural geomorphic feature called a Chenier formed by sediments

Louisiana's only hope is a proposed 95-mile long "controlled diversion" of the lower Mississippi River - essentially an earth ditch on a colossal scale. It would bring as much as a third of the lower Mississippi's flow, 200,000 cubic feet per second down what is called the Third Delta Conveyance Channel. A hulking waterway for a mere \$2 billion in construction costs. In comparison, it would be the cost of 2-B1 bombers.

What took 7,000 years to create will be destroyed in another 10 or 20 years if action is not taken now. Louisiana needs the Mississippi River to manufacture land, islands, wetlands, and stable shorelines, so that an entire culture and economic way of life can survive.

### **4. Causes of Change**

Louisiana contains one of the largest expanses of coastal wetlands in the contiguous U.S., and accounts for 90 percent of the total coastal marsh loss occurring in the Nation. Since the 1930s, Louisiana has lost over 1.2 million acres of land (Barras et al. 2003; Barras et al. 1994; and Dunbar et al. 1992).

Most studies agree that land loss and the degradation of the coastal ecosystem are the result of both natural and human induced factors, which interact to produce conditions where wetland vegetation can no longer survive and where wetlands are lost. Establishing the relative contribution of natural and human-induced factors is difficult.

The increase in loss during the mid-to-late 20<sup>th</sup> century can

be directly linked to human activities, with the building of dams, levees, channel dredging, upstream reservoirs, human settlement and other economic development. These changes have fundamentally altered the deltaic processes and limited their ability to rebuild.

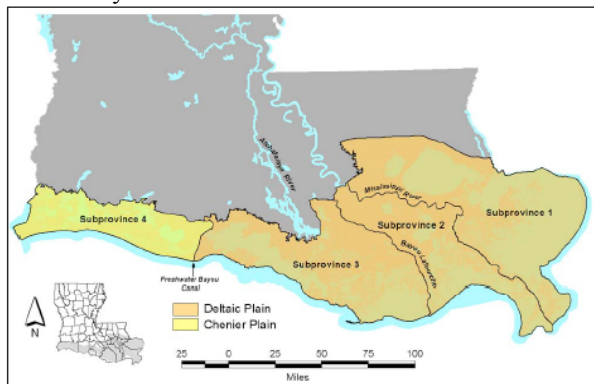


Figure 3. LCA Study area and land loss potential. (Courtesy of LCA November 2004 Report).

In the Chenier Plain (see figure 3), human activities have fundamentally altered the hydrology of the area, which has impacted the long-term sustainability of the coastal ecosystems. (LCA Study 2004) Because of the magnitude and variety of these human-induced changes, and their interaction with natural landscape processes, all of the factors contributing to coastal land loss and ecosystem degradation must be viewed together to fully understand how Louisiana's coastal ecosystem shifted from the historical condition of net land gain to the current condition of accelerated net land loss.

#### 4.1 Natural Causes

In nature one process' end is another's beginning. With the erosion of barrier shorelines, or storm surge disruption of the marshes, there is the creation of new habitat and wildlife diversity.

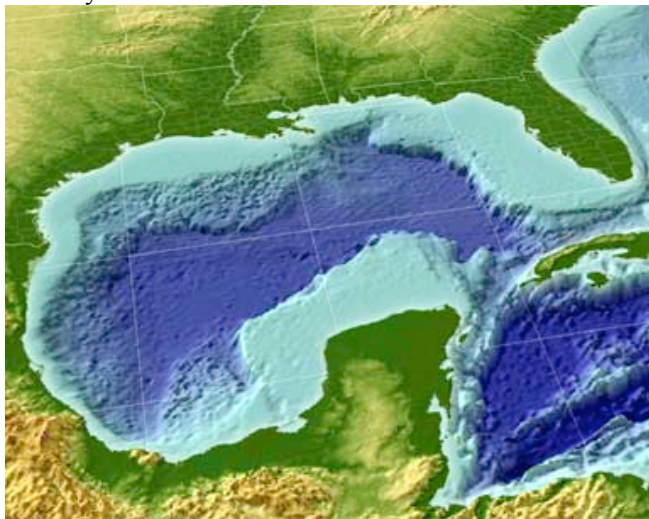


Figure 4. Below surface sediment depths in Gulf of Mexico

**4.1a Barrier island degradation** is a natural process, and is the latter stage of the deltaic process. Their human attribute is storm surge control. Without new sediment, there is no barrier to hurricane surges.

**4.1b Tropical storms** have direct and indirect destruction. Wave surges scour vegetation and bring saltwater intrusion in a matter of days and weeks rather than years. Since 1893, approximately 135 tropical storms and hurricanes have struck or indirectly impacted Louisiana's coastline. On average, since 1871, a tropical storm or hurricane affects Louisiana every 1.2 years (LCA study 2004).

