GIS ANALYSIS OF CONTINUOUS PATTERNS OF LANDLOSS IN THE LOUISIANA WETLANDS, AS A RESULT OF HUMAN ACTIVITY POST KATRINA 2005

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Purpose

• To show the high concentration of oil and gas wells located throughout the Louisiana wetlands.
• To establish a connection between the oil and gas infrastructure-service and distribution-and freshwater deprivation and saltwater intrusion.
(1) To establish a link between oil and gas well production and Louisiana wetlands land loss.
(2) To institute a link between freshwater deprivation and increasing land loss along the Louisiana coast.
(3) This research also seeks to determine what impact human activity has had on coastal erosion.
Methodology

- We obtained a copy of the USGS recently published report, which outlines the amount of land loss that resulted in the Louisiana Wetlands after Hurricanes Katrina and Rita.
- The next step was to initiate the downloading 1998, 2004 and 2005 DOQQ’s from www.atlas.lsu.edu, for the specific areas with the most land loss according to the USGS report, starting with Mermentau parish, the parish with the most wetland loss reported by the USGS.
- Once all the DOQQ’s are downloaded they will be entered into the GIS environmental as map layer, and then the oil and gas well data will be added as a map layer.
100+ YEARS OF WETLANDS’ LAND LOSS

- Past 50 years: Coastal LA has lost and average of 34 square miles of marsh, roughly 1,700 square miles.
- 1932 to 2000: Coastal LA has lost 1,900 square miles of land—roughly the size of Delaware.
- Next 50 years: Coastal LA could lose another 700 square miles of land—area the size of Washington, D.C./Baltimore.
Oil And Gas Wells In South Louisiana
1990-2000
160,000+ oil and gas wells located in the Louisiana wetlands.

Account for 18% U.S. oil production with an annual value of $6.3 billion.

Account for 24% of U.S. natural gas production with an annual value of $10.3 billion.
100+ Years of Land Change for Southeast Coastal Louisiana

SUMMARY

Coastal Louisiana has lost an average of 34 square miles of land, primarily marsh, per year for the last 50 years. From 1932 to 2000, coastal Louisiana has lost 1,900 square miles of land, roughly an area the size of the state of Delaware. If nothing is done to stop this land loss, Louisiana could potentially lose approximately 700 square miles of land, or about equal to the size of the greater Washington D.C.-Baltimore area, in the next 50 years. Further, Louisiana accounted for an estimated 90 percent of the coastal marsh loss in the lower 48 states during the 1990s. The area shown on this map represents over 75 percent of the total land loss for coastal Louisiana.

Backdrop is 2000 TM panchromatic band.
SUMMARY
Coastal Louisiana has lost an average of 34 square miles of land, primarily marsh, per year for the last 50 years. From 1932 to 2000, coastal Louisiana has lost 1,900 square miles of land, roughly an area the size of the state of Delaware. If nothing is done to stop this land loss, Louisiana could potentially lose approximately 700 square miles of land, or about equal to the size of the greater Washington D.C.-Baltimore area, in the next 50 years. Further, Louisiana accounted for an estimated 90 percent of the coastal marsh lost in the lower 48 states during the 1990s.
Map 2.1
GAP Land Use/Land Cover for Louisiana

Marsh Types
- Fresh Marsh
- Intermediate Marsh
- Brackish Marsh
- Saline Marsh

Wetland Types
- Wetland Forest Deciduous
- Wetland Forest Evergreen
- Wetland Forest Mixed
- Wetland S/S Deciduous
- Wetland S/S Evergreen
- Wetland S/S Mixed
- Wetland Barren

Upland Types
- Upland Forest Deciduous
- Upland Forest Evergreen
- Upland Forest Mixed
- Dense Fire Thicket
- Upland S/S Evergreen
- Upland S/S Mixed
- Upland Barren

Other Types
- Agriculture/Chopland/Grassland
- Vegetated Urban
- Non-Vegetated Urban
- Water

Projection Information:
Universal Transverse Mercator
Zone 15
Spheroid Clarke 1866
North American Datum 1927
Channeling: over the past 100 years, numerous channels and canals have been cut through the wetlands for transportation and oil exploration.

Result: Creation of the movement of unnatural water patterns, ultimately increasing erosion and wetland demise.

Result: Freshwater deprivation, vegetation decay, and increasing land loss.
The following maps are images of Mermentau Basin, Breton Sound Basin, Calcasieu/Sabine Basin and Terrebonne Basin before Hurricanes Katrina and Rita.
Mermentau Basin Trends
1956 - 78 Loss = 2.6 Sq Mi/Yr
1978 - 90 Loss = 4.2 Sq Mi/Yr
Breton Sound Basin Trends
1956 - 78 loss rate = 2.6 Sq Mi/Yr
1978 - 90 loss rate = 1.9 Sq Mi/Yr

Legend
- 1956 - 78 Loss
- 1956 - 78 Gain
- 1978 - 90 Loss
- 1978 - 90 Gain

NWRC Open File Report 94-01
Sabine - Calcasieu Basin Trends
1956 - 78 loss rate = 7.2 Sq Mi/Yr
1978 - 90 loss rate = 2.6 Sq Mi/Yr
Terrebonne Basin Trends
1956 - 78 Loss = 9.3 Sq Mi/Yr
1978 - 90 Loss = 10.2 Sq Mi/Yr

Legend
- 1956 - 78 Loss
- 1956 - 78 Gain
- 1978 - 90 Loss
- 1978 - 90 Gain

NWRC Open File Report 94-01
The following are 2004 DOQQ images of Mermentau Basin & Breton Sound Basin, before Hurricanes Katrina and Rita. The basins with the most square mile land loss after Hurricanes Katrina and Rita, according to the USGS report.
Oil and Gas Wells in Breton Sound Basin Sample
The following are 2005 DOQQ images of Cameron Parish, after Hurricanes Katrina and Rita.
PROPOSED SOLUTION

• Develop an aqueduct system along the Intracoastal Canal to channel a steady flow of freshwater across the LA wetlands-annually- to stimulate the natural growth of freshwater vegetation land cover.
Engineers Build Land with Dredged Sediment Marsh Creation as a Coastal Restoration Strategy

• “Water Marks” Louisiana Coastal Wetlands Planning, Protection and Restoration News (December 2007) Issue

• “Erosion and subsidence exact a heavy toll on Louisiana’s coastal zone, claiming nearly 2,000 square miles of land in the past 75 years. But scientists and engineers seeking to rebuild barrier islands and restore marshes have a powerful technique at their disposal: marsh creation.”

• www.Lacoast.gov

• Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) in 1990. It funds wetland enhancement projects nationwide, designating approximately $60 million annually for work in Louisiana.
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