**4.1c Eustatic sea level change**, is the global change in rising oceans. Considering current conditions the future prediction is from 5 to 13 inches of global ocean rise.

**Relative sea level change** is the term applied to the difference between the change in Eustatic sea level and the change in land elevation. Relative sea level change is also referred to as subsidence.

Land elevations decrease due to subsidence from compaction and consolidation of sediments, faulting, and groundwater depletion. Recent studies have shown that subsurface fluid (e.g., oil and gas) withdrawal may also be a contributor to subsidence. For most of coastal Louisiana, sediment accretion is insufficient to offset subsidence, causing a loss in land elevations.

### 5. Human Activities causing damage

**5.1 Levees**, 2,250 miles of them have been created since the Europeans settled in coastal Louisiana. In efforts to control the river and protect from storms, the inadvertent destructive consequence is land loss and reduced stability to wetland habitats.

**5.2** There are 10 **Navigation channels** both deep and shallow within the Louisiana coastal area that both cause saltwater intrusion through the channels and stop freshwater from filtering to wetland habitats. A total of 60% of the river flow is directed to these channels to maintain shipping flows.

**5.3 Oil and gas discovery** in Louisiana during the 1920s have created over 10,000 miles of pipeline channels and canals. Most have never been mapped, many are not known to be functioning, and some actually cause accidents when fisherman unknowingly run aground a submerged phantom pipeline that is not on a map. In addition there are over 50,000 production facilities as well as chemical companies that are within this coastal area that aid to dredging banks, altered hydrology, and water pollution.

**5.4 Hypoxia**, excess nitrogen, is affecting coastal Louisiana as well as the Gulf of Mexico. In 2001 there was noted over 20,000 square kilometers of hypoxic zone. (LCA Study

2004). With a loss of wetlands, there is loss in vegetation to absorb the nutrients, and less ability to transport the nutrients with a reduction of freshwater movement.

## **6. Oil and Fossil Fuel Industry in Louisiana**

Before Europeans arrived in Louisiana, native people have been living there for thousands of years including the ancient people of Poverty Point. Over the years after oil drilling began, also came the water pollution and the dumping of toxic mud and water into the wetlands. The native people were misled with lies and state support. Sickness followed and eventually in modern days human ethic and rights lawsuits have followed. It is very hard to find someone that has not been affected, or part of the oil industry that would be an unbiased jury participant. Big corporations are hard to fight, even to change things that they know are right.

It is the very hush that is keeping the problem with Louisiana wetlands quiet due to the loss of the oilfield economy. Most are willing to turn their heads instead of lose what little money comes their way, and most legislators are like talking to deaf ears, everyone is involved somehow with the oil and chemical industry.

Surface seeps of hydrocarbons in southern Louisiana were known long before the resource became profitable to exploit. Indians in Louisiana used oil from natural seeps for medicines. In 1540, Hernando DeSoto discovered the resource. Early explorers called the oil "stone pitch" and used it to seal their ships.

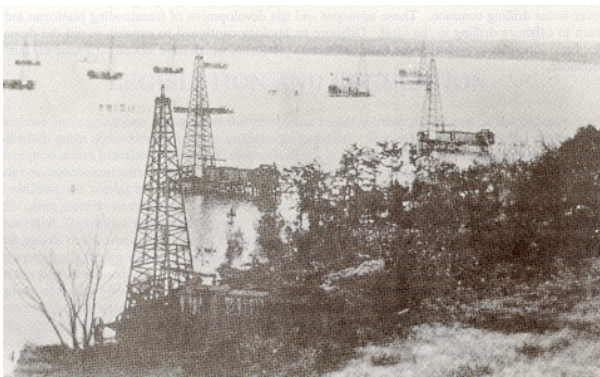


Figure 5. First over-water drilling rig in Caddo Lake near Shreveport, Louisiana. (Circa 1910)

The Oil and Gas Industry in Louisiana employs more than 120,000 people (6% of the state's workforce), which equate to 4.5 billion dollars annually. (Louisiana Oil and Gas Facts). In 1988 "Bullwinkle" the world's tallest man-made offshore structure, was launched May 21, 1988 by Shell Offshore, Inc. Bullwinkle carried a \$500 million price tag and is located approximately 150 miles south of New Orleans. In 1997 a record-breaking lease sale in the Gulf of

Mexico happened exposing nearly \$1 billion in bids by companies seeking to drill in the Gulf of Mexico. In 1999 OPEC agrees to production cuts causing oil prices to increase, and hence into a new era.

## **7. Projections for the Future**

The Louisiana coast is home to many rigs and pipelines, crucial infrastructure for the domestic oil and natural gas industries and for petroleum arriving by ship from foreign sources.

Wetlands act as a natural buffer protecting such industrial systems from hurricanes and other storms.

Though it did not directly hit the infrastructure area, Hurricane Ivan nonetheless caused extensive damage to infrastructure in 2004.

A more direct hit—resulting in lost oil and wrecked infrastructure—could cause major disruptions to U.S. energy sources. If a Category Five hurricane such as Ivan were to land near coastal Louisiana there would not only be major damage to offshore oil facilities, but would include a near total loss of major cities, property and endangering millions of people.

Energy-consuming Americans aren't the only ones with a stake in the future of wetlands. Shrimping and fishing industries would have wetland loss as well as the New Orleans shipping port.

Mark Schexnayder, a marine biologist with the Louisiana State University Agricultural Extension and Research Center's Sea Grant Program hopes to preserve what's left—a far easier task than trying to rebuild wetlands after they've disappeared. "You can't stand on [the land] anymore. It's gone." (National Geographic, 2005).

"There's a lot left that we can preserve and keep from going south," he said. "Being close to the situation for 20 years and watching islands disappear before your eyes, you tend to get frustrated with the pace [of protection efforts]."

Part of Schexnayder's task is public awareness. "It's not always easy to make someone from central Louisiana realize that an investment in the coastal wetlands is an investment for the whole state," he said. "And that needs to be understood on a national level."

While the causes are numerous, there is only one obvious solution—returning sediment to the Mississippi Delta, the Mississippi River is the only way to do that. Over 50 million U.S. dollars spent annually to remedy the problem has thus far failed to keep pace with the problem. For this author, growing up in the Bayou Country of Louisiana my home

has a sense of fear. I am afraid when I go back to places that I remember when I was a kid, they won't be there anymore.

## **8. Solar Solutions**

Optimists like Christopher Flavin and Nicholas Lensson wrote an article in 1994 entitled "Power Surge: A Guide to the Coming Energy Revolution." I wonder if they envisioned in their optimism a war in Iraq?

They envisioned innovations such as lightweight automobiles, the movement from coal to gas, rooftop solar panels and mass produced wind generators.

The Worldwatch Institute study contrasted sharply with projections by the industry-oriented World Energy Council and the International Energy Agency, both of which expect skyrocketing oil imports, bankrupting energy bills in developing countries, and unprecedented disruptions to the global atmosphere. Flavin and Lenssen projected an economical transition to an efficient and sustainable world energy system.

In the Worldwatch scenario, solar, wind, and geothermal energy would grow rapidly in the early twenty-first century, while the use of coal and oil would fall by 73 and 20 percent respectively during the next 25 years.

"Although some large energy companies may fail in the years ahead, new ones are likely to prosper," say Flavin and Lenssen. There was a turn of the century oil boom, perhaps the next energy-transition promises a new generation of entrepreneurs.

Sales of solar cells expanded more than 40 percent in 1997 and solar power is now the world's second fastest growing energy source-at an average growth rate of 16 percent per year since 1990.

"World solar markets are growing at ten times the rate of the oil industry, whose sales have expanded at just 1.4 percent per year since 1990," say the Worldwatch authors, Christopher Flavin and Molly O'Meara.

## **9. Conclusions**

The past and continued loss of Louisiana's coastal wetlands will significantly affect the ecology, society, and economy of the region and the Nation. The continued decline of the natural ecosystem will result in a decrease in various functions and values associated with wetlands, including corresponding diminished biological productivity and increased risk to critical habitat of Federally listed threatened and endangered species. The capacity of the coastal wetlands to buffer storm surges from tropical storm events will diminish, which will increase the risk of significant damage to oil, gas, transportation, water supply and other private and public infrastructure and agriculture

lands and urban areas.

Considering the Erosion of coastal Louisiana water from Peggy Rooney, "Louisiana's Wetlands Calamity," in *EPA Journal*, September/October 1989.

Time that has passed since the city of New Orleans was founded near the mouth of the Mississippi River, where it covers 518 square kilometers of land **275 years**

Time it takes for an area of coastal land the size of New Orleans to disappear from the mouth of the Mississippi at the present rate of erosion **3 years**

The area the size of a football field is lost every 15 minutes. Where in the world can you stand and watch land suffocate and drown in front of you at such a fast and rapid rate that you can actually see it?

The time has come for a new energy revolution. What we demand here in Oregon, or New York or Oklahoma does not stay there, it demands resources from around the world, and your dependency on oil and fossil fuels is killing the largest wetlands in the United States including a vast food resource, the North-South American flyway, and millions of people that call Louisiana home.

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